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The Economic Performance of the EU Aquaculture Sector (STECF 14-18)

Scientific, Technical and Economic Committee for Fisheries (STECF)

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THE ECONOMIC PERFORMANCE OF THE EU AQUACULTURE SECTOR (STECF 14-18)

THIS REPORT WAS REVIEWED DURING THE PLENARY MEETING HELD IN BRUSSELS

8-12 SEPTEMBER 2014

Background

Following the latest DCF call for economic data on the EU aquaculture, EWG 14-10 is requested to analyse and comment on the economic performance of the EU and national aquaculture sectors between 2008 and 2012.

Previous editions of this report have been fundamentally descriptive and have focused more on the presentation of data. This year's report should provide a more analytical approach notably on the drivers and aspects of policy relevance in aquaculture. Analysis for variables and indicators not explored in previous reports should be developed (e.g. debts, investments, raw material volume and costs). Additionally, the issue of data quality remains essential for the 2014 report.

In 2014, the Economic Report on EU aquaculture should have a special chapter designed to deepen analysis on this sector.

Request to the STECF

STECF is requested to review the report of the STECF Expert Working Group meeting, evaluate the findings and make any appropriate comments and recommendations.

Introduction

The Expert Working Group 14-10 convened in September 2014 in Ispra (Italy), to produce the 2014 Economic Performance of the European Union Aquaculture sector report. The report reflects the work by 24 external experts and 2 experts of JRC that attended the meeting. Furthermore, 4 external experts were available by correspondence.

This is the fourth report focusing on the performance of the aquaculture sector and providing an overview of the latest available information on the structure, social, economic and competitive performance of the aquaculture sector at national and EU level. The data used in this publication covers the period from 2008 to 2012, and was collected under the Data Collection Framework (DCF). The call for data was issued by DG MARE on the 19th of May 2014. Member States were requested to submit the data within one month after the call, making the submission deadline the 19th of June 2014.

Observations of the STECF

The quality of the data submitted compared to the previous data calls continues to improve. However, there are still issues with several parameters that Member States should improve in the future. Data checks were performed by the JRC before the meeting and communicated to the Member States for possible corrections. Furthermore, experts at the EWG meeting also checked the submitted data. The checks resulted in data resubmissions by some MS after the deadline and even after the EWG meeting.

The data coverage improved for 2012. This is to some extent was driven by the improvements in UK and Cyprus data. This improves the current analysis of the EU aquaculture sector. However, there is still room for improvement especially on the economic indicators.

STECF notes that there were:

a) MSs submitting incomplete data sets with some parameters missing thereby preventing an EU wide assessment of economic performance (e.g. Greece representing 8.8% in weight of the EU aquaculture sector),
b) the Netherlands only provided data for 2008 – 2011. The Dutch aquaculture production represents 3.7% in weight and 2.4% in terms of value of the EU aquaculture production in 2011.
c) the coverage of UK data has improved but is has not been possible to calculate all economic indicators (e.g. net profit) on the segment level for 2011, as the data set was incomplete. Most of variables are missing for the years 2008-2010.
d) For France some variables associated with some minor production segments are missing. These segments represent around 5-7% of overall national turnover. Therefore, it has not been possible for France to provide all indicators that fully encompass the total national production.
e) In addition there are minor data issues in other countries referred to in the report which prevent the analysis time series in several cases

STECF notes that while data covering freshwater aquaculture production is not mandatory, some MS did supply data. A mandatory collection of data on freshwater aquaculture would give a much more comprehensive overview of the economic performance of the sector which is also very relevant to cover the whole fishing and aquaculture production in Europe.

As data delivery for freshwater production is not mandatory and not all countries deliver the data voluntarily, the EWG used other data sources to give a more complete picture in volume and value of aquaculture production within the EU. STECF observes that in 2013, the working group included data from FAO and EUROSTAT. However, from 2014 the EWG have decided only to use EUROSTAT data. The reason behind this choice is firstly that FAO data actually is based on data originating from EUROSTAT and secondly that FAO try to estimate volume and value if data are missing in the EUROSTAT dataset. For the later, the EWG experts have compared actual figures with FAO estimation and concluded that these

estimates are not reliable for countries with minor aquaculture productions, such as the land locked countries in EU. Taking this into account, the EWG decided not to include FAO data. Instead, only EUROSTAT data was used to cover the freshwater aquaculture sector in landlocked countries, which account for 3.2% of weight and 2.3% of value of the total EU28 aquaculture production in 2012. Additionally, countries without marine aquaculture still have some freshwater production. For example, Belgium has a production in the freshwater aquaculture sector of 0.3% of weight and 0.2% of value for the EU. STECF agrees with the approach taken by the EWG
Additionally, for the purpose of this analysis, the EU aquaculture production for EU has been completed by including EUROSTAT data to fill in the gaps of missing turnover and volume of sales in the report.

STECF observes that the 2012 DCF data included in table 2.1 relating to e.g. the number of companies and employment covers 90% (75% in 2011 report) of total value of EU production (following EUROSTAT total production). The necessary economic variables to calculate economic performance of EU aquaculture sector at a national level (see table 2.2 EWG 14-10) is available from the DCF for 78% (70% in 2011) of value of production, while full economic performance on segment level covered 75% (50% in 2011) of EU aquaculture production value.

STECF observes that there are several obstacles to future growth of the aquaculture sector, e.g.:

a) Environmental legislation (esp. Marine Strategy Framework Directive (MSFD) and Water Framework Directive (WFD)) may restrict the issuing of new licenses inter alia limitation on the discharge of nutrients. Where nutrient discharge is not permitted?, expensive recirculation system would be required for additional production capacities
b) Other environmental externalities, such as diseases which spread to natural stocks (like the salmon lice), the use of antibiotics and chemicals, and concerns regarding genetic mixing can be limiting factors.
c) Availability of feed may be a limiting factor in the future even with potential additional supply coming from the CFP landings obligation. Therefore, further research could be necessary in order to reduce the dependency on the currently used feeding inputs used in the aquaculture sector.
d) Competition for space in coastal waters (with other sectors like windfarms and Natura 2000 areas) and inland (with agriculture)
e) Availability of freshwater (rights) for inland aquaculture
f) Most companies are still relatively small as 90% of the employees are employed in companies with less than 10 employees. These companies are often family owned and have no or very limited intention to increase production. Large investments to increase production are not possible for many of these businesses due to lack of capital or lack of market demand.
g) There are only a few large companies which could act as a leader for parts of the sector.
h) The sector is relatively small and not attractive for the development of supporting industries which makes investments more expensive.

STECF observes that there are only a limited number of countries that expect a substantial growth in the sector despite the general desire by MS to expand production.

Conclusions of the STECF

The EWG 14-10 report provides a good overview of the economic performance of the EU aquaculture sector. It also represents an improvement in terms of quality and coverage compared to previous reports. Also, a time series of five years is now available and thus improve the type of analysis that can be undertaken, for instance between various segments and production techniques within and between Member States. Despite the effort of individual experts, useful analysis was still limited by the coverage and quality of the data submitted by MS and in some cases the failure of submitting the required data.

The data submission by MS after the deadlines compromises the ability of the EWG to undertake its work effectively and may also compromise the quality of the report (see also section 7.2 of this plenary report).

STECF also notes that there is improvement in the comparability between DCF and Eurostat production data.

Regarding the future growth of the aquaculture sector, STECF concludes that administrative, legislative and technical issues are restrictive in fostering growth in production. From an economic perspective, the technical barriers will be solved if there is an economic incentive to do so.

Specialisation, using economics of scale and vertical integration, may give possibilities to improve the economic situation and competitiveness of the sector. However, in most cases this may be complicated and hampered by other obstacles identified above, thus preventing a substantial increase in the size of a farm.

STECF concludes that there is increasing competition with aquaculture products from countries outside EU, but the demand for aquaculture products are in general also increasing. Additionally, STECF considers that for future reports, price developments should be reported, as low prices could be an important factor for the future growth of the sector.

STECF acknowledges that the EWG-14-10 adequately addressed all of the Terms of Reference and endorses the findings in the report.

EXPERT WORKING GROUP EWG-14-10 REPORT

REPORT TO THE STECF

EXPERT WORKING GROUP ON THE ECONOMIC PERFORMANCE OF THE EU AQUACULTURE SECTOR (EWG 14-10)

ISPRA, ITALY, 8-12 SEPTEMBER 2014

EXECUTIVE SUMMARY

The 2014 Annual Economic Report (AER) on the Economic Performance of the EU Aquaculture sector provides a comprehensive overview of the latest information available on the sector's structure and economic performance from 2008 to 2012.

Europe represents the largest market for fish in the world. Over the past decades consumption has increased. However, EU landings of wild fish have been stagnant or even decreasing; while EU aquaculture production has been stagnant. This has led to an increase in fish imports and today 65% of the seafood consumed in the EU is imported. The future demand for fish is expected to increase due to increasing population and income and health benefits associated with fish consumption. The growing demand offers a unique opportunity to expand the aquaculture production in the EU.

However, aquaculture production is dominated by Asian countries covering 88% of the production volume. In contrast, the EU28 contribution to world aquaculture production has been decreasing significantly over time in both volume and value terms, representing only 1.9% and 3.5% of global production in 2012.

A precondition to move the European aquaculture sector forward is to establish and increase the knowledge of the existing aquaculture production. In that respect this report is an important contribution describing in detail the main species produced and technique used in the sector. Furthermore, areas for growth are descript in a special chapter, pin pointing the most important issues that have to be addressed to move the sector forward.

The report contains an executive summary including key findings (ToR 1) followed by an introduction chapter containing the Terms of reference, an overview of the data collected under DCF and a section on data coverage and quality. The next chapter includes an EU overview (ToR 2) followed by a detailed analyses of aquaculture sectors (i.e. marine, shellfish and freshwater) and main species produced in each of these segments (ToR 3). This is followed by national chapters (ToR 4) with an elaboration of economic performance, structure and main species produced by each country. Additionally, a special chapter (ToR 5) is provided on areas for growth in the EU aquaculture sector with an elaboration of main drivers, trends and outlook 2013/2014.

The EWG were able to adequately address all subject related to the TOR including writing a special chapter on areas for growth in the EU aquaculture sector.

KEY FINDINGS

Aquaculture production by the 28 European Union Member States reached 1.108 million tonnes and 3.365 billion Euros in 2012 according to Eurostat. Compared to 2011, the production value and weight increased by 3.4% and 3.8%, respectively.

Aquaculture data collected under the DCF showed that the sales volume and value reached 1.388 million tonnes and 4.368 billion Euros, in 2012. This corresponds to an increase of 3% in sales volume and 10 % in sales value.

EU aquaculture production is mainly concentrated in 4 countries: Spain, United Kingdom, France and Greece, making up 71% in volume and 70% in value of EU28 totals.

The 20 countries covered under the DCF reported a number of more than 12 thousand aquaculture enterprises. It is estimated that the total number of enterprises in EU28 is between 14 and 15 thousand. 90% of the enterprises in the aquaculture sector are micro-enterprises, employing less than 10 employees.

The reported number of employees under the DCF reached 69,000 thousand in 2012. The total EU28 employment is estimated to be around 80,000 thousand people. The number of FTE reported decreased by 2%, which might indicate a tendency towards higher specialization and less part-time employment in the sector. However, the use of part time labour still significantly contributes to the workforce in the European aquaculture sector. Female employment made up 24% of EU aquaculture employment and 17% of total FTE. The average yearly wage was 22,100 Euros, corresponding to a 9% increase compared to 2011.

Profitability for the EU aquaculture sector was positive in 2012 and the Gross Value Added of the sector increased by 4%. However, the EBIT decreased by 26% and ROI decreased from 9% to 7%. Furthermore, the labour productivity decreased by 4% from 2011 to 2012.

The aquaculture sector in EU28 can be divided into three main sectors: Marine, Shellfish and Freshwater production. The most profitable of these three sectors are the Marine sector which generated 179.3 million Euros in EBIT, followed by the shellfish sector with 130.1 million Euros and the freshwater sector with 32.6 million Euros.

The main species produced in EU28 in terms of value are Atlantic salmon, oysters, seabream, seabass and trout, whereas the Mediterranean mussels dominate in weight.

In the marine sector United Kingdom is the main producer of salmon covering 88% of the value, while Greece is the main producer of seabream and seabass covering 53% of the value.

In the shellfish sector France and Spain are the most important countries in terms of production volume and value, employment and numbers of enterprises. France is the main producer of oysters covering 89% of the total EU28 production, whereas Spain is the main producer of Mediterranean mussels covering 43% of the volume. The main producers of clam is Italy, however Portugal have the largest numbers of enterprises and employment in this sector.

The main species produced in freshwater in terms of volume 48% and value 43% is trout. The most important producers in terms of value are Italy (28%), France (18%) and Denmark (14%). Carp is another important species mostly produced in Eastern Europe, where the main producer is Poland covering 39% in terms of total value.

The technical innovations introduced to manage or overcome the technical externalities in the European countries are only expected to have a minor positive effect on future growth, in the short run (2013-2014). A few countries have positive expectation do to the changes in legislation and the issuing of new licenses, which is expected to affect production volume.

In the North European EU countries, the focus on environmental regulation for the inland farms has advanced the introduction of more sophisticated RAS technology. However, to insure future growth the development of the RAS technology most continue. Furthermore, the prices of building the new RAS systems must be lowered to become an economically attractive investment.

A special issue concerning the Mediterranean EU countries is the lack of available credit due to financial crisis. This seems to be an important issue shared by these countries and is considered an important hindrance to growth.

A majority of the experts point out that the administrative issues are far more important to solve than the technical ones. The EWG 14-10 experts identified environmental regulations, difficulties in the licenses process due to multilevel governance and competition for space both on land and in the costal zones as the most important areas to be addressed to increase growth in the EU aquaculture sector. It still seems that providing better framework condition for the aquaculture industry is by far the most important issue to solve to lay the foundation for future growth in the European aquaculture sector.

1 INTRODUCTION

The 2014 Annual Economic Report (AER) on the Economic Performance of the EU Aquaculture sector is the fourth report of its kind produced for the sector and provides a comprehensive overview of the latest information available on the production, economic value, structure and competitive performance of the aquaculture sector at the national and EU level.

The report has been produced by aquaculture economists from the JRC and a group of economic experts convened under the Scientific, Technical and Economic Committee for Fisheries (STECF). The data used to compile the various analyses contained within the report were collected under the data collection framework (DCF); cf. Council regulation (European Commission (EC) No 199/2008 of 25th February 2008).

This report includes data for 2008 to 2012. The data collected is reported by national totals and by segments divided on species (e.g. salmon, sea bass and sea bream, trout, carp, mussel, oyster and clam) and technique used for production (e.g. hatcheries and nurseries, on growing, combined, cages, rafts, long lines, bottom and others) The data analyzed covers Income (turnover, subsidies and other income), Personnel costs (Wages and salaries of staff and Imputed value of unpaid labour), Energy costs, Raw material costs (livestock costs and feed costs), Repair and maintenance costs, Other operational costs, Capital costs (depreciation of capital and financial costs), Extraordinary costs, Capital value, Net Investments, Debt, Raw material volume (livestock and feed), Volume of sales, Employment (Number of persons employed and FTE national) and Number of enterprises for the years 2008 to 2012. Moreover, turnover and volume of sales are detailed by species.

The expert group consisted of 24 independent experts from 18 countries and 1 observer. The list of experts can be found in the Appendix 3 of this report. In addition 4 countries provided advice on their national chapters per correspondents.

The publication includes:

- An overview of the EU aquaculture sector and the economic performance of the sector
- A detailed economic and structural assessment of the EU aquaculture sector for the main production environment and species
- A National chapters for each country describing the economic performance and structure in the Member States, including trends and triggers and outlook for 2013-2014
- A special chapter on areas for growth in the EU aquaculture sector, including an EU overview and national overviews

1.1 Terms of reference

Following the latest DCF call for economic data on the EU aquaculture, EWG 14-10 is requested to analyse and comment on the economic performance of the EU and national aquaculture sectors between 2008 and 2012.

Previous editions of this report have been fundamentally descriptive and have focused more on the presentation of data. This year's report should provide a more analytical approach notably on the drivers and aspects of policy relevance in aquaculture. Analysis for variables and indicators not explored in previous reports should be developed (e.g. debts, investments, raw material volume and costs). Additionally, the issue of data quality remains essential for the 2014 report.

In 2014, the Annual Economic Report on EU aquaculture should have a special chapter designed to deepen analysis on this sector.

TERMS OF REFERENCE

STECF is requested to provide the Annual Economic Report on Aquaculture sector for 2014 including, at least, the following sections:

1. A summary containing key findings.

2. EU aquaculture economic overview: drivers and main trends. (It must include specific sections on aquaculture employment, economic performance, and productivity at EU level)

3. EU analyses of economic performance by aquaculture segments

4. National chapters on the economic performance of the aquaculture segments:

- National aquaculture overview
    - Recent developments
    - Employment and average salaries
    - Economic performance and indicators
    - Structure and performance of aquaculture segments
- Issue of special interest
- Outlook for future production trends
- Data coverage and quality

5. Special topic: Areas for growth in the EU aquaculture sector.

- EU overview
    - Short recognition of accepted issues effecting growth (Administrative/regulatory barriers (licenses, space, use of water, multilevel governance etc.)
- Focus on technical externalities effecting growth:
    - organic waste
    - nitrogen, phosphorous
    - escapes
    - diseases / viruses / antibiotics

    - feed dependence
    - domestication of new species
- National overview
    - Most important areas to be addressed for production growth (Regulatory/Technical)
    - New developments in terms of production technology and regulatory measures.
    - Future outlook for growth (2013-2014)

1.2 Data collected under DCF

The economic variables to be collected for the aquaculture industry sector under the Data Collection are specified in section A of the Chapter IV and in Appendix X of Commission Decision 2010/93/EC of the 18th of December 2010, on Adopting a multiannual Community programme pursuant to Council Regulation (EC) No 199/2008 establishing a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy.

Table 1.1: List of economic variables for the aquaculture sector

Variable group	Variable	Unit
Income	Turnover	EUR
	Subsidies	EUR
	Other income	EUR
Personnel costs	Wages and salaries	EUR
	Imputed value of unpaid labour	EUR
Energy costs	Energy costs	EUR
Raw material costs	Livestock costs	EUR
	Feed costs	EUR
Repair and maintenance costs	Repair and maintenance	EUR
Other operational costs	Other operational costs	EUR
Capital costs	Depreciation of capital	EUR
	Financial costs, net	EUR
Extraordinary costs, net	Extraordinary costs, net	EUR
Capital value	Total value of assets	EUR
Net Investments	Net Investments	EUR
Debt	Debt	EUR
	Livestock	Tonne
Raw material volume	Fish feed	Tonne
Volume of sales	Volume of sales	Tonne
Employment	Number of persons employed	Number
	FTE National	Number
Number of enterprises	Number of enterprises	Number

Following DCF the statistical unit for the aquaculture data collection is defined as enterprise, which is the lowest legal entity for accounting purposes. The population refers to enterprises whose primary activity is defined according to the EUROSTAT definition under NACE Code 05.02: 'Fish Farming'.

More detailed definitions of parameters can be found in the glossary (section 6).

Data is requested to be reported by segment and in National totals. Segments are defined as a combination of the main species cultured and the technology used for their production.

Segments are classified by the following main species:

1. Salmon
2. Trout
3. Sea bass & Sea bream
4. Carp
5. Other freshwater fish
6. Other marine fish
7. Mussel
8. Oyster
9. Clam
10. Other shellfish

Segments are also classified by the technology used:

- Fish farming:
    - Land based:
        - Hatcheries and nurseries
        - On growing
        - Combined
    - Cages
- Shellfish farming
    - Rafts
    - Long line
    - Bottom
    - Other

1.3 Data coverage

Data on the EU aquaculture sector has been requested under the Data Collection Framework (DCF) (cf. Council regulation, European Commission (EC) No 199/2008 of 25th February 2008). The MS has been requested to provide data for the years 2008-2012 with the possibility to provide only 2012 data and update 2008-2011 if needed. The call for data was issued by DG MARE on the 19 May 2014. Member States were requested to submit the data within 1 month of the call, making the submission deadline the 20 June 2014.

All EU Member States are required to collect and provide data on salt water aquaculture, while the collection of data for freshwater aquaculture is not compulsory. The Data Collection Framework (DCF) requires data quality assurance by Member States. Data checks were performed by the JRC trough the comprehensive analysis of the data submitted and by experts attending the meeting to elaborate this report. As a consequence of these data checks data has been resubmitted by some of the countries after the deadline and during the EWG meeting. There has also been a few countries resubmitting data after the meeting due to discrepancies found during the meeting.

This was the fourth call for data on aquaculture. Although there was an improvement in the numbers of countries submitting data and the overall data quality compared to the previous calls, there are still issues that have to be improved by the Member States. The main data coverage concerns are summarised in the following points:

Under the DCF, the submission of marine aquaculture data is compulsory, while the submission of inland freshwater aquaculture data is voluntary. Therefore, aquaculture data is not requested from the landlocked countries Austria, Czech Republic, Hungary, Luxemburg and Slovakia. According to EUROSTAT aquaculture production in these countries accounted for 3.2% of weight and 2.3% of value of the total EU28 aquaculture production in 2012.

Belgium, Latvia and Lithuania only produce aquaculture products in freshwater, hence these MS did not carry out any data collection within the DCF framework. According to EUROSTAT, the production of these countries covered 0.3% of weight and 0.2% value of total EU aquaculture production in 2012.

Germany, Slovenia and Estonia only reported the mandatory marine aquaculture data, even though fresh water aquaculture production is dominating in these countries. The unreported production from these Member States accounted for 1.6% of the EU28 aquaculture production in terms of weight and 2.3% in terms of value in 2012.

Poland provided turnover and sales weight, structure and employment indicators for all aquaculture sector (using other administrative data sources), however costs, capital value and some other indicators are not collected for fresh water aquaculture, which is dominating in this country (see Table 1.2 and Table 1.3). The contribution from the Polish aquaculture sector in weight and value was 2.7% and 2.9% to the total EU28, representatively.

Greece only provided data on the structure of the sector, employment in terms of number of employees, weight of sales and turnover. The Greek aquaculture production is significant, especially for the marine aquaculture production, representing 8.8% in weight and 12.5% in value of the EU28 in 2012.

Table 1.2. Comparison of the DCF turnover provided for 2012 with EUROSTAT value of production

	Marine			Freshwater			Shellfish			National total		
	DCF	EUROSTAT	*share*	DCF	EUROSTAT	*share*	DCF	EUROSTAT	*share*	DCF	EUROSTAT	*share*
Austria		0.0	*0.0%*		14.6	*1.9%*		0.0	*0.0%*		**14.6**	***0.4%***
Belgium		0.0	*0.0%*		0.0	*0.0%*		0.0	*0.0%*		**0.0**	***0.0%***
Bulgaria	1.1	5.1	*0.3%*	1.9	14.0	*1.8%*	0.4	0.6	*0.1%*	**3.3**	**19.7**	***0.5%***
Croatia	68.4	55.2	*3.0%*	7.7	7.9	*1.0%*	1.6	4.6	*0.4%*	**77.7**	**67.7**	***1.9%***
Cyprus	26.5	23.0	*1.2%*	0.5	0.6	*0.1%*	0.1	0.1	*0.0%*	**29.2**	**23.6**	***0.6%***
Czech Republic		0.0	*0.0%*		36.8	*4.8%*		0.0	*0.0%*		**36.8**	***1.0%***
Denmark	57.2	29.2	*1.6%*	95.1	60.5	*7.9%*	0.9	0.4	*0.0%*	**155.0**	**90.0**	***2.5%***
Estonia	0.0	0.0	*0.0%*	0.9	1.2	*0.2%*	0.0	0.0	*0.0%*	**0.9**	**1.2**	***0.0%***
Finland	12.4	32.2	*1.7%*	32.3	12.4	*1.6%*	0.0	0.0	*0.0%*	**52.9**	**44.6**	***1.2%***
France	35.7	36.6	*2.0%*	105.9	129.4	*16.9%*	802.4	547.0	*53.3%*	**961.1**	**713.0**	***19.5%***
Germany	0.0	0.0	*0.0%*	0.0	81.4	*10.6%*	9.5	0.1	*0.0%*	**9.5**	**81.5**	***2.2%***
Greece	448.1	441.2	*23.7%*	7.4	8.9	*1.2%*	7.1	6.0	*0.6%*	**545.0**	**456.2**	***12.5%***
Hungary		0.0	*0.0%*		29.9	*3.9%*		0.0	*0.0%*		**29.9**	***0.8%***
Ireland	75.7	76.3	*4.1%*	2.8	2.1	*0.3%*	47.3	49.0	*4.8%*	**130.3**	**127.4**	***3.5%***
Italy*	79.9	104.7	*5.6%*	249.6	121.9	*15.9%*	135.3	187.3	*18.2%*	**464.9**	**413.9**	***11.3%***
Latvia		0.0	*0.0%*		1.4	*0.2%*		0.0	*0.0%*		**1.4**	***0.0%***
Lithuania		0.0	*0.0%*		7.6	*1.0%*		0.0	*0.0%*		**7.6**	***0.2%***
Malta	83.2	93.0	*5.0%*	0.0	0.0	*0.0%*	0.0	0.0	*0.0%*	**83.2**	**93.0**	***2.5%***
Netherlands*	0.0	2.0	*0.1%*	15.7	15.2	*2.0%*	48.8	72.3	*7.0%*	**64.4**	**89.4**	***2.4%***
Poland	0.0	0.2	*0.0%*	101.4	104.9	*13.7%*	0.0	0.0	*0.0%*	**105.1**	**105.1**	***2.9%***
Portugal	34.1	0.6	*0.0%*	1.4	0.9	*0.1%*	23.3	0.0	*0.0%*	**58.8**	**1.4**	***0.0%***
Romania	0.1	0.1	*0.0%*	18.0	18.1	*2.4%*	0.0	0.0	*0.0%*	**18.1**	**18.1**	***0.5%***
Slovakia		0.0	*0.0%*		3.2	*0.4%*		0.0	*0.0%*		**3.2**	***0.1%***
Slovenia	0.4	0.3	*0.0%*	0.0	2.0	*0.3%*	0.4	0.2	*0.0%*	**0.7**	**2.5**	***0.1%***
Spain	314.6	272.2	*14.6%*	56.5	46.1	*6.0%*	90.4	117.3	*11.4%*	**482.3**	**435.6**	***11.9%***
Sweden	0.0	33.2	*1.8%*	48.7	11.5	*1.5%*	1.0	1.0	*0.1%*	**49.8**	**45.6**	***1.2%***
United Kingdom	698.1	657.7	*35.3%*	51.5	34.2	*4.5%*	46.2	41.0	*4.0%*	**795.8**	**732.8**	***20.0%***
Grand Total	**1935.3**	**1862.8**	***51%***	**797.2**	**766.4**	***21%***	**1214.7**	**1026.8**	***28%***	**4088.1**	**3656.0**	***100.0%***

* Italy didn't provide 2012 data for EUROSTAT, thus EUROSTAT data for 2011 has been used for comparison; Netherlands didn't submit data for 2012 during the data call therefore 2011 data has been used for the comparison.

The Netherlands only provided data for 2008 – 2011. The Dutch aquaculture production represents 3.7% in weight and 2.4% in terms of value of the EU28 aquaculture production in 2012. According to the data collection program, the data provision from the Netherlands is delayed by 2 years from the end of the accounting year till the time when the data is available for submission to the end user. To include the Netherlands in this report, data for 2011 has been used in the EU overview instead of 2012 and comparison has been done between 2010 and 2011.

The data coverage improved in 2012. This is to some extend driven by the improvement of UK and Cyprus data. The improvement makes the current analysis of the EU aquaculture sector more pertinent. However, there is still room for improvement especially on the economic indicators.

It should be mentioned that Cyprus data by segment has been uploaded after the finalising of the meeting. There have been some mistakes identified after the closure of the uploading facility; therefore Cyprus data should be interpreted with caution. Cyprus only represents less than 1% of the EU aquaculture production and the mistakes identified are considered to have a very limited effect on the quality of this report.

For the purpose of this analysis the EU aquaculture production for EU28 has been completed by including EUROSTAT data to fill in the gaps of missing turnover and volume of sales in this report. The EUROSTAT data is included in the tables by adding a line 'Other non DCF' in the countries list of tables presenting main production and employment indicators. The line includes all other EU countries (not in the list of each table) production, including land locked countries and countries which doesn't report freshwater or overall production.

Table 1.3. Comparison of DCF sales volume provided for 2012 with EUROSTAT weight of production

	Marine			Freshwater			Shellfish			National total		
	DCF	EUROSTAT	*share*	DCF	EUROSTAT	*share*	DCF	EUROSTAT	*share*	DCF	EUROSTAT	*share*
Austria		0.0	*0.0%*		2.9	*1.1%*		0.0	*0.0%*		**2.9**	***0.2%***
Belgium		0.0	*0.0%*		0.0	*0.0%*		0.0	*0.0%*		**0.0**	***0.0%***
Bulgaria	0.9	1.5	*0.4%*	0.8	4.5	*1.8%*	0.8	0.9	*0.1%*	**2.5**	**6.9**	***0.6%***
Croatia	6.6	6.6	*1.7%*	4.8	4.2	*1.6%*	1.3	3.2	*0.5%*	**12.7**	**13.9**	***1.1%***
Cyprus	0.0	4.3	*1.1%*	0.0	0.1	*0.0%*	0.0	0.0	*0.0%*	**4.7**	**4.3**	***0.4%***
Czech Republic		0.0	*0.0%*		20.8	*8.1%*		0.0	*0.0%*		**20.8**	***1.7%***
Denmark	12.9	10.3	*2.7%*	29.3	23.1	*9.0%*	1.1	0.5	*0.1%*	**43.7**	**33.9**	***2.8%***
Estonia	0.0	0.0	*0.0%*	0.2	0.3	*0.1%*	0.0	0.0	*0.0%*	**0.2**	**0.3**	***0.0%***
Finland	4.3	10.3	*2.7%*	6.3	2.8	*1.1%*	0.0	0.0	*0.0%*	**11.1**	**13.1**	***1.1%***
France	5.0	5.1	*1.3%*	33.3	40.5	*15.8%*	230.1	159.6	*26.9%*	**268.7**	**205.1**	***16.6%***
Germany	0.0	0.0	*0.0%*	0.0	18.7	*7.3%*	6.7	0.0	*0.0%*	**6.7**	**18.7**	***1.5%***
Greece	94.3	90.0	*23.5%*	2.2	2.3	*0.9%*	17.6	16.5	*2.8%*	**114.8**	**108.8**	***8.8%***
Hungary		0.0	*0.0%*		14.6	*5.7%*		0.0	*0.0%*		**14.6**	***1.2%***
Ireland	12.4	12.6	*3.3%*	0.8	0.7	*0.3%*	22.7	22.9	*3.9%*	**36.2**	**36.1**	***2.9%***
Italy	11.7	13.5	*3.5%*	70.0	38.8	*15.1%*	109.5	111.9	*18.8%*	**191.2**	**164.1**	***13.3%***
Latvia		0.0	*0.0%*		0.6	*0.2%*		0.0	*0.0%*		**0.6**	***0.0%***
Lithuania		0.0	*0.0%*		3.6	*1.4%*		0.0	*0.0%*		**3.6**	***0.3%***
Malta	7.0	7.4	*1.9%*	0.0	0.0	*0.0%*	0.0	0.0	*0.0%*	**7.0**	**7.4**	***0.6%***
Netherlands	0.0	0.4	*0.1%*	9.1	3.0	*1.2%*	34.5	42.5	*7.2%*	**43.5**	**46.0**	***3.7%***
Poland	0.0	0.0	*0.0%*	32.0	33.2	*12.9%*	0.0	0.0	*0.0%*	**33.2**	**33.2**	***2.7%***
Portugal	5.8	0.2	*0.1%*	0.5	0.3	*0.1%*	3.9	0.0	*0.0%*	**10.2**	**0.5**	***0.0%***
Romania	0.0	0.0	*0.0%*	9.9	10.0	*3.9%*	0.0	0.0	*0.0%*	**10.0**	**10.0**	***0.8%***
Slovakia		0.0	*0.0%*		1.3	*0.5%*		0.0	*0.0%*		**1.3**	***0.1%***
Slovenia	0.1	0.1	*0.0%*	0.0	0.7	*0.3%*	0.3	0.0	*0.0%*	**0.4**	**0.7**	***0.1%***
Spain	44.0	42.9	*11.2%*	18.9	16.8	*6.5%*	207.7	206.9	*34.9%*	**271.3**	**266.6**	***21.6%***
Sweden	0.0	10.5	*2.7%*	13.5	2.0	*0.8%*	1.3	1.3	*0.2%*	**14.8**	**13.8**	***1.1%***
United Kingdom	166.4	167.1	*43.7%*	15.8	11.1	*4.3%*	27.4	27.4	*4.6%*	**209.5**	**205.6**	***16.7%***
Grand Total	**371.3**	**382.8**	***31%***	**247.3**	**256.5**	***21%***	**665.0**	**593.6**	***48%***	**1292.5**	**1232.8**	***100.0%***

* Italy didn't provide 2012 data for EUROSTAT, those EUROSTAT data for 2011 been used for comparison; Netherlands didn't submit data for 2012 during the data call therefore 2011 data been used for the comparison.

The data coverage by country and variable is presented in the Table 1.4 and Table 1.5. The tables are showing partially missing data by country and on the National total and segment level.

Reading the EU overview in chapter 2 of this report the following data issues should be taken into account.

The United Kingdom provided detailed cost structure for 2011 and 2012 and significantly improved data submission, however it has not been possible to calculate all economic indicators (e.g. net profit) on the segment level for 2011, as the data set was incomplete. Most of variables are missing for the years 2008-2010.

France provided a full set of economic variables on aquaculture segment level for 2010-2012, however due to some missing variables for some minor segments (representing around 5-7% of overall national turnover) it has not been possible for the country to provide all indicators on the national level representing 100% of the production.

The EU sector analysis in the chapter 3 of this report is based on national aquaculture segment level data, which for each sector divided on production techniques and species produced. Missing data for some countries or missing data from some years of the major producers (see Table 1.5) can affect the results of the time series analysis. The major issues for the time series analysis are:

France started to report full data sets (with all economic variables) from 2010. As France is one of the major producers in some specific segment, 2008-2009 data are currently removed from some of the time series figures analysing trends for all the years 2008-2012.

Spain have been removed from the price analysis of some species due to missing volume of sales for the years 2008-2010, which affects the average prices significantly.

UK reported a full data set for 2012, however, it has not been possible to estimate the previous years and for that reason UK has been removed from some of the time series analysis.

Greece has been excluded on all graphs with economic performance indicators for all species analysis due to missing data on all economic indicators.

Croatia provided full data sets for 2011 and 2012. The Croatia production is less significant and has been excluded in the time series analyses on species and techniques.

Bulgaria only reported data by segment for 2012. The Bulgarian production is less significant and has been excluded in the time series analyses on species and techniques.

All in all, the conclusion is that the data coverage and quality has improved compared to 2011 and that data for the EWG report are provided within the deadline set for submission.

2012 data on national level (i.e. number of companies, employees) is available for 90% (75% in 2011 report) of total value of EU28 production. The necessary economic variables for full economic performance of EU aquaculture sector on national level is available for 78% (70% in 2011) of value of production, while full economic performance on segment level covered 75% (50% in 2011) of EU28 aquaculture production value.

Table 1.4. Coverage of the data provided during the data calls at National total level 2008-2012

	BGR	CYP	DEU	DNK	ESP	FIN	FRA*	GRC	IRL	ITA	MLT	NLD	POL*	PRT	ROU	SVN	SWE	GBR	EST	HRV
	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012	2008 2009 2010 2011 2012
Income																				
Turnover	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y n	n y y y y	y y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Subsidies	n 0 0 0 y	y y y y y	0 0 0 0 0	0 0 0 0 0	y y y y y	y y y y y	n n n n n	y y 0 0 n	0 y 0 y y	y y y y y	y y 0 0 0	0 0 0 0 n	n y y y n	0 0 0 0 0	n 0 0 y y	0 0 y y y	0 y y y y	0 0 0 y y	0 0 0 0 0	y y
Other income	n 0 0 0 y	y y y y y	0 0 0 0 0	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	0 y y y 0	y y y y n	n y y y n	0 0 0 y y	n y 0 y y	y y y y y	y y y y y	0 0 0 0 y	y y y y y	y y
Operating Costs																				
Wages and salaries	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Imputed value of unpaid labour	n y y y y	0 y y 0 0	0 0 0 0 0	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	0 0 0 y y	0 0 0 0 n	n y y y n	n y y y y	n y y y y	0 0 y y y	y y y y y	0 n n y y	y y y y y	0 y
Energy costs	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	y y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Raw material: Feed costs	n y y y y	y y y y y	0 0 0 0 0	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	y y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Raw material: Livestock costs	n y y y y	y y y y y	0 0 0 0 0	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	y y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Repair and maintenance	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Other operational costs	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	y y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Capital Costs																				
Depreciation of capital	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Financial costs, net	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Extraordinary Costs																				
Extraordinary costs, net	n y y y y	y y y y y	0 0 0 0 0	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	0 0 y 0 0	y y y y y	y y y y 0	y y y y n	n 0 y 0 n	n y y 0 0	n y y y y	y y y y y	y y y y y	n n n y y	0 0 y y 0	y y
Capital Value																				
Total value of assets	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Net Investments	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Debt	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	n y y y y	y y y y y	y y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Production																				
Raw material volume: Feed	n y y y y	y y y y y	0 0 0 0 0	y y y y y	y y y y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	y y y y y	n y y y n	n y y y n	y y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Raw material volume: Livestock	n y y y y	y y y y y	0 0 y 0 0	y y y y y	n n n y y	y y y y y	n n n n n	n n n n n	y y y y y	y y y y y	n n y y y	n y y y n	n y y y n	y y y y y	n y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y
Total sales volume	n y y y y	y y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y n	n y y y y	y y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Employment																				
Total employees	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y n	n y y y y	y y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Female employees	n y y y y	y y y y y	0 0 0 0 0	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	y y y y y	y y y y y	y y y y y	0 0 0 0 n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	0 0 0 y y	y y y y y	y y
Male employees	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	y y y y y	y y y y y	y y y y y	y y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
FTE	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	y y y y y	y y y y y	y y y y y	n y y y n	n y y y y	n y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Female FTE	n y y y y	y y y y y	0 0 0 0 0	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	y y y y y	y y y y y	y y y y y	n 0 0 0 n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	0 0 0 y y	y y y y y	y y
Male FTE	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	n n n n n	y y y y y	y y y y y	y y y y y	n y y y n	n y y y n	n y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Structure																				
N. of enterprises <=5 employees	n y y y y	y 0 0 0 y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	0 0 0 0 0	y y y y n	n y y y y	y y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
N. of enterprises >10 employees	n y y y y	y y y y y	0 0 0 0 0	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	0 0 0 0 n	n y y y y	y y y y y	n y y y y	0 y y y y	y y y y y	y y y y y	0 0 0 0 0	y y
N. of enterprises 6-10 employees	n y y y y	y y y y 0	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y 0 0 0	y y y y n	n 0 0 0 y	y y y y y	n y y y y	y 0 y y y	y y y y y	y y y y y	0 0 0 0 y	y y
Production by species																				
Sales production	y y y y y	y y y y y	y y y y y	y y y y y	n n n y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y n	y y y y y	y y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y
Turnover production	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y y y n	y y y y y	y y y y y	n y y y y	y y y y y	y y y y y	y y y y y	y y y y y	y y

*France provided some economic variables on segment level, covering 90-95% of turnover; Poland provided some variables for total aquaculture production 2012 (including fresh water) therefore it was decided not to provide national totals for those indicators, which only represents marine (salmon hatcheries and nurseries for stocking) production.

Table 1.5. Coverage of the data provided during the data calls at aquaculture segment level 2008-2012

	BGR					CYP					DEU					DNK					ESP				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Income																									
Turnover	n	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Subsidies	n	n	n	n	y	y	y	y	y	y	0	0	0	0	0	0	0	0	0	0	y	y	y	y	y
Other income	n	n	n	n	y	y	y	y	y	y	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
Operating Costs																									
Wages and salaries	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Imputed value of unpaid labour	n	n	n	n	y	0	y	y	0	0	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
Energy costs	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Raw material: Feed costs	n	n	n	n	y	y	y	y	y	y	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
Raw material: Livestock costs	n	n	n	n	y	y	y	y	y	y	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
Repair and maintenance	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Other operational costs	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Capital Costs																									
Depreciation of capital	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Financial costs, net	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Extraordinary Costs																									
Extraordinary costs, net	n	n	n	n	y	y	y	y	y	y	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
Capital Value																									
Total value of assets	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Net Investments	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Debt	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Production																									
Raw material volume: Feed	n	n	n	n	y	y	y	y	y	y	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
Raw material volume: Livestock	n	y	y	n	y	y	y	y	y	y	0	0	y	0	0	y	y	y	y	y	n	n	n	y	y
Total sales volume	n	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	n	n	n	y	y
Employment																									
Total employees	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Female employees	n	n	n	n	y	y	y	y	y	y	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
Male employees	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
FTE	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Female FTE	n	n	n	n	y	y	y	y	y	y	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
Male FTE	n	n	n	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Structure																									
N. of enterprises <=5 employees	n	y	y	y	y	y	0	0	0	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
N. of enterprises >10 employees	n	0	0	0	y	y	y	y	y	y	0	0	0	0	0	y	y	y	y	y	y	y	y	y	y
N. of enterprises 6-10 employees	n	y	y	y	y	y	y	y	y	0	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Production by species																									
Sales production	y	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	n	n	y	y
Turnover production	y	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y

	FIN					FRA					GRC					IRL					ITA				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Income																									
Turnover	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Subsidies	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	0	y	0	y	y	y	y	y	y	y
Other income	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Operating Costs																									
Wages and salaries	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Imputed value of unpaid labour	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Energy costs	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Raw material: Feed costs	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Raw material: Livestock costs	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Repair and maintenance	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Other operational costs	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Capital Costs																									
Depreciation of capital	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Financial costs, net	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Extraordinary Costs																									
Extraordinary costs, net	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	0	0	y	0	0	y	y	y	y	y
Capital Value																									
Total value of assets	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Net Investments	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Debt	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Production																									
Raw material volume: Feed	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Raw material volume: Livestock	y	y	y	y	y	n	n	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Total sales volume	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Employment																									
Total employees	y	y	y	y	y	y	y	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Female employees	y	y	y	y	y	y	y	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Male employees	y	y	y	y	y	y	y	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
FTE	y	y	y	y	y	y	y	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Female FTE	y	y	y	y	y	y	y	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Male FTE	y	y	y	y	y	y	y	y	y	y	n	n	n	n	n	y	y	y	y	y	y	y	y	y	y
Structure																									
N. of enterprises <=5 employees	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
N. of enterprises >10 employees	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
N. of enterprises 6-10 employees	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Production by species																									
Sales production	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
Turnover production	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y

	MLT					NLD					POL					PRT					ROU				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Income																									
Turnover	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Subsidies	y	y	0	0	0	0	0	0	0	n	n	y	y	y	y	0	0	0	0	0	n	n	0	y	y
Other income	0	y	y	y	0	y	y	y	y	n	n	y	y	y	y	0	0	0	y	y	n	y	0	y	y
Operating Costs																									
Wages and salaries	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Imputed value of unpaid labour	0	0	0	y	y	0	0	0	0	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Energy costs	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Raw material: Feed costs	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Raw material: Livestock costs	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Repair and maintenance	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Other operational costs	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Capital Costs																									
Depreciation of capital	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Financial costs, net	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Extraordinary Costs																									
Extraordinary costs, net	y	y	y	y	0	y	y	y	y	n	n	0	y	0	0	n	y	y	0	0	n	y	y	y	y
Capital Value																									
Total value of assets	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Net Investments	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Debt	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Production																									
Raw material volume: Feed	y	y	y	y	y	n	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Raw material volume: Livestock	y	y	y	y	y	n	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Total sales volume	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Employment																									
Total employees	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Female employees	y	y	y	y	y	0	0	0	0	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Male employees	y	y	y	y	y	y	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
FTE	y	y	y	y	y	n	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Female FTE	y	y	y	y	y	n	0	0	0	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Male FTE	y	y	y	y	y	n	y	y	y	n	n	y	y	y	y	n	y	y	y	y	n	y	y	y	y
Structure																									
N. of enterprises <=5 employees	0	0	0	0	0	y	y	y	y	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
N. of enterprises >10 employees	y	y	y	y	y	0	0	0	0	n	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y
N. of enterprises 6-10 employees	y	y	0	0	0	y	y	y	y	n	n	0	0	0	y	y	y	y	y	y	n	y	y	y	y
Production by species																									
Sales production	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y
Turnover production	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y

	SVN					SWE					GBR					EST					HRV				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Income																									
Turnover	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y				y	y
Subsidies	0	0	y	y	y	0	y	y	y	y	n	n	n	n	y	0	0	0	0	0				y	y
Other income	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Operating Costs																									
Wages and salaries	y	y	y	y	y	y	y	y	y	y	n	n	n	y	y	y	y	y	y	y				y	y
Imputed value of unpaid labour	0	0	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				0	y
Energy costs	y	y	y	y	y	y	y	y	y	y	n	n	n	y	y	y	y	y	y	y				y	y
Raw material: Feed costs	y	y	y	y	y	y	y	y	y	y	n	n	n	y	y	y	y	y	y	y				y	y
Raw material: Livestock costs	y	y	y	y	y	y	y	y	y	y	n	n	n	y	y	y	y	y	y	y				y	y
Repair and maintenance	y	y	y	y	y	y	y	y	y	y	n	n	n	y	y	y	y	y	y	y				y	y
Other operational costs	y	y	y	y	y	y	y	y	y	y	n	n	n	y	y	y	y	y	y	y				y	y
Capital Costs																									
Depreciation of capital	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Financial costs, net	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Extraordinary Costs																									
Extraordinary costs, net	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	0	0	y	y	0				y	y
Capital Value																									
Total value of assets	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Net Investments	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Debt	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Production																									
Raw material volume: Feed	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Raw material volume: Livestock	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Total sales volume	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y				y	y
Employment																									
Total employees	y	y	y	y	y	y	y	y	y	y	n	n	n	y	y	y	y	y	y	y				y	y
Female employees	y	y	y	y	y	n	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Male employees	y	y	y	y	y	n	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
FTE	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
Female FTE	y	y	y	y	y	n	n	n	n	n	n	n	n	n	y	y	y	y	y	y				y	y
Male FTE	y	y	y	y	y	n	n	n	n	n	n	n	n	n	y	y	y	y	y	y				y	y
Structure																									
N. of enterprises <=5 employees	y	y	y	y	y	y	y	y	y	y	n	n	n	n	y	y	y	y	y	y				y	y
N. of enterprises >10 employees	0	y	y	y	y	y	y	y	y	y	n	n	n	n	y	0	0	0	0	0				y	y
N. of enterprises 6-10 employees	y	0	y	y	y	y	y	y	y	y	n	n	n	n	y	0	0	0	0	y				y	y
Production by species																									
Sales production	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y				y	y
Turnover production	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y				y	y

2 EU AQUACULTURE SECTOR OVERVIEW

Aquaculture is the fastest growing animal food producing sector in the world and is an increasingly important contributor to global food supply and economic growth. The share of global supply of fish and shellfish increased from 15% in 1992 to 42% in 2012. The estimated global seafood[1] supply increased from 155.8 million tonnes in 2011 to 158.0 thousand tonnes in 2012. The increase was driven by the aquaculture sector, which compensated for the decrease in capture fisheries production of 2.6%

Production from world capture fisheries of fish and shellfish has been fluctuating around 90.0 million tonnes per year during the last two decades. In contrast to this, the global aquaculture production has been increasing, as shown in Figure 2.1, producing 66.7 million tonnes in 2012.

The global value of fish and shellfish from aquaculture production reached 107.5 billion Euros (138.0 billion USD)[2] in 2012. The sector has increased the production 81% since 2002 and more than 3 times over the last 2 decades (see Figure 2.1). However this increase has not been evenly distributed and most of the growth has been driven by Asian countries producing 88% of the world aquaculture products. China is the most important producer of aquaculture products in the world, producing almost 62% of the global fish and shellfish. European aquaculture production represented only 1.9% of the world aquaculture production in terms of weight and 3.5% in value.

The aquaculture production in EU28 has increased by 25% from 1992, however; since 2002 the production has decreased by 1%. As EU capture fisheries production has been decreasing over the analysed period, aquaculture has become relatively more important to supply the seafood market. In 2012 the aquaculture sector provided 21% of the fish and shellfish supply in EU28.

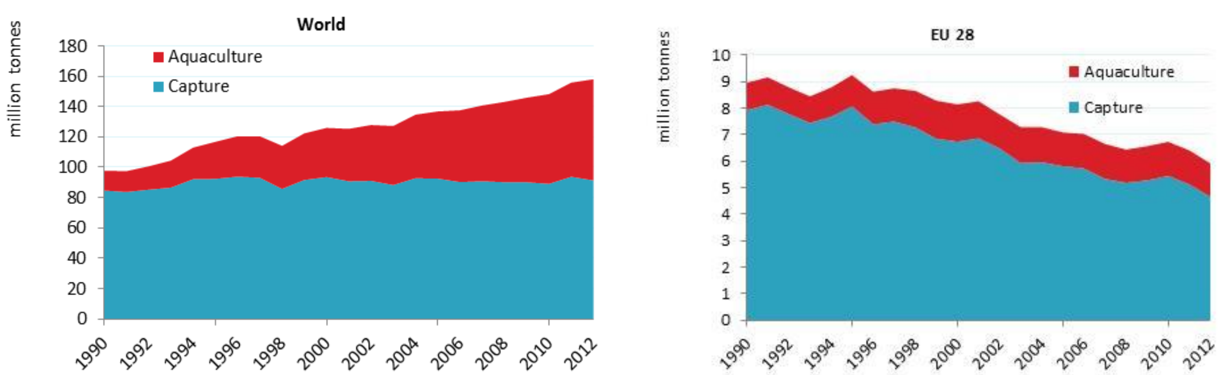

Figure 2.1: World and EU-28 seafood production (capture and aquaculture): 1990-2012.

Source: FAO, 2014

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[1] Aquatic plants represented 26.3% of global weight of world aquaculture production in 2012, however it have been excluded from this analysis as these aquaculture products are not covered by DCF. According to FAO estimates EU28 produce around 5.4 thousand tonnes (0.4% of overall EU28 aquaculture production) of aquatic plants.

[2] The exchange rates used is 1 USD to 0.7789 Euro. European Central Bank average exchange rate data.

2.1 The EU aquaculture sector

Aquaculture production in the EU28 reached 1.108 million tonnes and accounted for 3.365 billion Euros in 2012[3]. The EU28 represents 1.9% of the world aquaculture production in volume and 3.5% in value[4].

EU aquaculture production is mainly concentrated in 4 countries: Spain, United Kingdom, France and Greece. Figure 2.2 and Figure 2.3 show the significance of the Member State's aquaculture production in the relation to the total EU28 aquaculture production in weight and value, respectively.

Spain, with 24% of the total EU production in volume, is the largest aquaculture producer in the EU, followed by United Kingdom and France with 19% each, and Greece with 10%. These four countries account for 71% of the total EU28 aquaculture production by weight.

In terms of value, United Kingdom is the largest producer in EU with 22% of the total production value, followed by France (21%), Greece (13%) and Spain (13%). These four countries contribute 70% of the total EU aquaculture value.

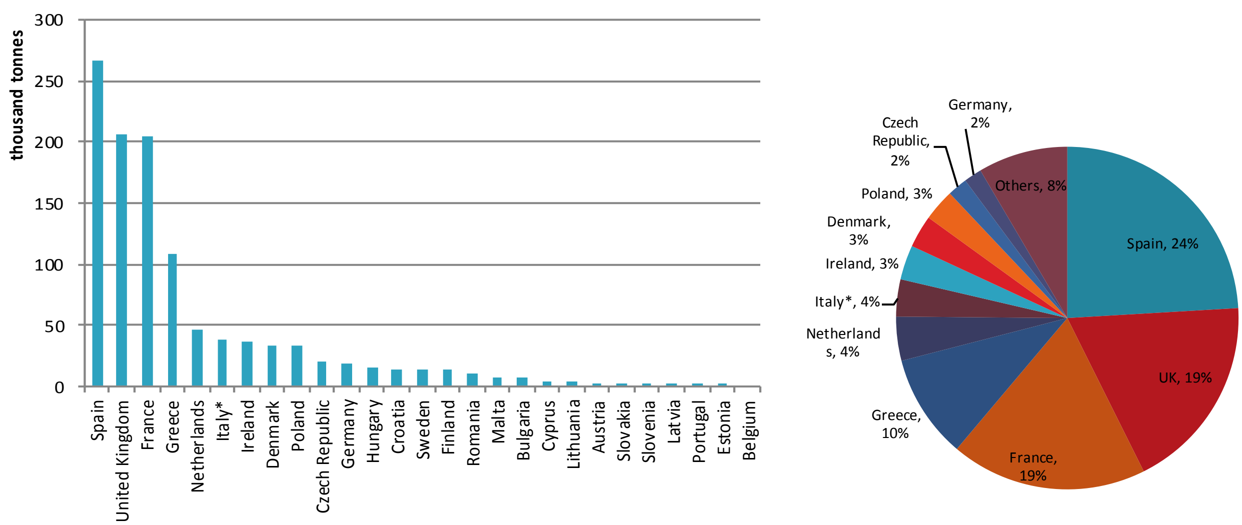


Figure 2.2: Aquaculture production in EU Member States in terms of weight: 2012.

* Note: 2011 data is used. Source: EUROSTAT, 2014

It should be noted that even though Spain has the largest aquaculture production volume (24%) it is only fourth in value (13%). This is due to the low market value of mussels (around 0.44 Euros per kg), which represent 77% of the Spanish aquaculture production volume, but only 19% of the value.

[3] The EUROSTAT database do not have Italian data for 2012. The values have been imputed using 2011 data.

[4] FAO FishStat data base (plants production excluded).

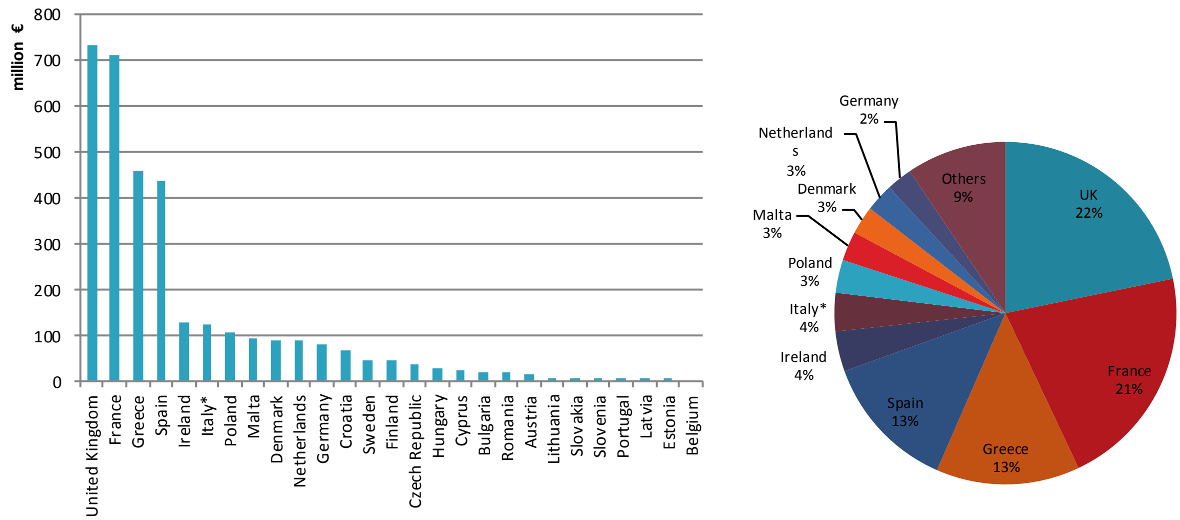


Figure 2.3: Aquaculture production in EU Member States in terms of value: 2012.

* Note: 2011 data is used. Source: EUROSTAT, 2014

From an employment perspective, the social importance of the aquaculture industry is not always reflected in the contribution, by volume or value, to the EU totals. Shellfish production employs more labour compared to the marine and freshwater production. The shellfish sector most often consist of small family owned businesses and have a large social importance for some regions in EU.

2.2 Economic performance of the EU aquaculture sector

Table 2.1 reports the number of enterprises, total sales volume, turnover, employment measures in FTE and mean wages for the analysed EU countries in 2012.

The values reported in Table 2.1, have been complemented with Eurostat data mainly to overcome the lack of some Member States freshwater aquaculture data.

Table 2.1: Economic and employment indicators for the EU aquaculture sector: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Bulgaria	163	2.5	3.3	454	321	3.1
Croatia	174	12.7	77.7	1892	1464	17.6
Cyprus	10	3.2	25.8	259	248	11.0
Denmark	127	43.7	155.0	432	311	70.7
Estonia	6	0.2	0.9	22	17	9.3
Finland	120	11.1	52.9	402	326	38.1
France	3249	268.7	961.1	18640	10581	23.7
Germany	8	6.7	9.5	39	39	58.7
Greece	1051	114.8	545.0	4900		
Ireland	279	36.2	130.3	1708	956	42.2
Italy	587	191.2	464.9	5164	1937	37.0
Malta	6	7.0	83.2	167	153	23.1
Netherlands*	115	43.5	64.4	467	332	33.1
Poland	840	33.2	105.1	5583	4377	11.4
Portugal	1443	10.2	58.8	2572	2083	8.1
Romania	430	10.0	18.1	2968	2523	2.3
Slovenia	11	0.4	0.7	34	28	28.4
Spain	3032	271.3	482.3	19892	5743	22.5
Sweden	174	14.8	49.8	370	263	33.4
United Kingdom	641	209.5	795.8	3231	2705	38.6
Other none DCF		95.5	280.0			
Total DCF reported	***12466***	***1291.0***	***4084.6***	***69196***	***34406***	***22.1***
Total EU		**1386.5**	**4364.7**			

Source: EU Member States DCF data submission & EUROSTAT, 2014
*Note: 2011 data is used.

Number of enterprises

The DCF data cover 20 countries which have reported a total of more than 12 thousand enterprises in 2012. It is estimated that the total number of enterprises in the EU28 aquaculture sector is between 14 and 15 thousand.

The majority of the enterprises in the EU aquaculture sector are micro-enterprises with less than 10 employees. In 2012 these comprised 90% of all aquaculture enterprises in the EU. These micro-enterprises tend to be family owned and are using rather extensive production methods and systems. The number of enterprises with more than 10 employees has increased from 1,108[5] in 2011 to 1,136 in 2012 corresponding to 9% of the total number of enterprises in 2012.

Production and sales

The total EU28 sales volume for the aquaculture sector, using DCF data complemented with Eurostat production is estimated to be 1.387 million tonnes in 2012. This corresponds to a 3% increase from 1.345 million tonnes reported last year. The DCF data on Total Sales Volume was also complemented with Eurostat production data to provide an overview of all 28 EU Member States. According to Article 2, of the EC Regulation No 762/2008 of the European Parliament and of the Council of 9 July 2008 on the submission by Member States of statistics on aquaculture and repealing Council Regulation (EC) No 788/96, defines “production” as the output from aquaculture at first sale, including production from hatcheries and nurseries offered for sale. It should be noted that total sales is used as an estimate of total production.

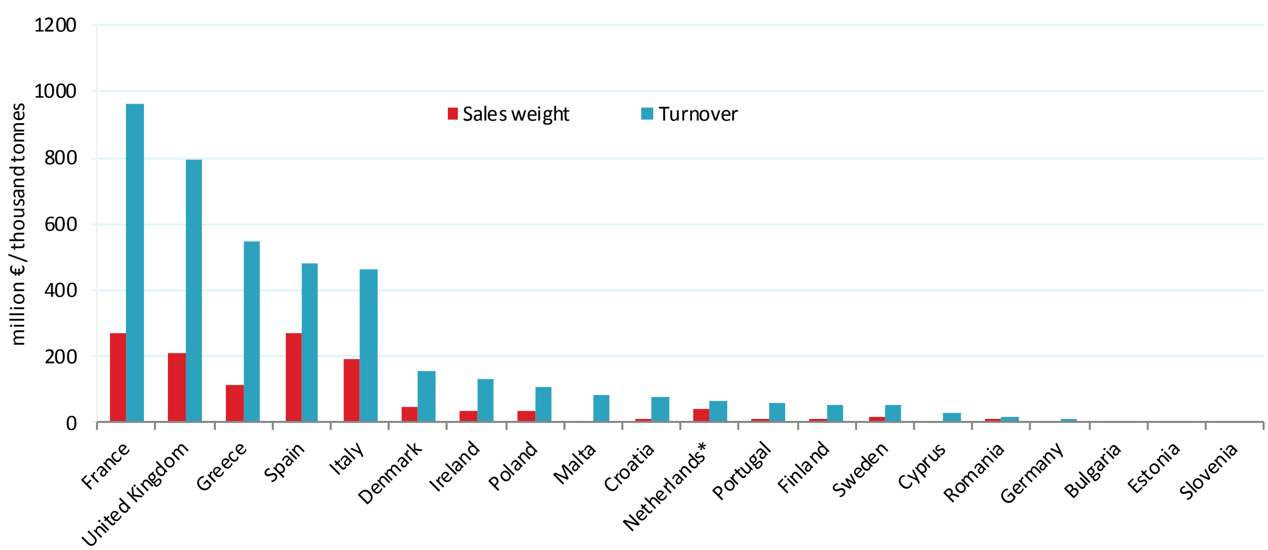


Figure 2.4: Total sales weight and turnover in the EU Aquaculture sector per MS: 2012.

Source: EU Member States DCF data submission, 2014

[5] This number is estimated by the EWG experts do to inconsistency in the reported numbers of enterprises by Spain.

As can be seen in Figure 2.4 there are large differences in the volumes and turnovers from aquaculture among the 20 countries reporting to the DCF. Basically there are five large producers: France, United Kingdom, Greece, Spain and Italy with reported turnovers between 400 and 1,000 million Euros. All other countries have reported turnovers less than 200 million Euros.

Turnover

The total value of sales (turnover) from the EU28 aquaculture sector is reported at 4.365 million Euros in 2012. This represents a 10 % increase to the 3.978 million Euros reported in 2011. DCF data on turnover has been complemented with Eurostat production value data to provide an overview for all 28 EU Member States.

Employment

The reported DCF data displays an employment of about 69,000 people in 2012, which is a decrease of 9% from the 76,000[6] employed estimated in 2011. It is estimated that the EU28 aquaculture sector directly employs around 80,000 persons.

From Figure 2.5 it can be seen that employment varies a lot between countries depending on the most important production in terms of species and technique used in each country.

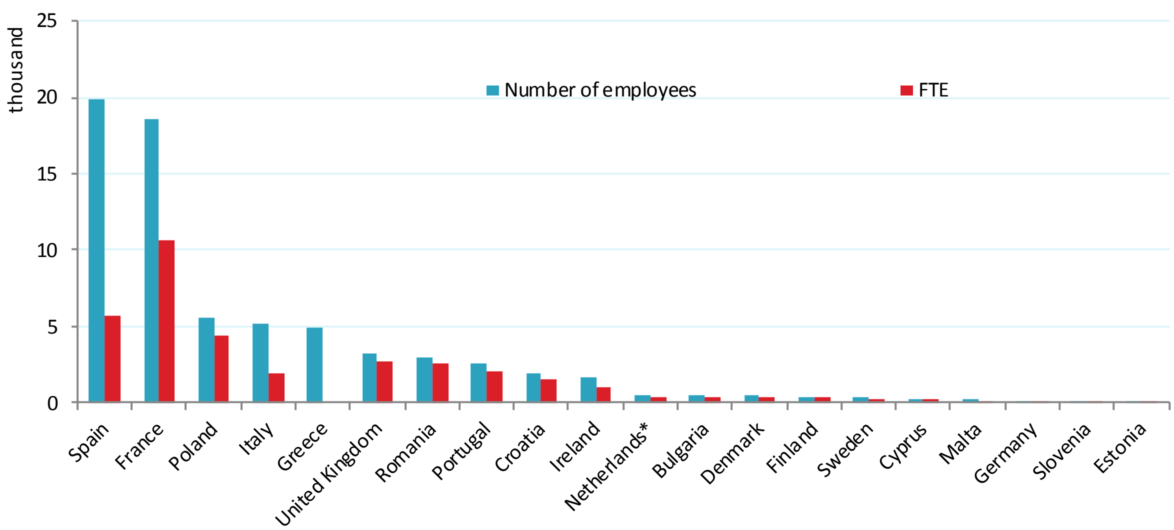


Figure 2.5: Numbers of Employees and FTE's in the Member States Aquaculture sector: 2012.

Source: EU Member States DCF data submission, 2014

[6] Poland did not report the numbers of employment and FTEs for the freshwater segments in 2011. The numbers have been estimated by STECF experts at around 5,600 for employees and 4,400 for FTEs.

Looking at the full time equivalents (FTEs) there has been a decrease of 2% from the 35,200 FTEs reported last year to the 34,400 FTEs reported this year. This might indicate a slight tendency towards less part-time employment in the aquaculture sector.

The EU aquaculture sector has a substantial component of part-time work. This can be seen from the ratio of full time equivalents (FTE) to total employees. The lower the ratio, the more part-time or seasonal work exists, while the higher (closer to 1) the ratio, the more occupation is full time. The current data from 18 countries (Excluding Greece and Poland) shows that the ratio for the EU aquaculture sector was 0.47 in 2011 and 0.5 in 2012.

The large proportion of part-time and seasonal employment in the EU aquaculture sector is mainly due to the shellfish segments, which have a significant percentage of part-time and seasonal work.

Women accounted for the 24% of employees in the EU aquaculture sector, but only 17% of the FTEs in 2012.

Mean wages

The average wage is calculated as the sum of the costs in wages and salaries and the imputed value of unpaid labour divided by the total number of employees and the total number of FTEs. DCF Data from 19 countries (Greece did not submit data on wages) show that the average wage per FTE for the EU aquaculture sector in 2012 was about 22,100 Euros per year. This is an increase of 9% from the 20,300 Euros reported in 2011. The salary increase was not evenly distributed as 5 countries (Cyprus, France, Germany, Poland and Romania) reported a decrease in average salary.

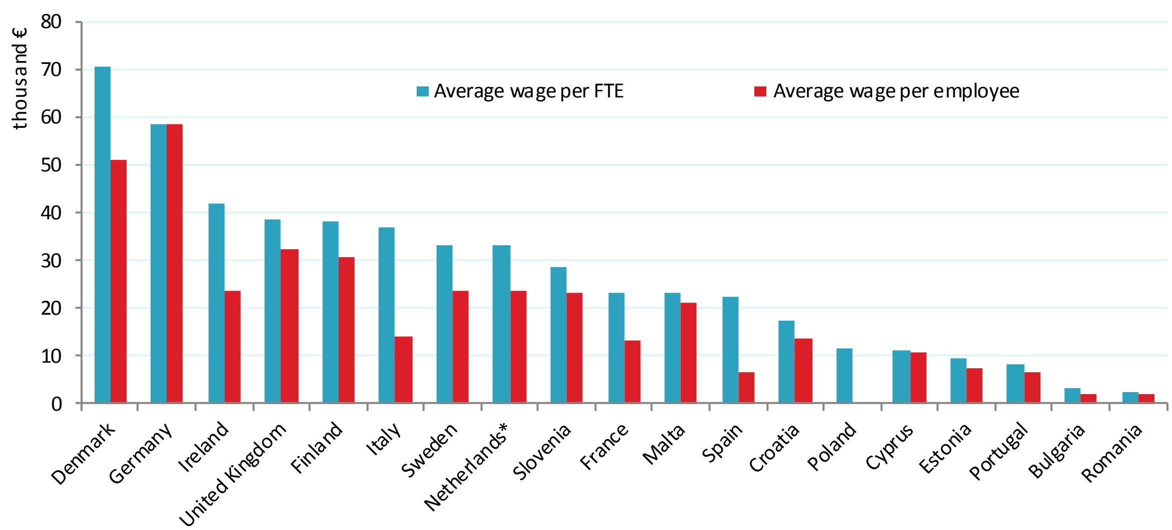


Figure 2.6: Average wage in the EU Aquaculture sector per MS: 2012.

Source: EU Member States DCF data submission, 2014

There are large differences between the average wages paid in each country. The average wages varied from 3,100 Euros per year in Bulgaria to 70,700 Euros per year in Denmark. The differences among countries and subsectors are being analysed in more detail in the next chapter.

Gross Value Added

DCF data from 18 countries (Greece and Poland did not submit the necessary data for calculation of GVA) show that the EU aquaculture sector provided about 1.294 billion Euros in Gross Value Added in 2012. This is an increase of 4% from the 1.247 billion Euros reported in 2011. Assuming a similar economic structure, it can be estimated that the GVA for the EU28 aquaculture sector could be about 1.500 billion Euros in 2012.

Table 2.2: Economic performance Indicators for the EU aquaculture sector: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Bulgaria	1.2 ▼	-0.1 ▼	-1 ▼	3.8 ▼	8 ▼	13 ▼
Croatia	17.5 ▼	-9.7 ▼	-3 ▼	11.9 ▼	6 ▼	4 ▼
Cyprus	7.1 ▼	3.6 ▼	10 ▼	28.5 ▼	19 ▼	2 ▼
Denmark	38.6 ▲	9.4 ▬	6 ▬	124.2 ▬	23 ▲	-1 ▼
Estonia	0.3 ▲	0.1 ▼	3 ▼	20.1 ▲	10 ▲	2 ▼
Finland	15.5 ▼	0.1 ▼	0 ▼	47.5 ▼	16 ▼	3 ▼
France*	485.1 ▲	97.9 ▼	9 ▼	49.4 ▲	45 ▲	-11 ▲
Germany	5.1 ▼	0.3 ▼	1 ▼	131.8 ▼	21 ▼	-6 ▲
Ireland	60.6 ▲	14.1 ▼	7 ▼	63.4 ▲	32 ▼	-3 ▲
Italy	205.7 ▲	114.8 ▲	16 ▲	106.2 ▲	29 ▲	28 ▼
Malta	-1.4 ▼	-6.4 ▼	-68 ▼	-9.5 ▼	-15 ▼	-4 ▼
Netherlands**	30.6 ▼	15.3 ▼	70 ▼	92.1 ▼	140 ▼	-7 ▲
Poland				26.5 ▲	18 ▲	
Portugal	51.0 ▲	7.4 ▼	3 ▼	24.5 ▲	20 ▲	-4 ▲
Romania	14.3 ▲	6.4 ▼	10 ▼	5.7 ▲	22 ▲	11 ▲
Slovenia	2.9 ▼	2.4 ▼	23 ▼	104.3 ▼	28 ▼	14 ▼
Spain	116.4 ▼	-27.2 ▼	-3 ▼	20.3 ▼	13 ▼	-2 ▲
Sweden	12.0 ▼	4.9 ▼	8 ▼	45.6 ▼	19 ▼	-3 ▼
United Kingdom	231.5 ▲	90.9 ▲	16 ▲	85.6 ▲	40 ▲	15 ▼
Total EU	**1294.1** ▲	**324.1** ▼	**7** ▼	**38.0** ▼	**28** ▬	**3** ▼

*Note: National totals are based on the data provided by segments. **Note: 2011 data been used.
Source: EU Member States DCF data submission, 2014

EBIT (Earnings Before Interest and Taxes or Operating Profit)

DCF data from 18 countries (excluding Greece and Poland) show that the EU aquaculture sector earned less profits in 2012 with a reported total EBIT of 324 million Euros, which is a decrease of 27% from the 446 million Euros reported in 2011.

ROI (Return On Investment)

ROI is a performance measure to evaluate the profitability of an investment. ROI is calculated as EBIT divided by total assets. DCF data from 18 countries (excluding Greece and Poland) shows an average ROI of the EU aquaculture sector of 7% in 2012, which is a decrease from the 9% reported in 2011. The operating profit margin or EBIT ratio can be obtained by dividing the EBIT by the turnover and is estimated at around 8% for 2012. However, the ROI for aquaculture is considered a better measure of long term viability.

Labour productivity

The labour productivity is calculated as the total costs in wages and salaries and the imputed value of unpaid labour divided by the total number of FTEs. DCF data from 19 countries (excluding Greece) shows that the labour productivity for the EU aquaculture sector was about 38 thousand Euros per FTE in 2012. This represents a 4% decrease from the 40 thousand Euros per FTE reported in 2011.

There is a large variation between member states in the estimated labour productivity. Bulgaria had the lowest labour productivity of 3.8 thousand Euros, whereas Germany had the highest with a labour productivity of 131.8 thousand Euros.

Capital Productivity

Capital productivity is calculated as Gross Value Added (GVA) divided by Capital value (total value of assets) in percentage. The indicator describes the average value added to the economy per unit of capital invested in the aquaculture sector. DCF data from 19 countries (excluding Greece) shows that the capital productivity for the EU aquaculture sector was 28% in 2012, which was similar to the capital productivity reported in 2011.

Future Expectations Indicator (FEI)

The FEI indicates whether the industry in a sector is investing more than the depreciation of their current assets. With DCF data from 18 countries (excluding Greece and Poland) the FEI for the EU aquaculture sector was estimated at 3.4%. This is a decrease of 33% from the 5.1% reported in 2011.

The industry seems to be investing less in itself, and consequently should have less positive expectations on the future development of the sector. However, the indicator should be interpreted with caution and there is a need to look and interpret this indicator in more detail on sector level, as it is done in next chapter.

3 THE STRUCTURE OF THE EU AQUACULTURE SECTOR

In 2012, marine fish accounted for 31% of the EU aquaculture production in weight, freshwater fish accounted for 21% and shellfish for 48%. While in value terms marine fishes accounted for 53% of the EU aquaculture production, freshwater fishes accounted for 19% and shellfish for 28%. The evolution of the EU aquaculture production in weight and value terms is represented in Figure 3.1.

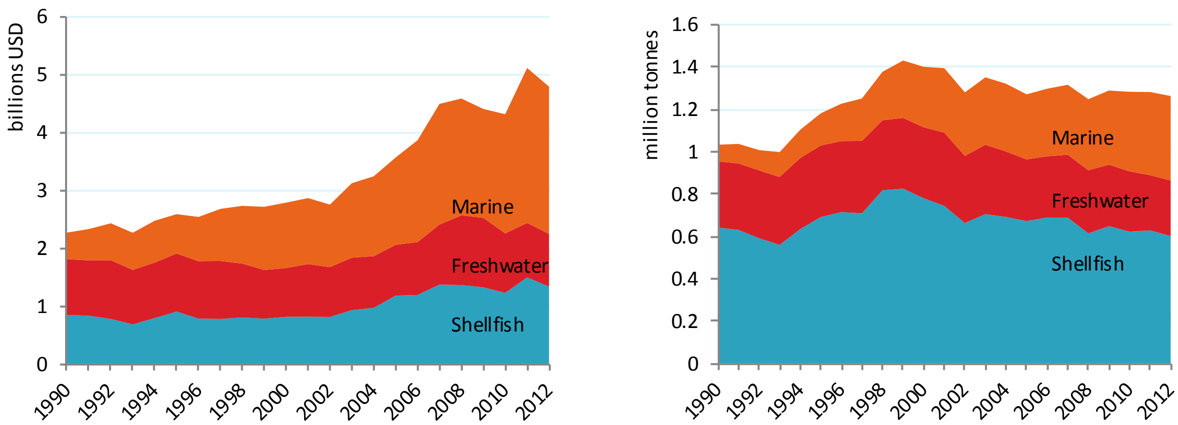


Figure 3.1: EU (28) aquaculture production in weight and value by subsector: 1990-2012.

Source: FAO, 2014

Figure 3.2 shows that income in the EU aquaculture sector is mainly generated in the marine sector (1,612 million Euros) and the shellfish sector (1,238 million Euros) followed by the freshwater sector (756 million Euros).

Most of the GVA is generated in the shellfish sector (651 million Euros) followed by the marine sector (404 million Euros) and the freshwater sector (217 million Euros).

EBIT is mainly generated in the marine sector (179 million Euros) followed by the shellfish sector (130 million Euros) and the freshwater sector showing a negative EBIT (-14 million Euros).

Net profit are also mainly generated in the marine sector (168 million Euros) followed by the shellfish sector (87 million Euros) and the freshwater sector showing a negative net profit (-32 million Euros). Greece and Poland are not included in the numbers shown in Figure 3.2, as they did not provide the numbers to calculate the economic indicators.

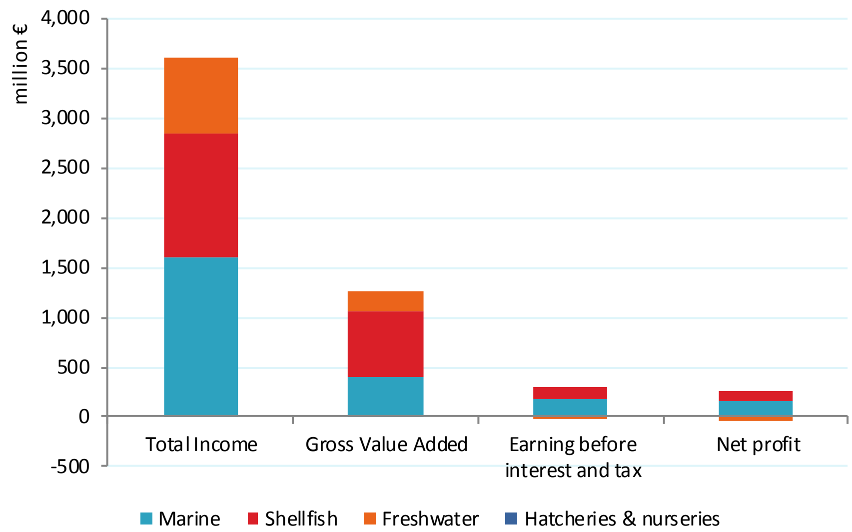


Figure 3.2: EU Aquaculture economic performance by subsector: 2012.

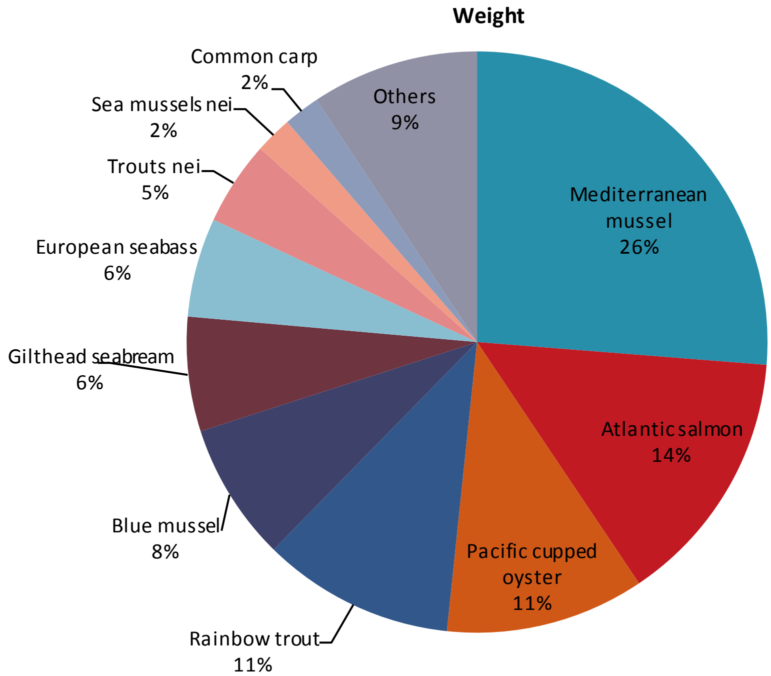
Source: EU Member States DCF data submission, 2014

Main species in the EU aquaculture

In 2012, according to DCF data, the production volume by specie for the EU aquaculture was 1.3 million tonnes and value over 4 billion euros. The main aquaculture species produced in weight terms were Mediterranean mussel (328 thousand tonnes, 26% of total EU production), Atlantic salmon (179 thousand tonnes, 14%), Pacific cupped oysters (138 thousand tonnes, 11%) and Rainbow trout (134 thousand tonnes, 11%). These four species account for more than half (62%) of the total EU aquaculture production in weight.

The Mediterranean mussel was produced mainly in Spain (62% of the EU production), and Italy (26%). Atlantic salmon was mostly produced in the United Kingdom, with more than 92% of the total production and Ireland (7%). Pacific cupped oysters were mostly produced in France (93%) and Ireland (5%). Rainbow trout was produced mainly in Denmark (31%), France (24%), Spain (13%) and United Kingdom (11%).

In 2012, the main aquaculture species produced in value were Atlantic salmon (782 million euros, 20% of total EU value), Pacific cupped oysters (633 million euros, 16%), European seabass (455 million euros, 11%), Gilthead seabream (433 million euros, 11%) and rainbow trout (416 million euros, 10%). These five species accounted for 68% of the total EU28 aquaculture production in value for 2012.



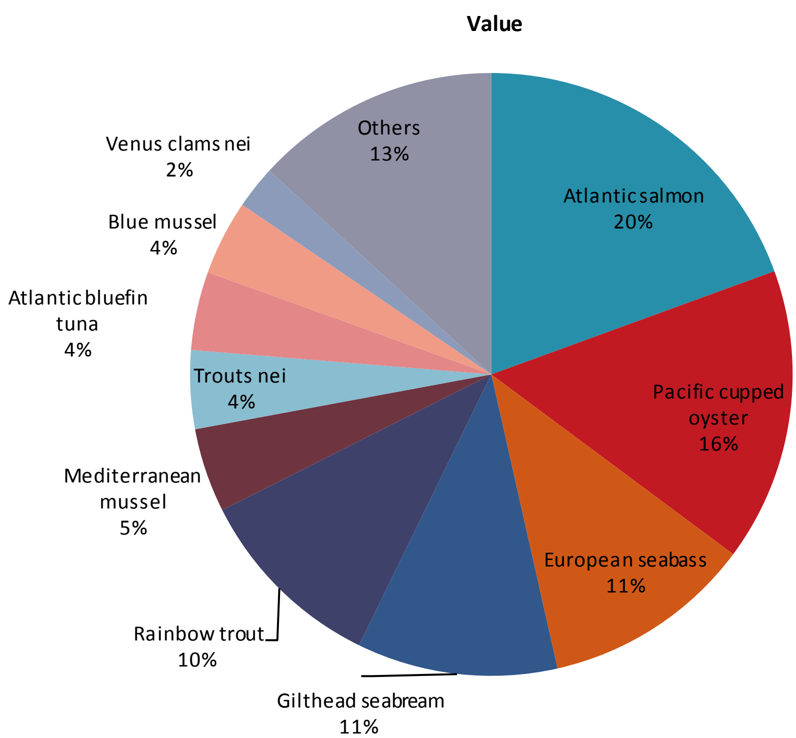


Figure 3.3: Main species produced in EU aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

3.1 Marine aquaculture

Marine aquaculture producing fish is characterised by being capital intensive, in the sense that relative large investment is needed for the physical equipment and the stoking of cages compared to the input of labour. The labour productivity in the sea cage farms is high compared to other aquaculture segments in EU.

Table 3.1: Economic indicators for the EU marine aquaculture: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Bulgaria	3	0.9	1.1	28	23	2.8
Croatia	26 ▼	6.6 ▼	68.4 ▲	871 ▲	805 ▲	14.3 ▲
Cyprus	9 ▬	3.2 ▲	25.1 ▼	248 ▲	243 ▲	11.2 ▼
Denmark	6 ▬	12.9 ▲	57.2 ▲	112 ▲	81 ▲	57.6 ▲
Finland	16 ▼	4.3 ▲	12.4 ▼	70 ▼	57 ▼	36.4 ▼
France	27 ▼	5.3 ▼	52.8 ▼	525 ▼	488 ▬	6.7 ▼
Greece	380 ▲	95.0 ▼	530.5 ▲			
Ireland	19 ▼	12.4 ▬	75.7 ▲	195 ▲	171 ▲	127.6 ▲
Italy	70 ▬	11.7 ▼	79.9 ▲	356 ▼	112 ▼	115.1 ▲
Malta	6 ▬	7.0 ▲	83.2 ▲	167 ▼	153 ▼	23.1 ▲
Portugal	53 ▲	5.8 ▲	34.1 ▲	457 ▲	440 ▲	15.0 ▲
Romania	2 ▲	0.0 ▼	0.1 ▼	0 ▬	0 ▬	
Slovenia	1 ▬	0.1 ▲	0.4 ▼	13 ▬	9 ▼	24.0 ▼
Spain	95 ▬	44.7 ▼	335.4 ▲	2147 ▼	1760 ▬	30.5 ▼
Sweden	7 ▼	0.0	0.0	0	0	
United Kingdom	70	166.4 ▲	698.1 ▲	1481 ▲	1342	23.7 ▼
Other none DCF		0.0	0.0 ▲			
Total DCF reported	***790*** ▲	***376.2*** ▲	***2054.3*** ▲	***6670*** ▲	***5684*** ▲	***27.2*** ▼
Total EU		**376.2** ▲	**2054.3** ▲			

Source: EU Member States DCF data submission & EUROSTAT, 2014

The total sales volume for the EU28 marine aquaculture sector is estimated to be 0.38 million tonnes and the total value of sales (turnover) is estimated to be 2.05 billion Euros in 2012. Available data reports almost 800 enterprises in the EU marine aquaculture sector in 2012. Enterprises had on average 16.3 employees (13.8 in FTE terms)[7].

[7] Greece is excluded from this calculation due to missing employment data on the segment level

Most of the enterprises in the subsector are represented by micro-enterprises (with less than 10 employees). In 2012, 66% of the marine enterprises were micro-enterprises[8].

From the available data it is estimated that the EU28 aquaculture marine sector had almost 7 thousand employees. Part-time work is not of major significance to the marine sector, since the ratio of full time equivalents (FTE) to total employment was 84%. The low percentage of imputed value of unpaid labour in the operational costs underlines this fact. Available data show that women accounted for 17% of marine sector employees.

The average wage per FTE for the EU marine aquaculture sector was 27,250 Euros in 2012. There is a significant variability in wages between countries. This variability in salaries can be explained by differences in labour productivity and the capital and production intensity of the different techniques. The imputed value of unpaid labour is almost negligible in this sector representing only 1.7% of the total wages.

Table 3.2: Economic Performance indicators for the EU marine aquaculture: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Bulgaria	0.7	0.3	13	30.6	26	14
Croatia	12.0	-0.9	0	14.9	6	6
Cyprus	6.4	3.0	8	26.4	18	2
Denmark	11.3	5.0	14	139.2	31	0
Finland	2.8	0.0	0	48.9	15	
France	9.9	6.2	256	68.0	409	-35
Ireland	23.1	-0.6	-1	135.0	26	-2
Italy	35.1	16.4	14	312.6	29	16
Malta	-1.4	-6.4	-68	-9.5	-15	-4
Portugal	31.3	1.6	1	71.1	12	-4
Slovenia	-0.3	-0.5	-15	-26.9	-8	12
Spain	53.5	-9.3	-2	30.4	10	-2
United Kingdom	221.1	164.4	33	164.7	45	17
Total EU	405.5	179.3	10	71.3	22	5

Source: EU Member States DCF data submission, 2014

The EU marine aquaculture sector provided more than 405.5 million Euros in Gross Value Added in 2012 and obtained a net profit after suffering losses on previous years. Measured in terms of EBIT profitability reached more than 179.3 million Euros. Overall profitability measured in terms of ROI reached 10% in 2012. Labour productivity was 88% above the EU aquaculture average with 71,300 Euros per FTE in 2012.

[8] The enterprises with 5 or less employees represented 43% of the EU aquaculture companies in 2012, enterprises with 6 to 10 employees represented 23% and companies with more than 10 employees represented the 34%. Greece been excluded from this calculation due to questionable data quality.

Figure 3.4: Main species produced in the EU marine aquaculture facilities: 2012.

Source: EU Member States DCF data submission, 2014

The most produced marine species in terms of total sales volume was Atlantic salmon representing 48% followed by Gilthead seabream (21%) and European seabass (18%). In terms of total sales value Atlantic salmon represented 41% followed by European seabass (21%) and Gilthead seabream (19%).

3.1.1 Salmon

The main salmon species cultured world-wide and in the EU is Atlantic salmon (*Salmo salar*). Minor production of farmed coho salmon (*Oncorhynchus kisutch*) and chinook salmon (*Oncorhynchus tshawytscha*) occurs outside the EU.

According to the FAO Statistics for 2014, the global production of farmed Atlantic salmon in 2012 was 2.07 million tonnes, valued at 7.85 billion Euros. Norway is the world's leading producer with 60% of the volume and 48% of the value. The EU produced nearly 175 thousand tonnes, valued at 823 million Euros in 2012. The EU produced 8.5% in volume and 10.5% in value of world Atlantic salmon production. Within the EU, the main producer is the United Kingdom (166,000 tonnes), followed by Ireland (12,600 tonnes) and Poland (1,200 tonnes). Currently, there is only minor production of Atlantic salmon in other EU countries.

The economic indicators for EU Atlantic salmon aquaculture collated under the DCF are presented in Table 3.4**.**. The United Kingdom is the main EU producer of Atlantic salmon with 92% of the production by weight and 88% by value. The UK also provides the greatest employment: 1,311 FTEs and 1,438 employees in 2012. The average annual wage in salmon aquaculture in the UK was 23,700 Euros. The second biggest producer was Ireland with 7% of the total production volume and 227 employees.

Table 3.3: Economic indicators for EU salmon aquaculture: 2012.

Country	Number of enterprises		Total sales volume		Turnover		Employment		FTE		Average wage	
	number		*thousand tonnes*		*million €*		*number*		*number*		*thousand €*	
Ireland	27	▼	12.6	▬	80.3	▲	227	▲	193	▲	121.9	▲
Poland	5	▲	1.2	▲	3.7	▲	60	▲	52	▲	11.4	▼
Spain	6	▲	0.0	▼	0.0		35	▼	31	▼	20.0	▲
United Kingdom	62		166.1	▲	696.5	▲	1438	▲	1311		23.7	
Other none DCF			1.3	▲	7.7	▲						
Total DCF reported	***102***	▲	***180.0***	▲	***780.5***	▲	***1760***	▲	***1587***	▲	***35.2***	▼
Total EU			**181.3**	▲	**788.2**	▲						

Source: EU Member States DCF data submissions, 2014 & EUROSTAT, 2014

The salmon segment of EU aquaculture employed 1,760 persons in 2012. Part-time work is not significant, since the ratio between the employment measured in full time equivalents (FTE) and the total employment was 90% in 2012.

Figure 3.5 shows the economic performance indicators by production technique for salmon aquaculture in 2012. The salmon combined segment makes up the majority of the turnover and the gross value added. Almost all of the net profit comes from the combined segment. Also salmon culturing in cages creates some turnover and gross value added, but the share of cages from the total EBIT and net profit is marginal. Salmon hatcheries and nurseries share of the turnover and profits is also minimal.

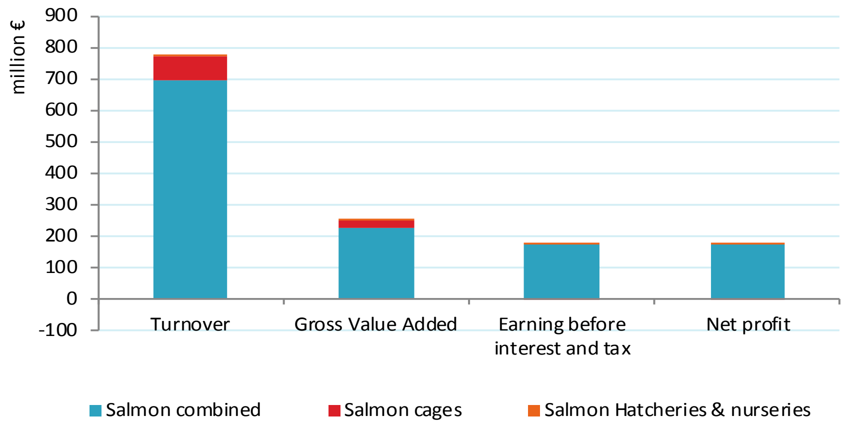


Figure 3.5: Economic performance indicators for salmon aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

EU salmon aquaculture produced a GVA of 253 million Euros and an EBIT of 171 million Euros. The ROI remained at the 2011 level of 29%. Labour productivity went down to 159,100 Euros per FTE from 744,700 Euros. The capital productivity was 43%. From the Future Expectations indicator it can be seen that in most countries de-capitalization is anticipated. The equity ratio of EU countries improved to 81% from 16% between 2011 and 2012.

Table 3.4: Economic performance indicators for EU salmon aquaculture: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Ireland	24.4 ▼	-1.1 ▼	-1 ▼	126.3 ▼	26 ▼	-2 ▲
Poland	1.4 ▲	0.6 ▲	8 ▲	26.5 ▲	18 ▲	-2 ▼
Spain	0.1 ▼	-0.3 ▼	-101 ▲	3.4 ▼	40 ▼	-2 ▼
United Kingdom	226.7 ▲	171.8	36	172.9	47	17
Total EU	252.6 ▲	171.1 ▲	29 ▬	159.1 ▼	43 ▲	14 ▼

Source: EU Member States DCF data submissions, 2014

From Figure 3.6 it can be seen that the economic performance of the EU salmon segment has been improving from 2011 to 2012, where the total operational cost data from UK are included in the DCF. The total operational costs went down in 2012, while the turnover increased improving the GVA and net profit margin significantly. However, United Kingdom data is only available for 2011 and 2012; therefore, Figure 3.6 cannot show the real evolution of the whole EU salmon segment from 2008-2012.

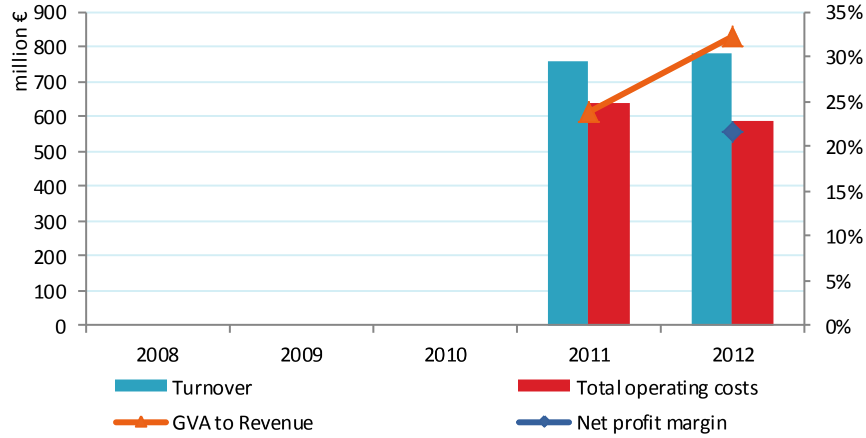


Figure 3.6: Economic performance indicators for salmon aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

From Figure 3.7 it can be seen that the salmon combined segment is mainly responsible for the turnover and GVA of the EU salmon segment. This is because the UK reports all its salmon production as coming from the combined segment. The total income of the combined segment has risen since 2008. Operational costs were reported only for 2011 and 2012 showing a decrease, but with increased GVA and profitability in 2012. The total income in the cages segment rose from 2008 to 2010, but has been quite steady after that. Total operating costs of salmon cages have been rising except in 2011. The GVA has been around 30% in recent years and the net profit margin was negative in 2012.

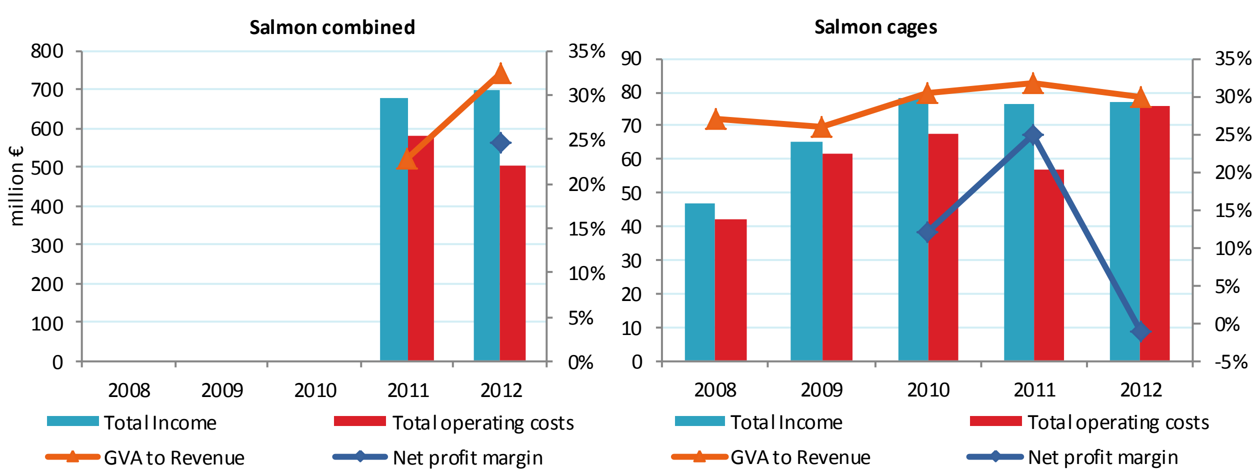


Figure 3.7: Development of economic performance for EU salmon aquaculture: 2008-2012.

Source: EU Member States DCF data submissions, 2014

The most important costs of the EU salmon aquaculture sector are the feed costs, which represented 42% of the total costs in the combined segment and 27% of the costs in the cages segment in 2012. Feed costs are high because salmon production demands expensive feed (especially fish oil). Other operational costs are high in the combined segment (41%) while wages and salaries make up only 6% of the total costs. The cages segment has relatively high costs of wages and salaries (28%), whereas the share of energy costs and repair and maintenance is 10% for each. 14 % of the total costs come from other operational costs. It is important to notice that the imputed value of unpaid labour is practically zero, because most of the work is done under formal contracts.

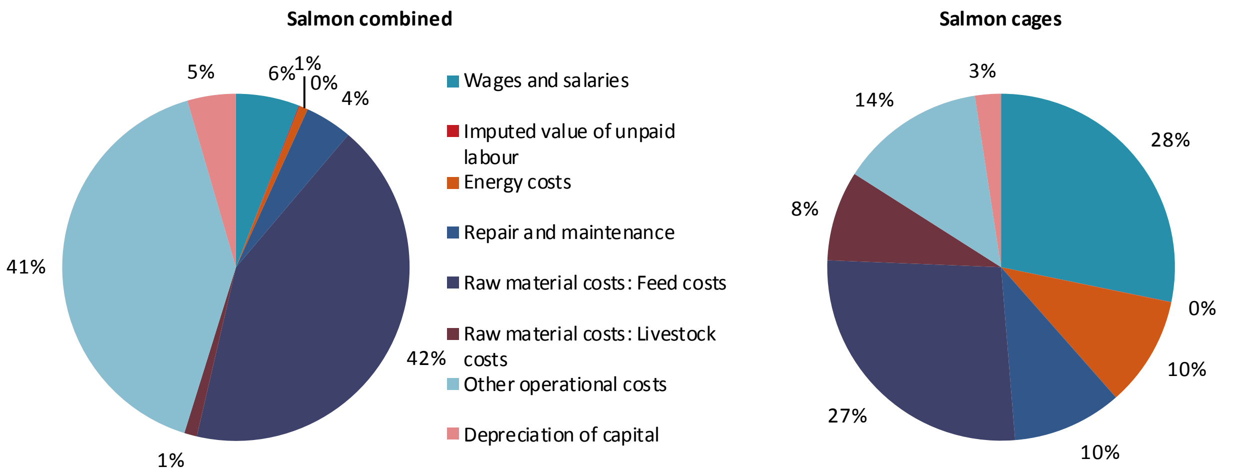


Figure 3.8: Costs breakdown for the EU salmon aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

The average price of Atlantic salmon has increased since 2009. In 2012 the price was around 4.3 Euros/kg.

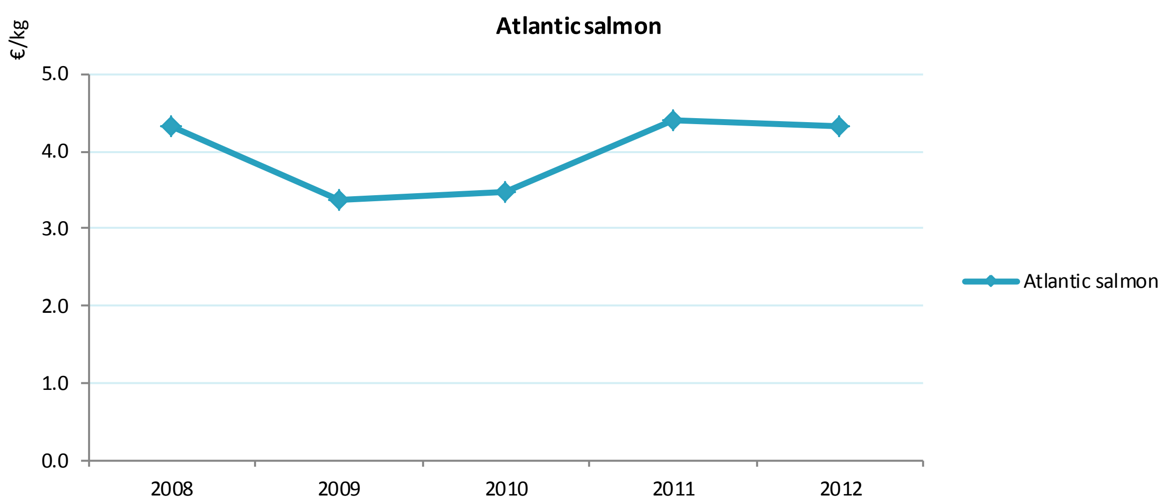


Figure 3.9: Price evolution of the main species of salmon group: 2008-2012.

Source: EU Member States DCF data submission, 2014

3.1.2 Seabass & Seabream

According to FAO production data, the combined production of European seabass (*Dicentrarchus labrax*) and Gilthead seabream (*Sparus aurata*) increased during the 2008 – 2012 period from 245 thousand tonnes valued 1,480 million USD in 2008 to 313 thousand tonnes valued 1,989 million USD in 2012. Leading production countries are Greece and Turkey producing 37% and 31% of the total volume and 37% and 28% of the total value in 2012, respectively. The 5 largest producing countries: Greece, Turkey, Spain, Egypt and Italy produced more than 90% of the total volume in 2012. Egypt and Tunisia have more than tripled their production volume since 2008, whereas Spanish and Italian production volume remained stable during the same period. The volume and value share of the EU producer countries have decreased during the same period by 8%.

Global production of European seabass (*Dicentrarchus labrax*) increased during the 2008 – 2012 period from 115 thousand tonnes valued 782 million USD in 2008 to 153 thousand tonnes valued 1,010 million USD in 2012. Turkey and Greece are the world seabass leading producers with 43% and 28% of the volume and 40% and 28% of the value produced, respectively. The EU produced more than 71 thousand tonnes, valued 532 million USD, in 2012, accounting for 46% of global production volume and 53% of the value. In the EU, the main European producer is Greece with 42.5 thousand tonnes, followed by Spain and Italy with around 14.5 and 6.7 thousand tonnes, respectively (FAO, 2014).

Global production of gilthead seabream (*Sparus aurata*) increased during the 2008 – 2012 period from 129 thousand tonnes valued 698 million USD in 2008 to almost 160 thousand tonnes valued 979 million USD in 2012. Greece and Turkey are the world gilthead seabream leading producers with 45% and 19% of the volume and 47% and 16% of the value produced, respectively. The EU produced nearly 104 thousand tonnes, valued 669 million USD, in 2012, accounting for 65% of global production volume and 68% of the value. In the EU, the main European producer is Greece with 72.3 thousand tonnes, followed by Spain and Italy with around 16.6 and 5.4 thousand tonnes, respectively (FAO, 2014).

The vast majority of seabass and seabream is produced and consumed in Southern European countries. The European industry consists of approximately 270 medium and large scale enterprises (Greece reported the number of farms (378) instead of enterprises) . Most of these firms combine the production of the two species, and volumes of each may change yearly according to the demand and prices. When price of seabream decreases producers usually increase the production of seabass.

Table 3.5: Economic indicators for the EU seabass & seabream aquaculture: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Croatia	23 ▼	4.4 ▲	25.7 ▲	460 ▲	413 ▲	13.1 ▲
Cyprus	9 =	3.2 ▲	25.1 ▼	248 ▲	243 ▲	11.2 ▼
France	20 ▼	2.7 =	32.6 ▼	283 ▼	275 =	11.9 ▼
Greece	378 ▲	91.3 ▼	510.3 ▲			
Italy	51 =	10.3 =	72.3 ▲	303 ▼	101 ▼	112.4 ▲
Malta	2 ▲	2.7 ▲	▲	45 ▼	39 ▼	▲
Portugal	47 ▲	1.4 =	13.6 ▲	246 ▲	230 ▲	13.8 ▲
Slovenia	1 =	0.1 ▲	▼	13 =	9 ▼	▼
Spain	61 ▼	33.8 ▼	231.0 ▲	1368 ▼	1108 ▼	31.0 ▲
United Kingdom	1	0.2 ▼	▼	28	21	
Other none DCF		0.0	0.0			
Total DCF reported	***593*** ▲	***150.0*** ▼	***923.9*** ▲	***2994*** =	***2439*** =	***25.6*** ▼
Total EU		**150.0** ▼	**923.9** ▲			

Source: EU Member States DCF data submission, 2014.

Based on DCF data, EU production decreased during 2012 to 150.0 thousand tonnes valued at 923.9 million Euros. Employment rose to almost 3,000 employed (excluding Greece) corresponding to 2,439 FTEs. On average the wages decreased in the EU seabass and seabream aquaculture segment.

Since 2008, the EU production of seabass and seabream has stabilised. The most important factors driving this stabilisation refer to the 2008/2009 price decline and the weak demand in southern Europe as an effect of the lower income due to the recent debt crisis. Low credit availability in southern Europe also contributed to the stabilisation of production. On top, rising feed costs have weakened the economic performance of the sector. Recent liquidity problems of the Greek producers did not allow the sector to recover from the 2008/2009 price decline. In Greece, the concentration process of the sector during the past years was mainly financed by loans. A large number of Greek SME's and larger aquaculture enterprises are now unable to repay these loans and a new restructuring and concentration cycle has started in Greece during 2014. This reconstruction is expected to affect enterprises that control more than 50% of the Greek production. Greek banks are thus expected to control the majority of the sector at least for a short period of time.

For the same period, non EU countries such as Turkey, Egypt and Tunisia have increased production of the two species. Approximately 10% of the Turkish production is controlled by Greek enterprises. While Turkish seabream production is significant, most of the quantities produced are consumed in the local market. On the other hand, Turkish seabass production is exported to EU countries thus receiving (until recently) export subsidies. There exists a price premium for the European seabass production, which is attributed to the quality of the product and the export subsidies for the Turkish producers. The delay of approximately one day for Turkish fresh seabass to reach the EU markets is reflected in the quality and the price of the product. Nevertheless, the export subsidy compensated till recently for the lower price of the Turkish product.

While southern EU countries are expected to start recovering from the recent debt crisis, demand for seabass and seabream is expected to grow in the near future. Nevertheless regulatory framework in the EU countries is expected to restrict expansion of production in the EU. On top, restructuring and concentration of the Greek enterprises is also expected to restrict expansion of production for at least 2-3 years (that is at least 2 production cycles). For these reasons demand for seabass and seabream in the next few years is expected to be covered by production outside the EU.

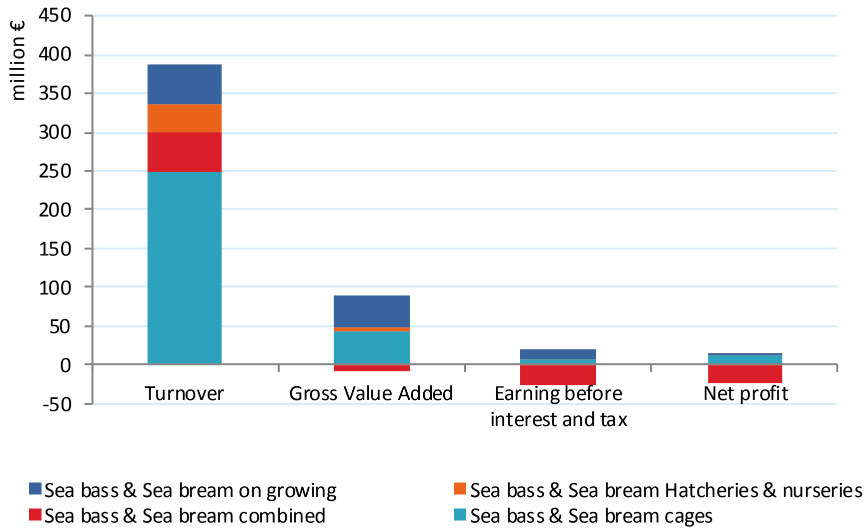


Figure 3.10: Economic performance indicators for sea bass and sea bream aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

Unfortunately, as Greek did not submit most of the economic variables, economic indicators presented in the above figure and the table below only refer to a minor part of the EU production. From the figure above, it can be seen that the segment of seabass and seabream in cages is the one with the highest turnover, followed by combined, hatcheries and nurseries and on growing. A similar situation may be identified when looking at the GVA production. It should also be noted that all segments registered profits in 2012, excluding seabass and seabream combined. In Greece, there exist only two segments, seabass and seabream combined and seabass and seabream cages.

Table 3.6: Economic Performance indicators for the EU sea bass and sea bream aquaculture: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Croatia	-10.3 ▲	-15.1 ▲	-15 ▼	-25.0 ▬	-10 ▼	7 ▲
Cyprus	6.4 ▼	3.0 ▼	8 ▼	26.4 ▼	18 ▼	2 ▼
France	9.9 ▼	6.2 ▬	256 ▲	68.0 ▲	409 ▲	-35 ▼
Italy	35.9 ▲	18.8 ▲	17 ▲	355.4 ▲	32 ▲	15 ▼
Portugal	15.4 ▲	-0.3 ▼	-1 ▼	66.9 ▲	55 ▲	-7 ▼
Spain	27.6 ▼	-14.3 ▲	-4 ▼	24.9 ▬	8 ▼	-1 ▼
Total EU	85.5 ▬	-2.7 ▼	0 ▼	37.4 ▲	14 ▼	3 ▼

Source: EU Member States DCF data submission, 2014

Countries producing relatively small quantities of seabass and seabream have recovered from the 2008/2009 price decline. However, in Spain the second larger producer in EU, the sector is still under recovery, since both the EBIT and net profit are still negative and has suffered a negative evolution compared with 2011. The recovery of the sector is still underway also in Greece[9] where despite the fact of positive EBIT, net profit remains negative for 2011 and 2012. In Italy, the recovery in 2012 was recorded in a more evident way, although the indicator of future expectation was negative. This indicator reflects the difficulty of obtaining credit and the difficulties of applying to the existing legislation

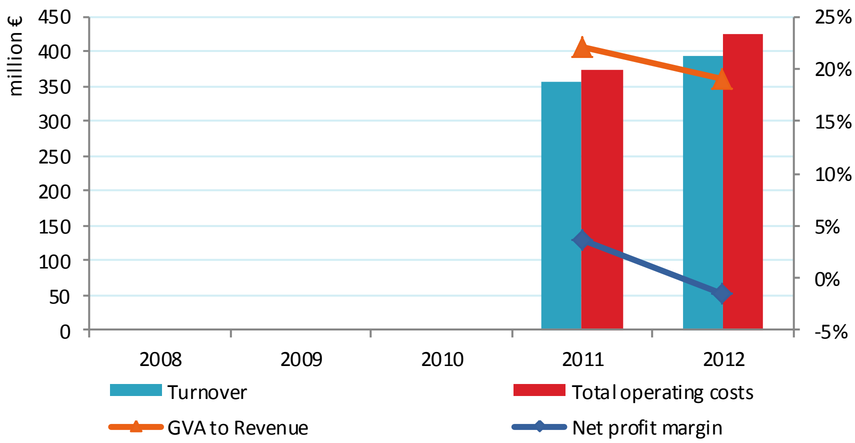


Figure 3.11: Economic performance indicators for sea bass and sea bream aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

In general terms, the increase in the operational cost has been overcome by increasing turnover during 2011 and 2012. Operational cost is mostly related to feed, which is the main production cost for seabream and seabass aquaculture. In particularly, the increase in feed cost has been high, and the result is a net profit margin just around zero or below, in 2012. This reduction is particularly significant in Spain where the net profit margin decreased by 45% between 2011 and 2012.

Looking at these tables and figures it should be born in mind that the economic performance of the largest and most important producer Greece is not included.

[9] Profit and loss for the Mari-culture industry in 2012 (in Greek). Downloaded from http://www.inr.gr/?p=a22 on 12/09/2014.

Figure 3.12: Development of economic performance for the EU sea bass and sea bream aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

In the above figure, the evolution of the cages segment should be noticed, where the net profit margin has been increasing since 2009, and finally it reaches a positive value in 2012. However, for the two remaining segment the profit margin was decreasing in 2012.

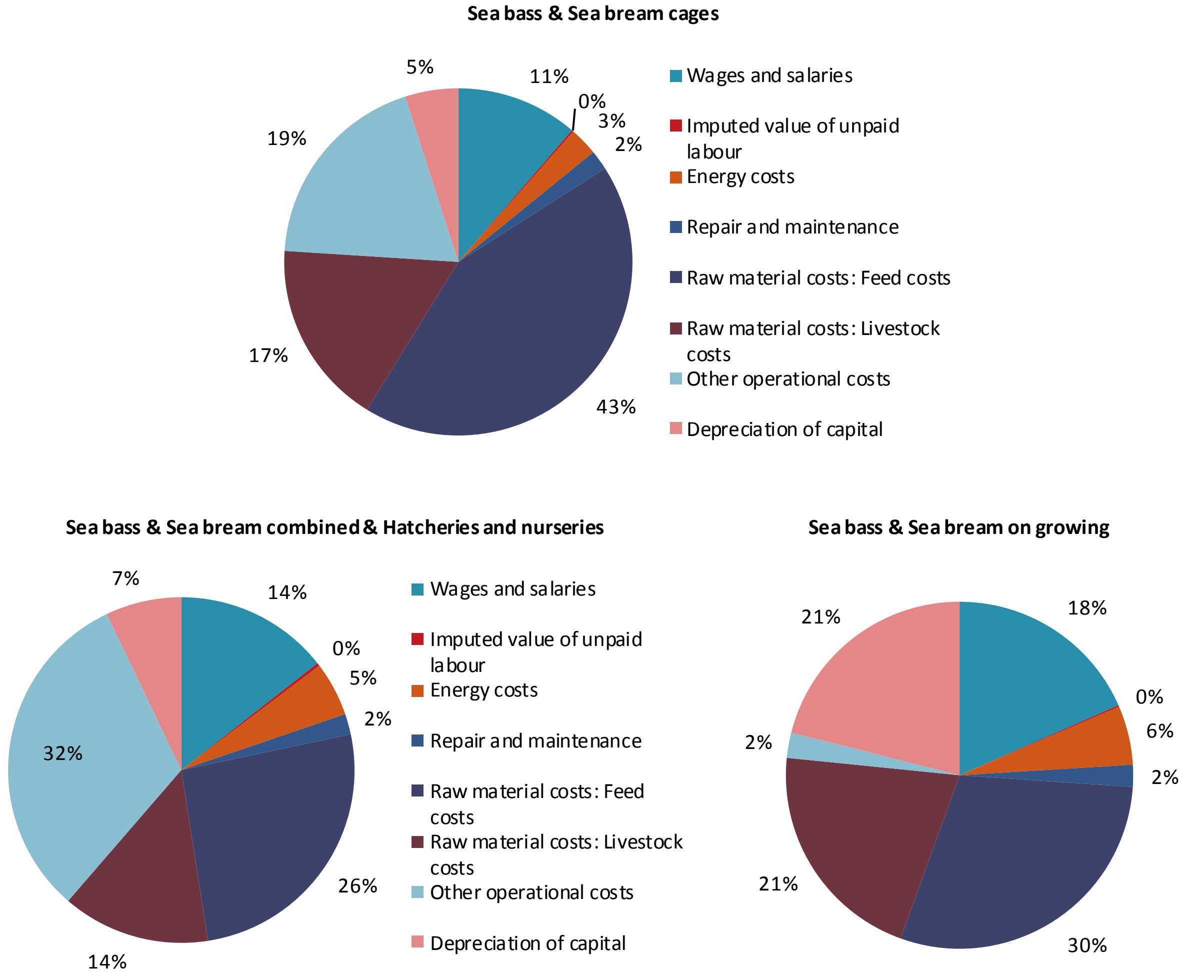


Figure 3.13: Costs breakdown for the EU sea bass and sea bream aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

In the figure above, the cost structure of the EU seabass & seabream aquaculture subsector is presented for 2012.

In the cages production segment, raw material (feed costs and livestock) account for 60% of the total cost, and this cost item increased by 18% compared to 2011. This finding contributes to the explanation of the difficulty of the sector to recover from the 2008/2009 crisis, especially for the main producers Greek and Spain. In Italy the cost of fingerlings (livestock) is less important for the operational costs, since the production in Italian hatcheries is able to meet almost total domestic demand. Other operational costs and wages account for 19% and 11% of the total cost respectively in 2012. Compared to the other producers Italy have high cost of wages and salaries; wages and salaries weighs, on the sharing of national operational costs, more than 45% of the total direct costs of production. Energy and maintenance costs account for 3% and 2% of the total cost respectively. Finally depreciation of capital is estimated to represent 5% of the total costs.

The increasing feed prices were the main driver of the negative performance of the economic indicators in Spain. For the two segments existing in Greece, seabass and seabream combined and seabass and seabream cages, the cost breakdown is in line with the above figures except in the case of feed cost and other operational costs but coincides as a total. Feed costs are expected to be higher and covers more than 50% of the total costs for both segments.

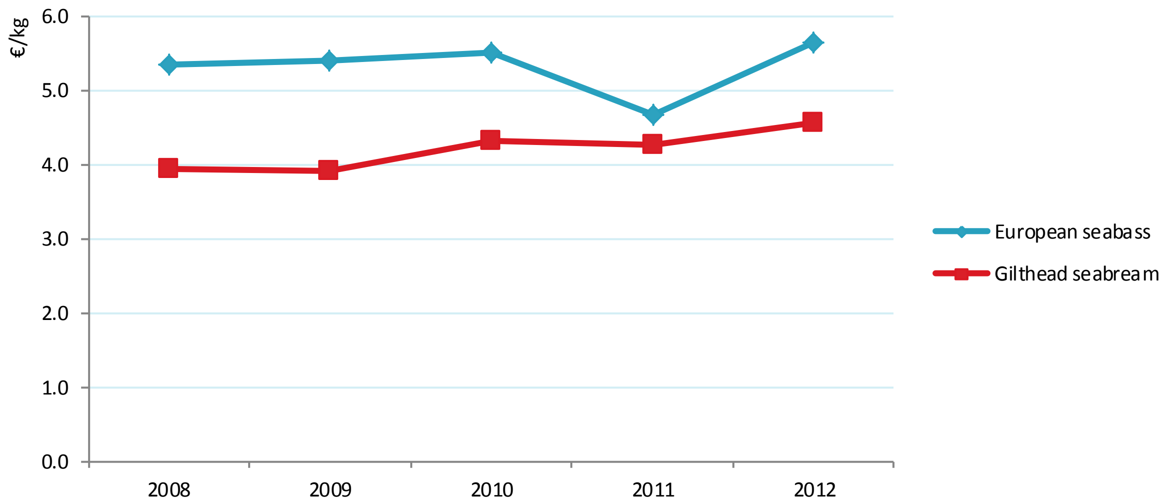


Figure 3.14: Price evolution of the main species of sea bass and sea bream group: 2008-2012.

Source: EU Member States DCF data submission, 2014

In the figure above, price evolution of European seabass and seabream is presented. Low seabream price for 2008-2009 is identified as well as the upward trend since 2010. In the case of Greece (not included in the price evolution data) seabream first sale price decreased during 2012. The development in the Italian price is similar to Greece. Prices in Spain increased during 2012 what contributes to explain the positive evolution of the average price and total income although the quantities produced decreased.

3.1.3 Other marine fish species

Current DCF segmentation classifies the enterprises according to the main species (or group of species) produced (e.g. salmon, trout, carp, mussels). However, there are a significant number of enterprises that produce species not specifically identified in the DCF segmentation. These species are grouped within other marine fish species.

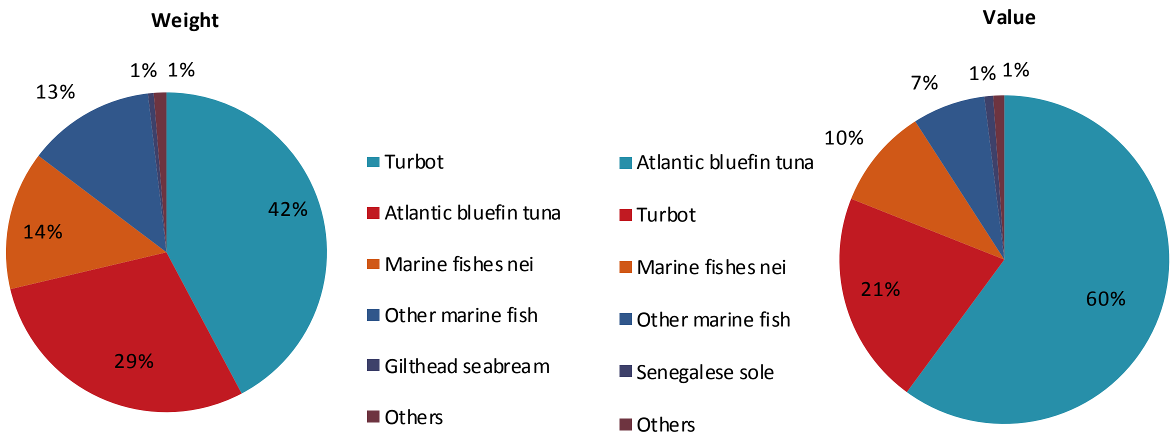


Figure 3.15: Main species, produced in the other marine fish farming facilities: 2012.

Source: EU Member States DCF data submission, 2014

The Figure 3.15 shows the divisions of other marine species produced in the EU. Atlantic Bluefin tuna is the most important species in terms of value, contributing by 169.1 million euros (60% of the total) and 8,400 tonnes (29%). This production is based on the feeding of the wild Atlantic bluefin tuna caught in the Mediterranean Sea and highly dependent on the catch quotas available. Atlantic Bluefin tuna mainly fed in Croatia, Malta and Spain. Turbot is the most important species by production volume, contributing 42% although it is second by value (21% of total). Turbot is mainly produced in Spain and Portugal, with more than 12,600 tonnes produced in the EU in 2012. The third most valuable grouping is marine fishes nei, contributing 10% to the total value and 14% to the total volume.

There are other marine species cultured in lower amounts, such as meagre, flathead grey mullet, mullets, sole, Atlantic halibut, etc. Some of these species have already started to be produced in a controlled way, while others are mostly experimental productions.

3.2 Shellfish aquaculture

The shellfish aquaculture is to a large extend based on small scale family owned enterprises. This sector contributes actively to external trade and has a very important social dimension given the high number of persons employed. The shellfish sector do not face limiting environmental concerns in terms of nitrogen and phosphorus emission, because shellfish help to improve water quality by filtering the water for phytoplankton absorbing these nutrients. However, shellfish farmers face other problems in terms of limitation of suitable production sites, competition for space and spreading of diseases.

The most important costs items of the EU shellfish aquaculture sector are labour and livestock. A large part of the employment is not performed under a formal contract. The workers are either the owners of the enterprise or family members.

The total sales volume for the EU28 aquaculture shellfish sector is estimated to be 0.66 million tonnes and the total value of sales (turnover) is estimated to be 1.2 billion Euros in 2012, as can be seen in Table 3.7

Table 3.7: Economic indicators for the EU aquaculture shellfish subsector: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Bulgaria	11	0.8	0.4	37	24	4.6
Croatia	107	1.3	1.6	173	121	6.9
Cyprus	1	0.0		11	5	
France	2914	230.1	802.4	16905	9151	23.3
Germany	8	6.7	9.5	39	39	58.7
Greece	595	17.6	7.1			
Ireland	241	22.7	47.3	1448	738	21.5
Italy	291	109.5	135.3	3892	1693	12.9
Netherlands*	77	34.5	48.8	248	186	43.4
Portugal	1375	3.9	23.3	2046	1577	5.8
Slovenia	10	0.3	0.4	21	18	30.7
Spain	2777	207.7	90.4	16858	3358	18.2
Sweden	28	1.3	1.0	50	24	18.0
United Kingdom	244	27.4	46.2	705	525	19.2
Other none DCF		0.0	0.0			
Total DCF reported	***8690***	***665.0***	***1214.7***	***42437***	***17461***	***19.4***
Total EU		**665.0**	**1214.7**			

Source: EU Member States DCF data submission, 2014 & EUROSTAT, 2014

Reported data shows the existence of almost 8.7 thousand enterprises in the EU aquaculture shellfish sector in 2012. Enterprises had on average 5.2 employees (2.2 in FTE terms). The majority of the enterprises in the sector are micro-enterprises (with less than 5 employees), covering 80% of the EU aquaculture shellfish enterprises.

From the available data, the EU28 aquaculture shellfish sector employed more than 42 thousand people. The shellfish sector has an important share of part-time work, since the ratio between the employment measured in full time equivalents (FTE) and the total employment was 41% in 2012. Available data show that women accounted for 31% of the employment of the sector corresponding to 24% in FTE terms.

Available data suggest that the average wage per FTE was 19,400 Euros in 2012. There is a large variability of wages between the EU countries. The salaries varied from 5,800 Euros in Portugal to 58,700 Euros in Germany. This significant variability in the salaries for shellfish aquaculture by country corresponds in part to the estimation of unpaid labour and the use of different techniques, for example, more capital intensive techniques are used in Denmark, Germany and the Netherlands. The unpaid labour is very important in the shellfish aquaculture and imputed value of labour represents 43% of the total wages.

Table 3.8: Economic Performance indicators for the EU aquaculture shellfish subsector: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Bulgaria	0.3	0.2	4	11.8	8	25
Croatia	1.6 ▲	0.5 ▲	10 ▲	13.6 ▲	29 ▲	-4 ▲
France	452.2 ▲	68.1 ▼	7 ▼	49.4 ▲	44 ▲	-13 ▲
Germany	5.1 ▼	0.3 ▼	1 ▼	131.8 ▼	21 ▼	-6 ▲
Ireland	35.1 ▲	16.2 ▲	19 ▲	47.5 ▲	41 ▲	-3 ▲
Italy	37.7 ▲	12.2 ▲	10 ▲	22.3 ▲	32 ▲	32 ▲
Netherlands	27.2 ▼	12.8 ▼	59 ▼	146.4 ▼	125 ▼	-5 ▲
Portugal	19.3 ▼	9.5 ▼	201 ▼	12.2 ▼	410 ▼	24 ▼
Slovenia	3.1 ▼	2.9 ▼	41 ▼	171.2 ▼	44 ▼	14 ▼
Spain	55.4 ▼	-4.0 ▼	-2 ▼	16.5 ▼	21 ▼	-2 ▼
Sweden	0.7 ▲	1.5 ▲	68 ▲	28.0 ▲	31 ▲	-8 ▲
United Kingdom	40.3 ▲	22.9 ▲	91	76.8	161	16
Total EU	651.6 ▲	130.1 ▼	8 ▼	37.7 ▲	42 ▬	-7 ▼

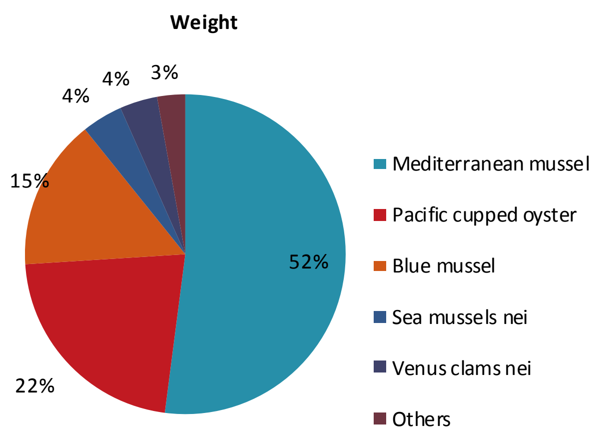
Source: EU Member States DCF data submission

Available data report that the EU shellfish aquaculture sector provided 0.65 billion Euros in Gross Value Added in 2012.

Available data show that the EU shellfish sector has obtained profits, measured in terms of EBIT of 130 million Euros. Most Member States producing shellfish reported a positive profitability, with only Denmark and Spain having negative profitability. The profitability measured in ROI terms was 8% in 2012.

Reported data shows that the labour productivity for the EU aquaculture shellfish sector was 37,700 Euros per FTE. Reported data also shows that the capital productivity was 42% in 2012.

The main species produces in EU shellfish farming facilities are in order of weight, Mediterranean mussel, Pacific cupped oyster, Blue mussel and Clams. However, in terms of value pacific oyster are the most important.



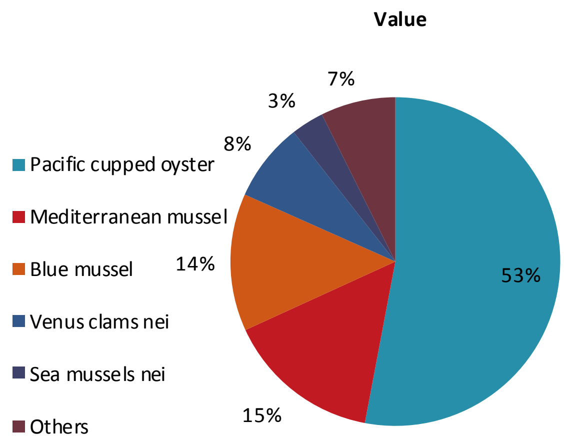


Figure 3.16: Main species, produced in the EU shellfish farming facilities: 2012.

Source: EU Member States DCF data submission, 2014

3.2.1 Mussel

The main species of mussels farmed in the EU are blue mussel (*Mytilus edulis*) and Mediterranean mussel (*Mytilus galloprovincialis*). Other species of mussels relevant in the international markets and farmed outside the EU are: Chilean mussel (*Mytilus chilensis)* or (*Mytilus edulis platiensis)*; the New Zealand green-lipped mussel, (*Perna canaliculus*); and the Korean mussel (*Mytilus Coruscus)* and (*Crenomytilus grayanus)*.

World´s total mussel production reached 1.9 million tonnes and 2.0 billion USD in 2012 (FAO, 2013). According to the data reported to FAO, the EU represents approximately 90% of world production of blue and Mediterranean mussel, both in volume and value. However, it is known that some countries do not report production per species, instead opting to refer to the country of production (e.g. Chilean mussel).

In Table 3.9 economic indicators for the mussel sector is shown. According to data collected under DCF, the volume of mussels produced in the EU is 467 thousand tons, valued at 372 million euros. In comparison with 2011, this represents a 2.8% increase in volume but a 7.2 % decrease in value. Three different species are reportedly produced: Mediterranean mussel (328,200 tonnes), blue mussel (96,200 tonnes) and sea mussel (26 tonnes) with 17.8 tonnes reported as “other”.

In the EU, the main producer is Spain with around 202,600 tonnes in 2012, compared to 208,500 tonnes in 2011. Runners-up are France and Italy with around 78,700 resp. 85,500 tonnes totally produced in 2012 (67,900 resp. 59,500 tonnes in 2011) (based on EU Member States DCF data submission).

Table 3.9: Economic indicators for the EU mussel aquaculture: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Bulgaria	11	0.8	0.4	37	24	4.6
Croatia	107	1.3	1.6	173	121	6.9
France	406	78.7	154.3	2165	1514	33.6
Germany	8	6.7	9.5	39	39	58.7
Greece	595	17.6	7.0			
Ireland	97	15.0	11.1	443	268	21.1
Italy	159	85.5	42.8	909	1020	7.8
Netherlands*	58	31.0	43.0	200	150	65.2
Portugal	17	0.4	0.5	58	54	10.1
Slovenia	10	0.3	0.4	21	18	30.7
Spain	2042	202.6	62.8	9059	2229	12.7
United Kingdom	124	26.0	38.5	399	305	19.9
Other none DCF		0.0	0.0			
Total DCF reported	***3645***	***467.2***	***372.8***	***13506***	***5746***	***17.8***
Total EU		**467.2**	**372.8**			

*The Netherlands did not provide data for 2012, data presented here are from 2011.
**The Romanian mussel sector is not presented due to confidentiality reasons.
***Denmark is excluded do to implausible FTE data and limited production.
Source: EU Member States DCF data submission

In terms of production value, France is by far the most important country, standing for more than a third of mussel turnover in 2012. The average wages differ significantly among the countries, which could be interpreted as an indicator for the technological and organisational development in the different countries.

Social importance of mussel sector in Spain

The mussel is cultivated mostly in Galicia, where it is a traditional and consolidated sector. The industry has a significant impact on the Galician economy. Most of the people working in the sector is from the local area. It is a sector with a high volume of production. The mussels are cultivated on more than 3.200 rafts, which belong to around 2,000 owners. This shows that the property is divided into a large number of families. The workers are often self-employed people and there are a lot of part time workers; many of them belonging to the same family as the owner. Other workers are fishermen who work on the rafts during the season where the fisheries are closed.

It is important to highlight that the sector is closely related to the canning industry, also situated in the same areas, and in which most of the inputs are from the Galician. Furthermore, there are no external investments in the Spanish mussel sector.

Main techniques

Three main farming techniques are being used in the production of mussels in the EU. Rafts, long line and bottom harvest are well differentiated methods of production, which set further differences in terms of costs and market prices.

The bulk of the whole EU mussels' production is harvested in the Spanish North West region of Galicia where rafts are the dominant technique. A raft is a floating platform with pending ropes of around 30 meters in the form of a matrix, which can be folded according to the depth where the platform is located. The mussels are attached to the rope and covered with a net produced with organic materials that will be progressively disappearing until the mussel fixes to the rope in a natural way. Every row in the matrix corresponds to a particular harvest, which will be collected and replaced in the appropriate date maintaining a continued production along the whole year. Rafts require a minimum depth of around 8 to 10 meters in order to result in efficient outputs.

Long line cultivation shares with rafts the use of ropes where vertical ropes or mussel bags are hang, but instead of the vertical disposition used in rafts, the ropes are horizontally displayed. This fact results in larger needs of space which not are always available due to competing water usages. However, it allows mussel culture in shallow waters where rafts would not be suitable.

Finally, bottom cultivation uses beds or poles fixed in the bottom where the mussels are deposited or attached. It solves some of the problems with required space in long line, but it is still not as efficient as rafts.

All the three techniques require the use of boats in order to collect the mussels and maintain the facilities. Whenever any member country did not report the technique used for mussel culture, the data were allocated into the generic “mussel other” category. The figures for this category should be considered cautiously since different techniques, including rafts, long line and bottom, could be mixed together.

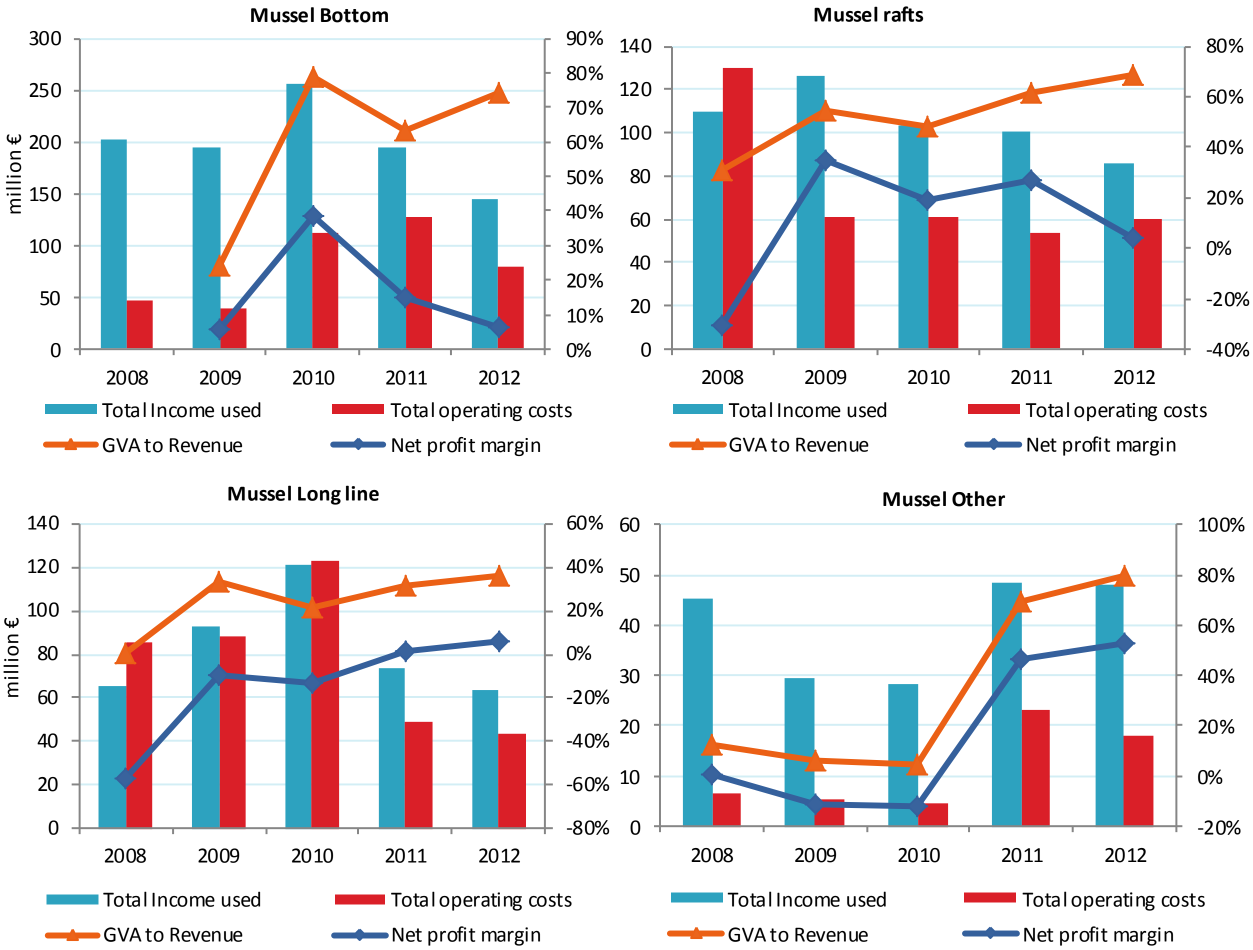


Figure 3.17: Development of economic performance for the EU mussel aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

The evolution of the operational costs sets a division into two categories. While rafts and long line techniques have reduced these costs since 2008, they have increased in the case of bottom culture. Operational costs of the raft technique have remained relatively stable since 2009. However, they kept decreasing in the case of long line after 2010, when they had increased with regard the previous year. The case of bottom culture indicates a significant increase in this kind of costs in 2010 and 2011 to start slightly decreasing in 2012. These changes along time are related with the levels of activity. While the production of mussels from rafts has reached a limit several years ago, due to lack of additional available suitable space for new settlements in Galicia, stability in operational costs appears logical. This argument also puts in question the reliability of the data collected for 2008. The increase in bottom culture can then be explained by decreases in the levels of activity as it indicates the production volumes of countries like Germany, France and the Netherlands. The opposite can be seen in long line where operational costs decrease as the production in Italy decreases.

Total income had increased until 2010 but then decreased in all segments during the observed period. Once again, rafts show the more stable trend than the other two segments. The decrease in the 2012 incomes can be explained, for rafts, due to an increase in the frequency of red tidal.

As a result of the evolution of costs and incomes, GVA slightly increased in the last year for the raft segment as a consequence of relatively stable costs and incomes. However, the decrease in the 2012 income resulted in an equivalent decrease in the net profit for the raft segment. GVA kept stable in bottom and long line culture. However the evolution of net profits shows greater differences across the two techniques. As incomes and costs evolved differently in the two segments, net profits also behaved in different ways. Bottom culture reduced their profits in an almost linear trend since 2010 as a consequence of increasing costs and decreasing incomes. Long line, instead, experienced a larger decrease in costs but a lower in incomes, resulting in a stable almost flat trend in net profits.

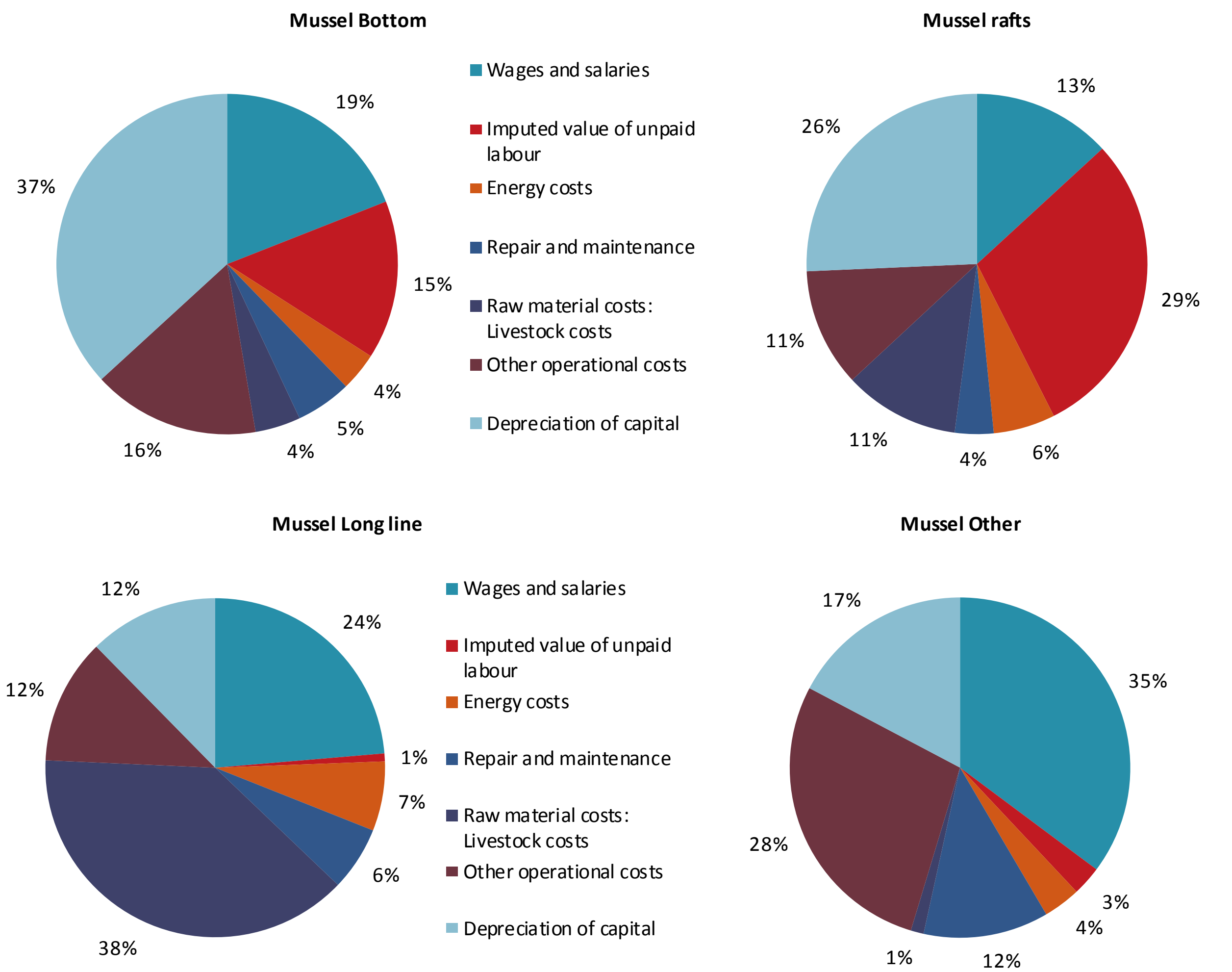


Figure 3.18: Costs breakdown for the EU mussel aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

As it may be expected, the important technical differences across the three techniques results in significantly different cost structures in terms of what are the relevant items and their magnitudes.

One of the cost categories setting differences across techniques is the imputed value of unpaid labor. This has to do with the legal form of the enterprise. Raft and bottom culture records a large number of personal and family owned business in which other members of the family random or periodically contribute to the activity without a formal contract or salary. In contrast, the long line segment is mainly composed by corporations and such kind of informal labor is rarely present. Unpaid labor represents 29% of the total raft costs and 19% in bottom culture, but only 1% in long line. This is also reflected in the importance of the formal wages and salaries which are 24% in long line, 19% in bottom and 13% in rafts.

Livestock costs, on the opposite, result more important in long line due to a particular way of imputing these kinds of costs in Italy, where the salaries of the persons involved in seed collection are included. This is explained in more detail in the Italian national chapter. The fact also informs about the lack of an external seed market, like it is the case in bottom and rafts, where references for a market price can be found, even that collection undertaken by the company itself. The variation in cost for livestock can also be explained by differences in production techniques. If mussel farmers have the capacity to harvest mussel seed themselves, there are no costs for livestock involved. With other production techniques, mussel farmers instead buy mussel seed which are grown larger using rafts, longlines or 'bouchot'.

Under these circumstances livestock costs are over weighted resulting in almost 40% of total long line costs, while it is only 11% and 4% in rafts and bottom, respectively.

In Germany and the Netherlands each mussel enterprise has at least one vessel of about 45 m length with prices of about 4.5 million €, meaning that the capital invested is quite high.

Finally, energy and repair and maintenance costs are quite similar in all the three techniques, with ranges going from 4% to 7% in the case of energy costs and from 4 to 6% in the case of repair and maintenance.

Mussel production in Germany and Netherlands is based on relatively large, professionalised companies. The amount of unpaid labour in these companies is low or absent. In other countries the business is very much depending on smaller family own companies with family members helping.

Table 3.10: Economic Performance indicators for the EU mussel aquaculture: 2012.

Country	GVA	GVA/ revenue	EBIT	ROI	Labour productivity	Capital productivity
	million €	*%*	*million €*	*%*	*thousand €*	*%*
Bulgaria	0.3	77	0.2	4	11.8	8
Croatia	1.6	59	0.5	10	13.6	29
France	109.9	68	1.2	0	72.6	45
Germany	5.1	54	0.3	1	131.8	21
Ireland	7.5	55	-1.1	-2	27.9	16
Italy	21.1	48	10.3	19	20.7	38
Netherlands*	22.7	49	9.5	44	151.6	106
Slovenia	3.1	93	2.9	41	171.2	44
Spain	45.4	72	16.9	11	20.4	31
United Kingdom	33.1	86	25.8	163	108.3	209
Total EU	225.3	67	53.1	10	40.3	41

*The Netherlands did not provide data for 2012, data presented here are from 2011.

** Data for Portugal seem implausible. As it only reported production of 400 tons of production and 500.000 € in turnover. The numbers are removed from the table and totals.
Source: EU Member States DCF data submission, 2014

For most mussel farmers, the total costs of production are almost fixed, given the absence of feed and livestock costs. With production, and thereby turnover, varying significantly per year, labour productivity shows high variation as well. This however is not explained by changes in the workforce, instead reflecting natural variation in production only.

Different ratios of GVA to revenue are indicating different intensive productions and different organisational links of the sector across Europe. In some countries like Slovenia most of the GVA is generated in the company itself, while in The Netherlands/Germany and Ireland the companies seem to have higher linkages to other purchaser along the value chain.

The EU mussel aquaculture gross value added reached more than 225 million Euros. EBIT reached almost 53 million Euros, showing a negative economic performance confirmed by a falling ROI of 10%. Labour productivity reached around 40 thousand Euros per year and capital productivity of 41%.

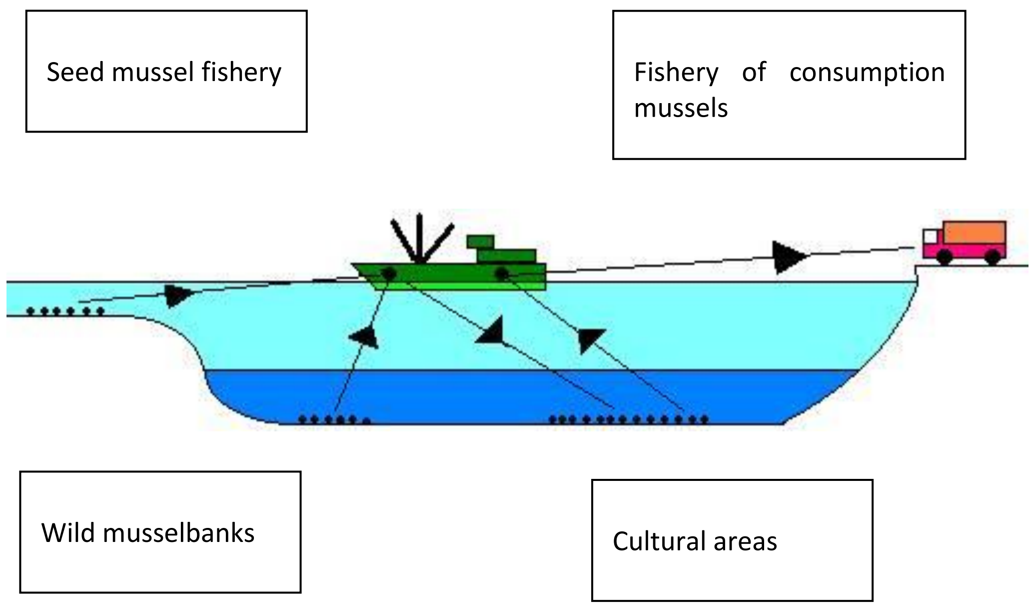


Figure 3.19 Principle of Mussel cultivation in Germany and The Netherlands

Source: www.muschelfischer.de

The seed mussels are collected from special areas and are then carried to areas where the growth conditions are better for the mussels. These areas are assigned by state authorities for a certain fee and timely limited. The mussels are then, after 1-2 years collected from the cultural spots and mostly sold at the mussel auction at Yerseke in the Netherlands. The most important markets for mussels from Germany are the Benelux-countries, France and in Germany especially the Rhineland. The collection of the mussels is done by dredges or beam trawl. The volume of seed mussels varies from year to year. In some years in the last decade almost no seed fall could be noticed. With a time lag of one to two years the volume of mussels for consumption varies accordingly. This is the main reason for the fluctuation of income in this sector. The employment is relatively stable.

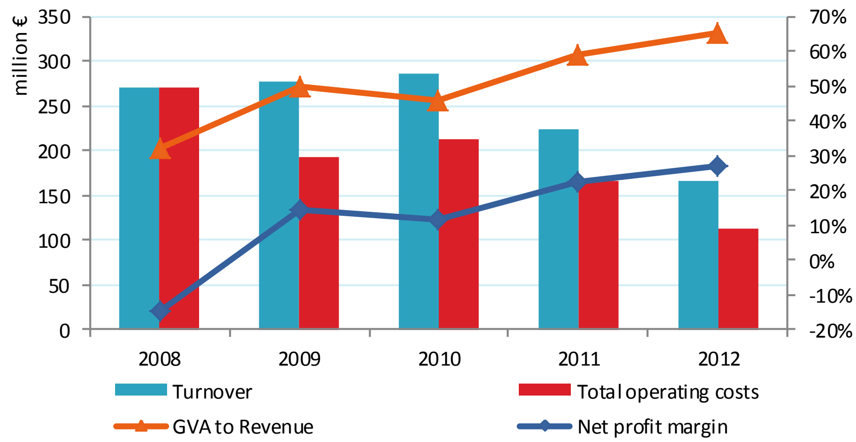


Figure 3.20: Economic performance indicators for mussel aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

Figure 3.20 show the performance of the mussels sector. Since the financial crises in 2008 the income, GVA and net profit margin has improved in the sector. However, the turnover and total operational cost has declined indicating a lower activity in the sector.

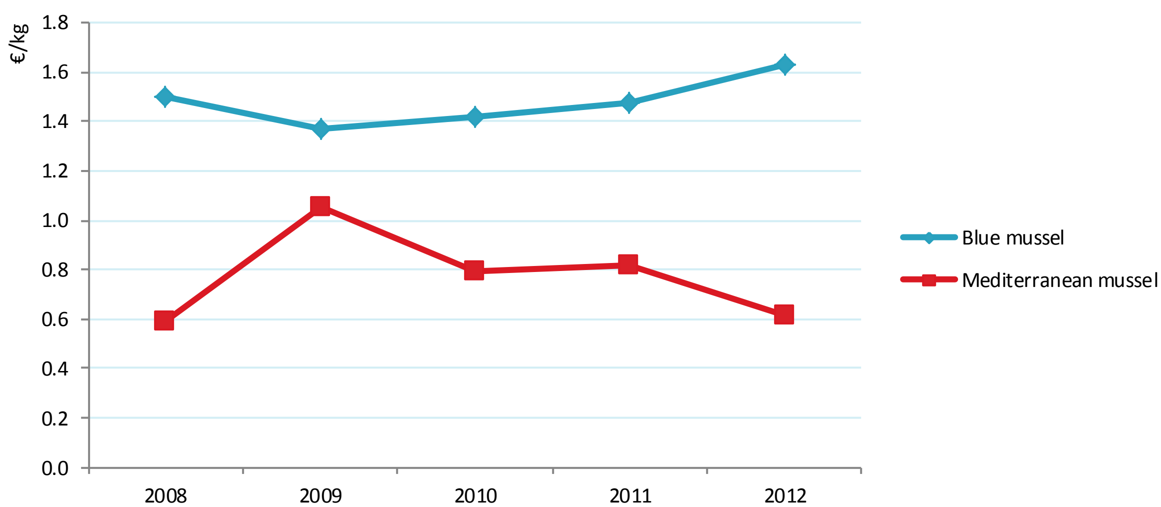


Figure 3.21: Price evolution of the main species of mussel group: 2008-2012.

Source: EU Member States DCF data submission, 2014

The market price for a kilo of blue mussels was one euro more expensive than for Mediterranean mussels in 2012. Mediterranean mussels had an average price around 60 cents along the period observed, and had a stable evolution. The peak in 2009 in Figure 3.21 is more due to absence of data for the year rather than a real significant increase in market price. The price for blue mussel increased 20 cents from 2009 until reaching 1.6 euro per kilo in 2012.

Table 3.11: Future Expectation Indicator

Country	Future Expextations Indicator				
	2008	2009	2010	2011	2012
Bulgaria					24.7
Croatia				-0.9	-3.9
Denmark	28.6	14.2	-3.7		-28.3
France			6.2	-0.5	-122.5
Germany	-6.7	-6.0	-7.6	-3.9	-6.3
Ireland	-25.5	62.6	-22.2	-12.9	-11.9
Italy	9.1	12.3	25.5	20.1	38.5
Netherlands*	2.1	2.7	-2.6	-4.7	
Portugal				-74.4	-11.4
Romania			-1.8		
Slovenia	3.5	-2.3	10.5	22.8	14.1
Spain	7.3	0.7	-45.0	-2.2	-1.1
United Kingdom					50.3
Total EU	-30.2	17.3	25.8	5.4	16.3

*The Netherlands did not provide data for 2012, data presented here are from 2011.
** The value for France 2012 seems to be a significant outlier due to data quality problems
Source: EU Member States DCF data submission, 2014

Table 3.11 shows the Future Expectations Indicator (FEI) which is simply the ratio of net investment and depreciation, meaning that positive values show more investments than depreciation of capital and vice versa. It is assumed that positive values reflect positive expectation about the future development in the sector, while negative values over consecutive years reflect insecurity or bad expectations and will lead to a decrease of the sector if it pertains for a longer period. With the exemption of Italy and UK, main producing countries show negative figures. Keeping in mind that a lot of costs are fixed, meaning that bigger investments as buying a new vessel occurs once in two or three decades. This is not reflected in this short time series presented in the table. E.g. 2009 figure for Ireland shows a big investment while in the following years deprciation increate due to the big investment but no relevant new investment in the following years has been made.

Outlook

Mussel production can be considered as an environmental friendly business, as no feed is necessary and the mussels take nutrients from the water column. This also includes stable production costs for the producers as the variation of feed and energy costs does not affect the business as in finfish aquaculture and recirculation systems. On the other hand it is an environmental depending production, which in some cases hinders a stable supply of seafood products from year to year. In some areas the problem of red tides is very relevant, in the Netherlands and Germany the problem of lacking seed mussels are an obstacle for stable and growing production. Bottom culture depend on the supply of mussel seed, either from the market or through own collection. There is natural variation in the amount of mussel seed available. Concerns about the ecological impact of mussel seed collection in the Wadden Sea have led to harvest restrictions.

The analysis of mussels still lacks from the data quality. Segmentation by species and technique cannot clearly be differentiated due to different understanding by MS when submitting data and due to different dominant technique in different countries. Some MS did not report data for 2012 (e.g. The Netherlands and Greece) and some just started to reporting (UK). This means, that all analysis of the European mussel sector must be taken with caution. The mussel business differs from country to country by technique and capital intensity. In all cases it contributes to rural development, either by direct employment, linkages to other industries or by providing positive external effects on tourism and regional gastronomy. More than this, mussels as an environmental friendly business contributes to food supply by providing valuable animal proteins and other nutrients, and the production itself improves the environmental conditions by taking nutrients from the water column.

3.2.2 Oyster

There are different species of oysters produced in aquaculture: Pacific cupped oyster, American cupped oyster, Slipper cupped oyster, Sydney cupped oyster, Indian backwater oyster, European flat oyster, Mangrove cupped oyster, Cortez oyster, Chilean flat oyster, etc. Total oyster production reached 4.75 million tonnes and 3 billion Euros in 2012. China is the world leading producer of oysters with 83% of the weight and 60% of the value produced (FAO, 2014).

The main species of oysters produced in the world are Pacific cupped oyster (Crassostrea gigas) and European flat oyster (Ostrea edulis). Total production of Pacific cupped oyster and European flat oyster in 2011 is around 610 thousand tonnes, valued in 1 billion Euros. Republic of Korea, Japan and France are the world Pacific cupped oyster and European flat oyster leading producers with 47%, 26% and 13% of the weight and 12%, 28% and 37% of the value produced. The EU produced around 96 thousand tonnes, with a corresponding value of 432 million Euros, in 2012. The EU produced 15.7% in weight and 42% in value of the global Pacific cupped oyster and European flat oyster production. In the EU, the main producer is France with around 83,353 tonnes, followed by Ireland with almost 7,560 tonnes (FAO, 2014).

Table 3.12: Economic indicators for the EU oyster aquaculture: 2012.

Country	Number of enterprises *number*	Total sales volume *thousand tonnes*	Turnover *million €*	Employment *number*	FTE *number*	Average wage *thousand €*
France	2311 =	130.5 ▼	582.3 ▲	13579 ▲	6864 =	22.2 =
Greece		0.0 ▲	0.1 ▲			
Ireland	128 =	7.6 ▼	35.8 ▲	929 =	431 ▲	22.2 ▲
Netherlands*	19 ▼	3.5 ▼	5.8 ▲	48 ▼	36 ▼	27.3 ▲
Portugal	47 ▲	0.8 ▼	2.7 ▼	93 ▲	87 ▲	6.4 ▲
Spain	67 ▲	2.4 ▼	0.5 ▼	648 ▼	99 ▲	8.1 ▲
United Kingdom	103	1.3 ▲	7.5 ▲	275	199	18.4
Other none DCF		0.0	0.0			
Total DCF reported	***2675*** ▲	***146.1*** ▼	***634.6*** ▲	***15572*** ▲	***7716*** ▲	***21.8*** =
Total EU		**146.1** ▼	**634.6** ▲			

Note: 2011 DCF data is used for the Netherlands.
Source: EU Member States DCF data submission

Reported data under the DCF shows that oyster aquaculture reached 146 thousand tonnes, which is a decrease of 5.6% compared to 2011 and a value of more than 634 million Euros in 2012, corresponding to an increase of 16.8% from 2011.

There are more than 2,675 enterprises that produces oyster in the EU. 86% of the enterprises are located in France, followed by Ireland (5%) and UK (4%). The enterprises employ more than 7,700 FTE workers.

This dependency on the availability of French data is also present on the following figure where the extent of the economic performance of the EU oyster aquaculture sector can be seen for 2012. Indicators for 2012 show a positive economic performance of the sector.

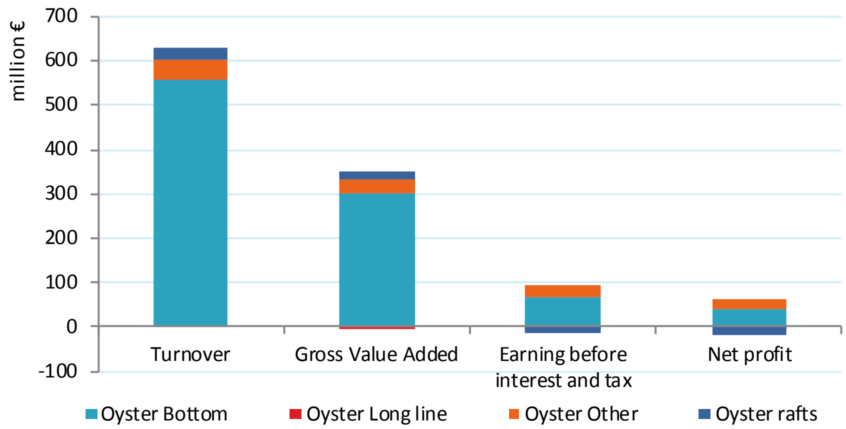


Figure 3.22: Economic performance indicators for oyster aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

The EU oyster aquaculture gross value added reached more than 352 million Euro, EBIT reached more than 76 million Euros, showing a positive economic performance confirmed by a ROI of 10%. Nevertheless, it should be noted that a heterogeneity exist in the economic performance of enterprises producing oysters. Overall, the Spanish and UK firms are characterized by negative EBIT and ROI, whereas enterprises of the major producing countries generate positive margins.

Labour productivity reached 45,800 Euros and a capital productivity of 47%. The future expectations indicator of the industry is negative (-12%). Ireland is characterized by a positive evolution in all its indicators.

Table 3.13: Economic Performance indicators for the EU oyster aquaculture: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
France	314.2	58.9	8	45.8	45	-12
Ireland	27.9	18.5	54	64.8	82	0
Netherlands*	4.5	3.3	705	124.9	957	-11
Portugal	2.4	1.9	92	27.9	119	70
Spain	0.2	-0.6	-13	2.3	5	-15
United Kingdom	7.1	-2.5	-27	36.0	77	-44
Total EU	352.0	76.1	10	45.8	47	-12

Source: EU Member States DCF data submission, 2014

The most important costs of the EU oyster aquaculture sector are livestock costs, which represented 39% of the total costs, wages and salaries represented 20%, imputed value of unpaid labour 16% and other operational costs 18%. Unpaid labour is an important workforce as can be seen from the importance of imputed value of unpaid labour compared to the total cost of wages and salaries. This reflects the importance of family structures of the European oyster farming. There is no feed cost. The feeding of oyster is exclusively of the nutrients available in the sea. The oyster producing enterprises generated a positive net profit, however, it has been declining between 2010 and 2012.

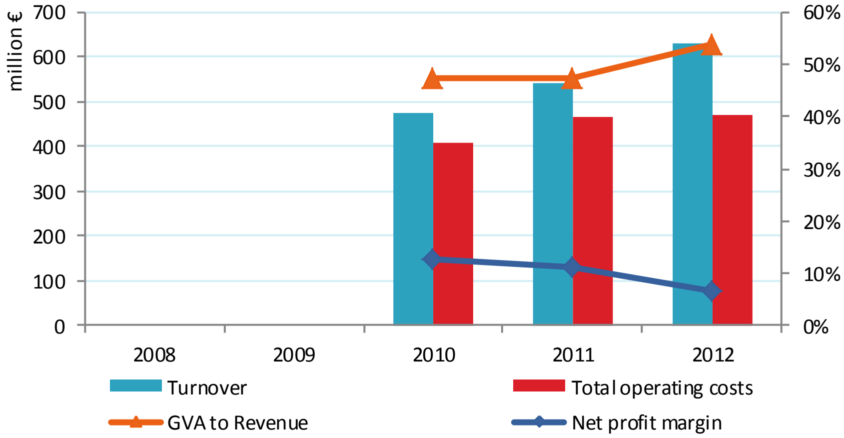


Figure 3.23: Economic performance indicators for oyster aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

The majority of the income and profits are generated in the oyster bottom segment with 89% and 87%, respectively. The gross value added of this segment reached more than 299 million Euro, net profit margin reached more than 37 million Euro. Furthermore, enterprises showed a positive economic performance with a positive net profit margin of 10%, compared to total income used. For the two other segment, Oyster other and oyster raft, total income and gross value added show a positive evolution. But the development of net profit margin is the opposite. For oyster raft, the economic performance is negative net profit of -55%. The net profit margin has increase for other oyster (47%, +17 points between 2010 and 2012).

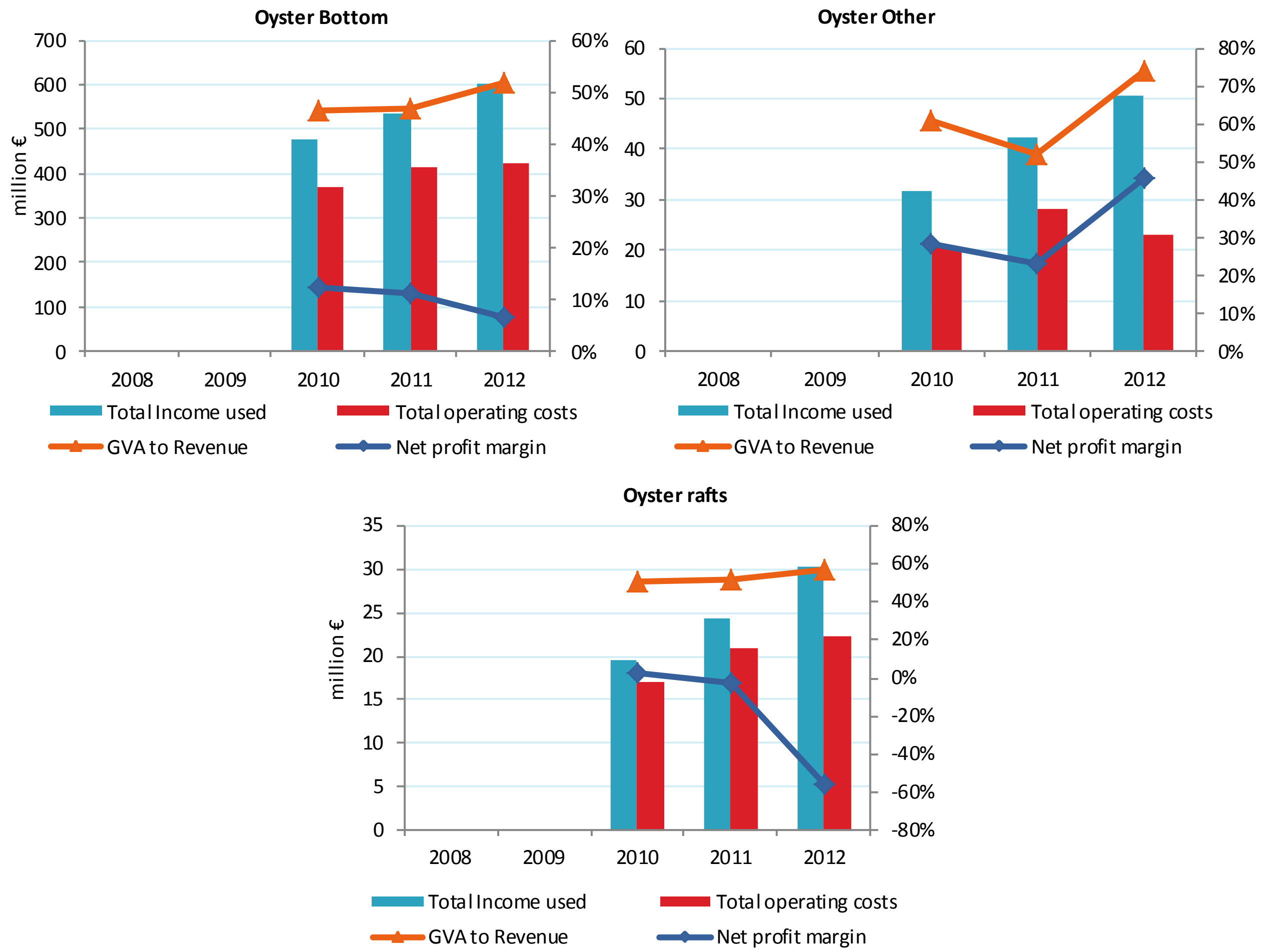


Figure 3.24: Development of economic performance for the EU oyster aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

The cost structure (including depreciation of capital) is very different between the segments. Three cost items characterize the oyster bottom segment: livestock costs, which represented 32% of the total costs, depreciation of capital (21%) and wages and salaries (15%). For the other oyster segment, wage and salaries represent 33% of total cost. The most important cost item for oysters on rafts is the depreciation of capital (51%).

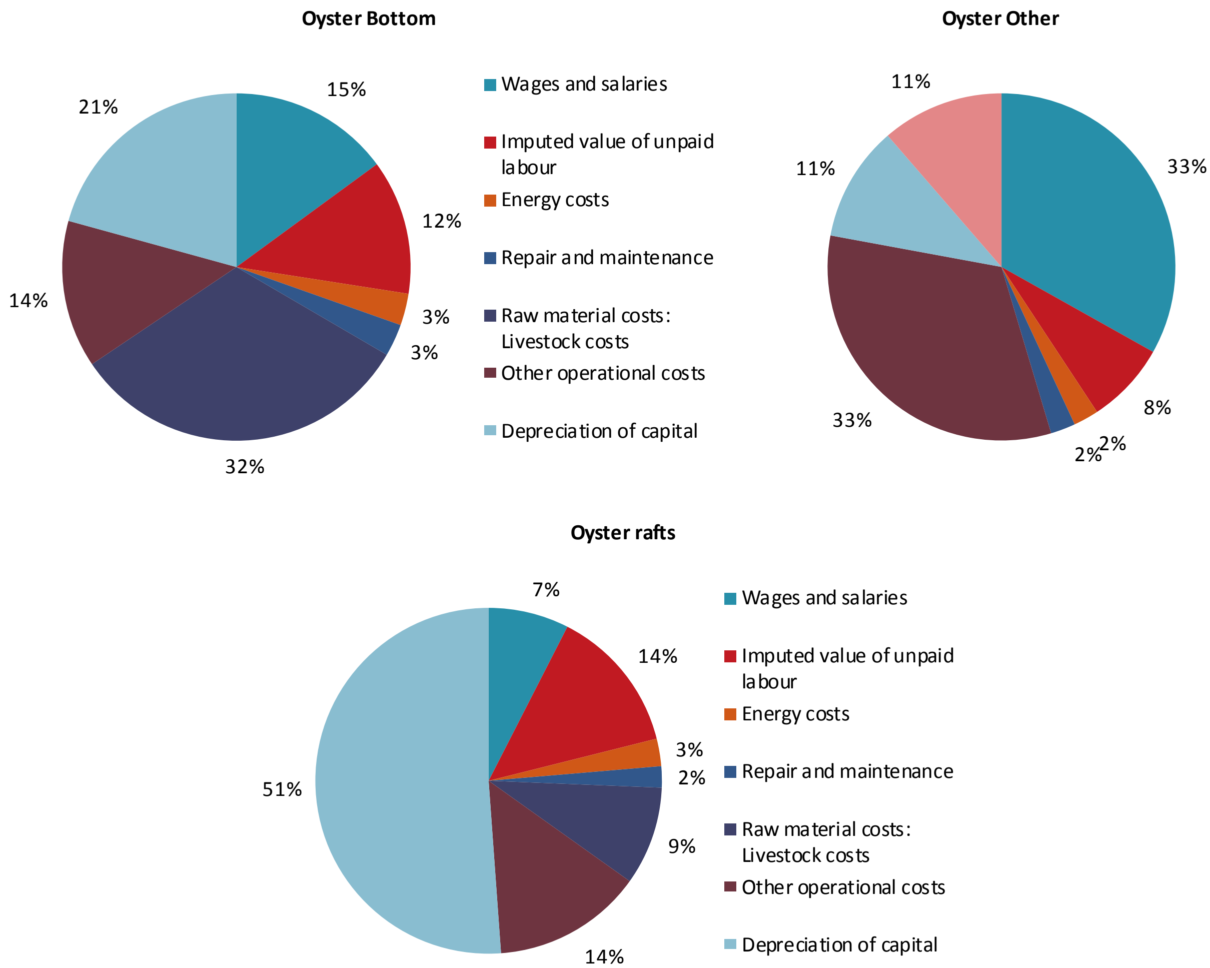


Figure 3.25: Costs breakdown for the EU oyster aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

World and EU prices of cultured Pacific cupped oyster and European flat oyster show a common increasing trend, but EU prices are more than double of the world prices. Concerning Pacific cupped oysters, the decrease in production translates into an increase of the price of sale (+ 45%) between 2010 and 2012. Before 2010, the data concerning the EU price of the European flat oyster must be used with caution do to the lack of data. A negative trend is observed between 2010 and 2011 (-38%), while an increase was observed between 2011 and 2012 (+ 6%).

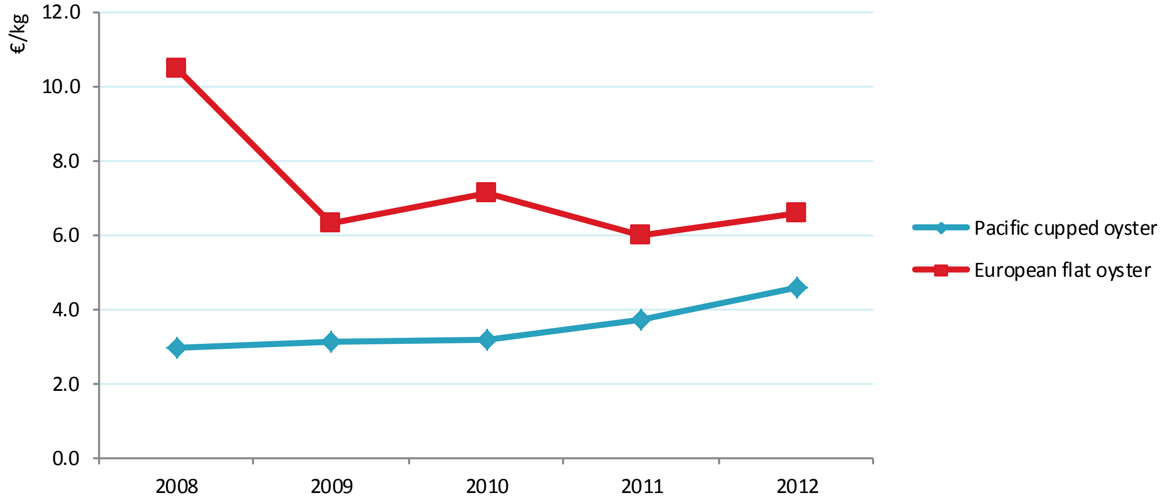


Figure 3.26: Price evolution of the main species of oyster group: 2008-2012.

Source: EU Member States DCF data submission, 2014

3.2.3 Clam

There are different species of clams and cockles produced in aquaculture: Japanese carpet shell, blood cockle, Japanese hard clam, Northern quahog, grooved carpet shell, common edible cockle, etc. Total clam and cockle production reached 29 thousand tonnes, corresponding to a value of 1.4 billion Euros, in 2012. The main clam species cultured in the EU are Japanese carpet shell (*Ruditapes philippinarum*) and grooved carpet shell (*Ruditapes decussatus*) (FAO, 2014).

Total production of Japanese carpet shell and grooved carpet shell in 2012 was 3.9 thousand tonnes, valued at 2.7 billion Euros. China is the leading producer of clam covering 98% of the weight and 92% of the value produced. The EU produced 1.1% by weight and 5.0% by value of global clam production. In the EU, the main producer was Italy with 36,750 tonnes followed by Portugal with more than 2,300 tonnes (FAO, 2014).

Data reported under the DCF shows that clam aquaculture produced 29 thousand tonnes with a value of almost 137.5 million Euros, in 2012.

Table 3.14: Economic indicators for the EU clam aquaculture: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Ireland	6 ▼	0.0 ▼	0.2 ▼	29 ▼	18 ▲	14.9 ▼
Italy	132 ▬	24.0 ▬	92.5 ▼	2983 ▲	673 ▼	20.5 ▲
Portugal	1282 ▼	2.3 ▲	19.6 ▼	1849 ▬	1395 ▲	5.7 ▲
Spain	653 ▬	2.6 ▼	25.3 ▼	7013 ▼	950 ▼	31.8 ▲
United Kingdom		0.0 ▼	0.1 ▬			
Other none DCF		0.0	0.0			
Total DCF reported	***2073*** ▼	***29.0*** ▬	***137.5*** ▼	***11874*** ▼	***3036*** ▼	***17.2*** ▲
Total EU		**29.0** ▬	**137.5** ▼			

Source: EU Member States DCF data submission

The collected data showed that at least 2,073 enterprises were producing clams in the EU. 62% of these companies were located in Portugal and 31% in Spain.

These enterprises employed 11,874 persons, corresponding to 3,036 FTEs. Part time workers make up an important contribution in this segment, since the calculated number of FTEs only adds up to 25.6% of the people actually employed in the segment.

Spain provided the highest average wage, corresponding to 31.8 thousand Euros per FTE.

Figure 3.27 show that the main production technique in terms of turnover and GVA is clam bottom. EBIT and net profit is negative. The negative results are strongly influenced by the economic performance in Spain and Ireland.

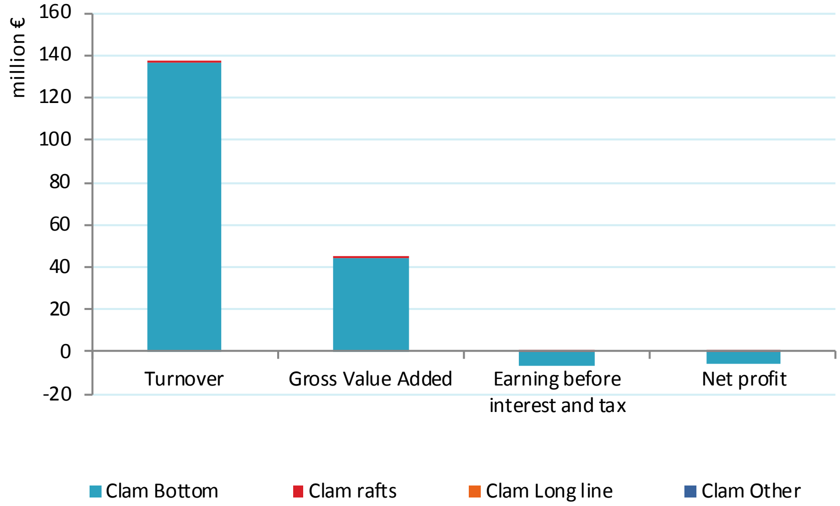


Figure 3.27: Economic performance indicators for clam aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

The EU clam aquaculture gross value added reached 44.4 million Euros, however; the EBIT was negative showing a loss of 6.6 million Euros, and a negative ROI of 4%. Labour productivity reached 14.6 thousand Euros. The capital productivity and the future expectations indicator decreased compared to 2011. The ROI in the clams segment is presumed to be strongly influenced by the negative performance of Ireland.

Table 3.15: Economic Performance indicators for the EU clam aquaculture: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Ireland	-0.4 ▼	-0.7 ▲	-204 ▲	-20.9 ▼	-114 ▼	-9 ▲
Italy	16.6 ▼	1.8 ▲	3 ▲	24.7 ▼	26 ▲	26 ▼
Portugal	18.8 ▼	10.9 ▼		13.5 ▼		
Spain	9.4 ▼	-18.7 ▲	-19 ▼	9.9 ▼	10 ▼	-3 ▲
Total EU	44.4 ▼	-6.6 ▼	-4 ▼	14.6 ▼	28 ▼	9 ▼

Source: EU Member States DCF data submission, 2014

The most important costs of the EU clam aquaculture sector are livestock, which represented 33% of the total costs. Other important cost items are wages and salaries (24%) and imputed value of unpaid labour (10%). Unpaid labour is an important workforce as can be seen from the importance of imputed value of unpaid labour covering 30% of the total costs comparing it to wages and salaries.

When interpreting the costs of the clam segment it is important to understand the dynamics within the sector. The clam farm often has the legal form of a cooperative, including both fishermen fishing for seed (livestock) and the actual clam farmers. One part of the year fishermen provide input in terms of seed (livestock) to the farms. This actually means that the purchase of seed is registered as a labour cost and not a purchase of livestock.

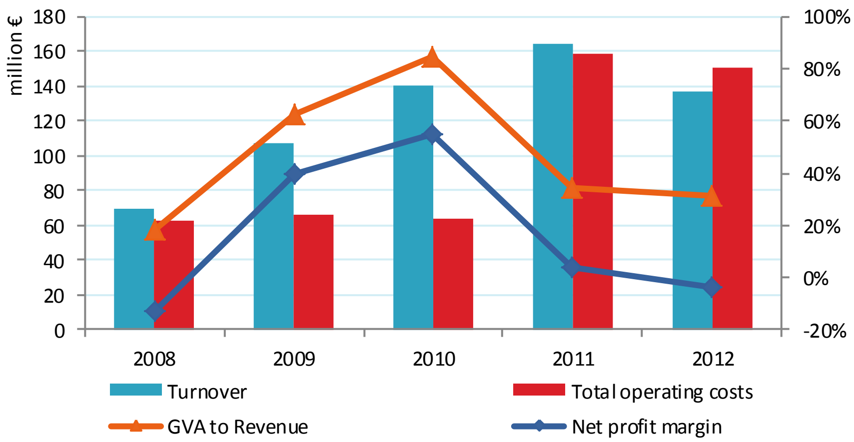


Figure 3.28: Economic performance indicators for clam aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

Although the segment is able to cover the cost of wages and salaries, the net profit is negative (-4%). This indicates that the financial costs and depreciation influences on the Net profit. Part of the segment suffers from historical financial exposures linked to investments in new technologies and logistics facilities.

The development in the segment clam bottom illustrates the situation for all four different clam culture segments. The limited access to credit and high depreciation do to investment in new farm technology and infrastructure drives the segment to a negative result in net profit in 2012.

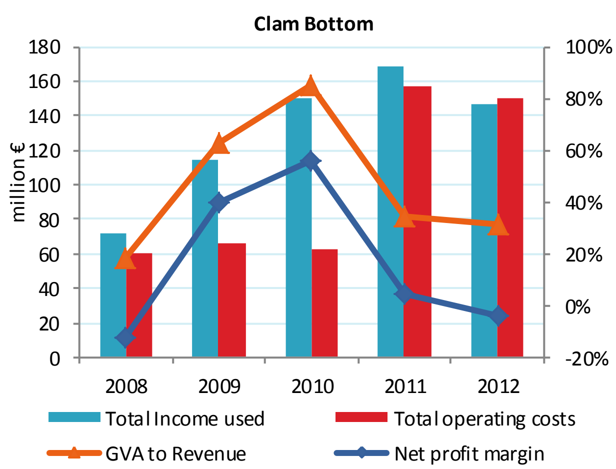


Figure 3.29: Development of economic performance for the EU clam aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

Figure 3.30 show the operating costs for clam bottom, which is similar to all the different techniques in this segment. Livestock is the most important cost item (33%) followed by wages and salaries (24%). This indicates that the clam production activity is very labour intensive with little use of machinery.

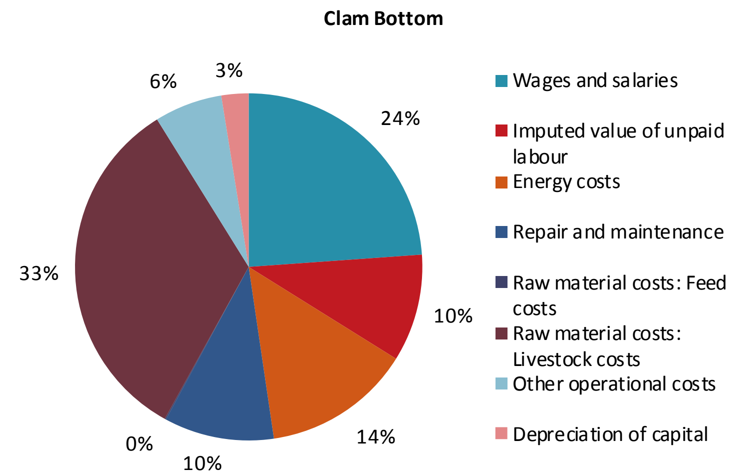


Figure 3.30: Costs breakdown for the EU clam aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

EU prices (and world prices) of cultured clams showed an increase during the period 2008 to 2011. However, during the last year prices has been decreasing for the two most important species in EU, which is illustrated in the Figure 3.31.

The price trends for the two species in average price per kg shown in Figure 3.31 indicates that the two types of clams are closely related and sold at the same market as the follows the same price pattern over the years

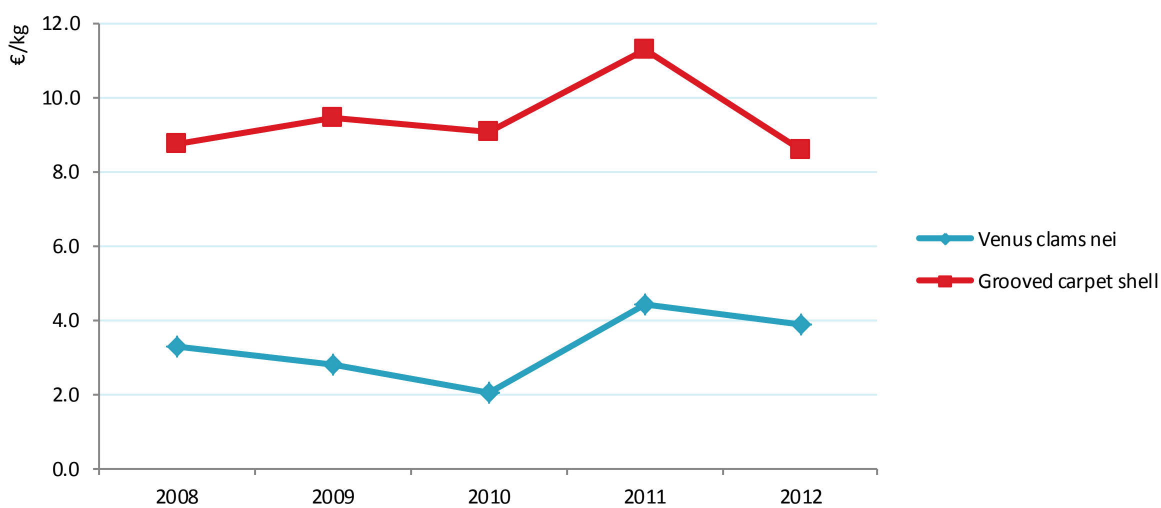


Figure 3.31: Price evolution of the main species of oyster group: 2008-2012.

Source: EU Member States DCF data submission, 2014

The price of 9 Euro / kg for grooved carpet shell is due to the characteristics of production. This species is reared in protected areas and the timing of growth is very similar to that of the natural life cycle. This production is perceived of high quality because it follows a natural growth. Production of this species is labour intensive rather than capital intensive.

3.2.4 Other shellfish segments

Both molluscs and crustaceans fall under the 'shellfish' category. Other shellfish species that were produced in other farming facilities in 2012 include the blue and the Mediterranean mussels, the pacific cupped oyster, clams and other shellfish.

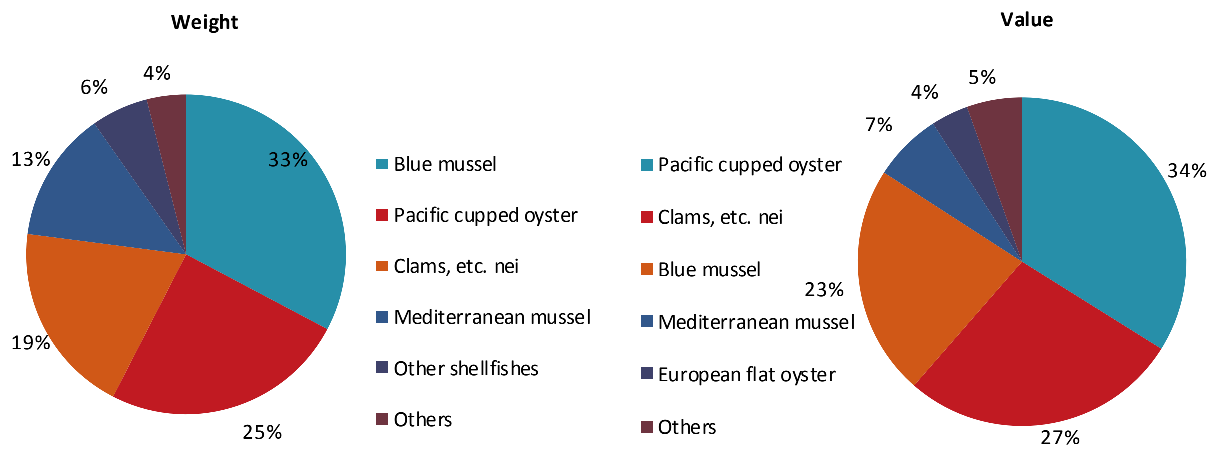


Figure 3.32: Main species, produced in the other shellfish farming facilities: 2012.

Source: EU Member States DCF data submission, 2014

In terms of weight, the Blue mussel is the most important (33%), followed by Pacific cupped oyster (25%) and by clams (19%). Mediterranean mussel production is the fourth most important in terms of weight (13%). Other shellfish species constitute the remainder. In terms of value however, the Pacific cupped oyster is the most important (34%), followed by the clams (27%) and by the Blue mussel (23%). The Mediterranean mussel, the European flat oyster and other shellfish make up the rest of the sales value. The higher importance in terms of value shown for the Pacific cupped oyster is essentially because this species fetches very high prices whereas mussels obtain low prices.

3.3 Freshwater aquaculture

The total volume of EU freshwater aquaculture was 312 thousand tonnes in 2012 generating a value of 991 million Euros. Compared to the EU marine aquaculture sector the volume was almost the same, but it only equals half of the production value.

Italy is the largest contributor to the EU freshwater production covering 22% of the volume and 25% of the value. Other major producers are France, Poland and Denmark covering 11%, 11% and 9% of the total EU production volume.

Table 3.16: Economic indicators for the EU aquaculture freshwater subsector: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Bulgaria	149	0.8	1.9	389	275	2.9
Croatia	41	4.8	7.7	838	532	25.1
Cyprus		0.1	0.6	0	0	
Denmark	111	29.3	95.1	308	221	75.2
Estonia	6	0.2	0.9	22	17	9.3
Finland	104	6.8	40.5	332	269	38.5
France	308	33.3	105.9	1210	942	24.1
Germany						
Greece	76	2.2	7.4			
Ireland	19	1.0	7.3	65	47	55.2
Italy	226	70.0	249.6	915	132	280.9**
Malta		0.0	0.0	0	0	
Netherlands*	38	9.1	15.7	219	146	1.5
Poland	840	33.2	105.1	5583	4377	0.1
Portugal	15	0.5	1.4	69	65	16.4
Romania	427	10.0	18.1	2967	2522	2.3
Slovenia						
Spain	160	18.9	56.5	886	625	23.1
Sweden	112	13.5	48.7	320	239	34.9
United Kingdom	327	15.8	51.5	1045	837	74.5
Other none DCF		63.0	176.9			
Total DCF reported	***2959***	***249.4***	***813.9***	***15168***	***11246***	***17.9***
Total EU		**312.4**	**990.8**			

Source: EU Member States DCF data submission, 2014 & EUROSTAT, 2014.
**Note: Italian average wage is not reliable due to an unsufficient number of FTE reported.

The economic performance of the freshwater sector is mainly dependent on trout covering 65% of total value in the freshwater segment (See Figure 3.33). The second major species produced in freshwater is carp. The farming of these two species has some distinct economic and employment characteristics. Trout aquaculture production is mostly obtained from more intensive technologies, whereas carp producers use more extensive technologies.

There were almost 3 thousand enterprises in the EU freshwater sector. The sector employed around 15 thousand people, corresponding to more than 11 thousand FTEs, as shown in Table 3.16. On average, each enterprise employed 5 persons. Average wage was around 18 thousand Euros in 2012, but among countries it varied significantly. Salaries are dependent on the technique used and the species produced.The highest salaries were reported in Denmark and UK, where intensive trout aquaculture dominates. The lowest salaries were paid in Romania and Bulgaria, where extensive carp production dominate.

Table 3.17: Economic Performance indicators for the EU aquaculture freshwater subsector: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Bulgaria	0.3	-0.6	-6	1.1	3	8
Croatia	3.9	-9.4	-10	7.4	4	-1
Denmark	26.0	4.5	4	117.5	21	-1
Estonia	0.3	0.1	3	20.1	10	2
Finland	12.7	0.1	0	47.2	16	4
France	34.6	7.3	8	36.7	39	-2
Ireland	2.5	-1.4	-10	53.4	17	-9
Italy**	132.9	86.1	18	1009.7	28	30
Netherlands*	3.3	2.5		22.8		
Portugal	0.5	-3.7	-115	7.0	14	-48
Romania	14.2	6.3	10	5.6	22	11
Spain	7.5	-7.4	-7	12.0	7	-3
Sweden	11.3	3.5	6	47.4	19	-2
United Kingdom	-30.0	-53.4	-93	-35.8	-52	-6
Total EU	218.2	32.6	3	19.7	18	12

Source: EU Member States DCF data submission, 2014.
**Note: Italian labour productivity is not reliable due to an insufficient number of FTE reported.

The EU freshwater aquaculture sector provided more than 218 million Euros in Gross Value Added in 2012, which correspond to the value reported for 2011. Measured in terms of EBIT profitability reached almost 33 million Euros. Overall profitability measured in terms of ROI reached 3% in 2012. Labour productivity was on average 19,700 Euros per FTE, as shown in Table 3.17.

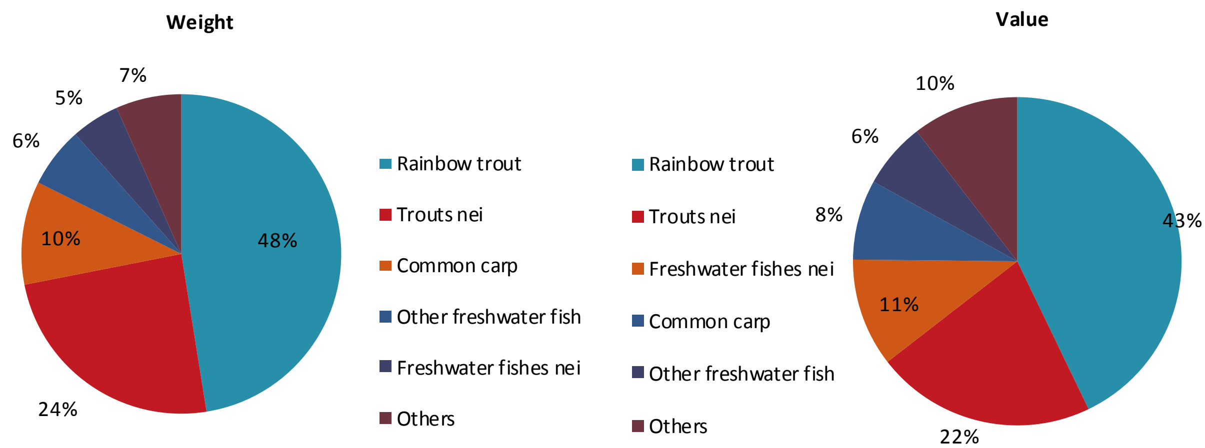


Figure 3.33: Main species, produced in the EU Member States excluding land lock countries freshwater farming facilities: 2012.

Source: EU Member States DCF data submission, 2014

In terms of weight, rainbow trout dominate this segment with 48% of the volume and 43% of the value. The combined group trout nei is the second most important in terms of volume and value contributing with 24% and 22%, respectively. In terms of weight carp is the third most important species with a volume of 10% and a value of 8% of total EU production.

3.3.1 Trout

The submitted DCF data shows that the EU freshwater trout production reached 170 thousand tonnes valued at 500 million euros in 2012. The DCF data represented 87% of total EU28 sales volume and 84% of turnover. There is a large variation in freshwater trout production within the Member States. The total sales volume varied from about 0.2 thousand tonnes in Sweden to more than 58 thousand tonnes in Italy. The total turnover varied from about 0.6 million Euros in Cyprus to 168.6 million Euros in Italy.

Table 3.18: Economic indicators for the EU trout aquaculture: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Bulgaria	30	0.3	1.1	123	91	2.8
Croatia	21	1.3	1.2	123	99	9.0
Cyprus		0.1	0.6	0	0	
Denmark	103	27.9	81.2	271	195	75.9
Estonia	6	0.2	0.9	22	17	9.3
France	308	33.3	105.9	1210	942	24.1
Greece	62	1.9	4.9			
Ireland	6	0.8	2.4	20	15	43.5
Italy*	173	58.4	168.6	629	122	164.3
Portugal	15	0.5	1.4	69	65	16.4
Romania	80	1.1	4.1	285	258	4.4
Spain	82	18.1	49.7	637	522	21.9
Sweden	7	0.2	1.7	42	24	13.3
United Kingdom	193	15.4	45.8	643	510	26.8
Other none DCF		24.7	98.2			
Total DCF reported	***1172***	***170.2***	***500.2***	***4881***	***3627***	***24.0***
Total EU		**194.9**	**598.4**			

Source: EU Member States DCF data submission.
*Note: Italian labour productivity is not reliable due to an insufficient number of FTE reported.

The numbers of enterprises engaged in trout production in the EU was 1,172. The enterprises employed 4,881 persons, corresponding to 3,627 FTEs. The freshwater trout sector has an important component of part-time work (0.74 ratio between FTE and employment). There is a large variation in the average wages between the countries. The salaries varied from 2.8 thousand Euros in Bulgaria to 75.9 thousand Euros in Denmark.

In 2012, income and GVA in the trout sector was mainly generated in the on-growing segment, representing 56% of the income and 66% of the GVA. The combined segment for trout was the second most important representing the remaining 44% of income and 34% of the GVA from the trout sector. Positive EBIT and net profit were obtained in the both major segments. The trout hatcheries & nurseries segments suffered losses in 2012. In economic terms, the hatcheries and nurseries segment has no significant economic importance. This is mainly because most of the activities related to hatcheries and nurseries are integrated in the combined segment.

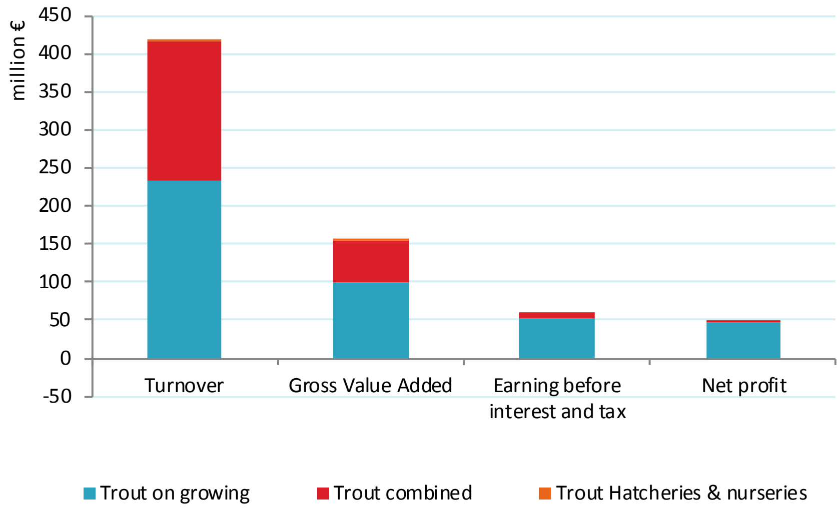


Figure 3.34: Economic performance indicators for trout aquaculture: 2012.

Source: EU Member States DCF data submission, 2014; UK data been removed from the graph as calculated GVA to turnover ratio is -76% and use of UK data is introducing bias in the global EU picture.

The reported DCF data shows that the trout sector has obtained a profit in 2012. The gross value added reached more than 119 million Euros. EBIT reached almost 6 million Euros, showing a positive economic performance confirmed by the ROI indicator of 1%. Labour productivity reached 32,800 euros and capital productivity 19%. The Future expectations of the industry reached 12%.

The economic performance in the different Members States shows large variation in the economic performance indicators. The GVA varied from about -35 million Euros in UK to 86 million Euros in Italy. The EBIT varied from -53 million Euros in UK to 60 million Euros in Italy. Labour productivity varied from around -69 thousand Euros in UK to 118 thousand Euros in Denmark. For the 12 Member States that produced freshwater trout 5 Member States had a negative profitability.

Table 3.19: Economic Performance indicators for the EU trout aquaculture: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectations Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Bulgaria	0.2	-0.1	-2	2.0	5	4
Croatia	-2.4 ▼	-3.2 ▼	-34 ▼	-24.6 ▼	-26 ▼	1 ▼
Denmark	23.0 ▲	3.7 ▲	3 ▲	117.8 ▲	21 ▲	-1 ▼
Estonia	0.3 ▲	0.1 ▼	3 ▼	20.1 ▲	10 ▲	2 ▼
France	34.6 ▲	7.3 ▼	8 ▼	36.7 ▲	39 ▲	-2 ▼
Ireland	1.5 ▼	0.5 ▲	11 ▲	100.7 ▲	31 ▼	-6 ▼
Italy*	86.4 ▲	60.2 ▲	22 ▲	707.4 ▲	32 ▲	33 ▲
Portugal	0.5 ▼	-3.7 ▼	-115 ▼	7.0 ▼	14 ▼	-48 ▼
Romania	2.3 ▼	0.9 ▼	7 ▼	9.0 ▼	19 ▼	-2 ▲
Spain	7.3 ▼	-6.9 ▼	-8 ▼	13.9 ▼	8 ▼	-3 ▼
Sweden	0.4 ▲	0.4 ▲	22 ▲	18.1 ▲	21 ▼	0 ▼
United Kingdom	-35.0 ▼	-53.4	-130	-68.6	-85	-8
Total EU	119.1 ▼	5.8 ▼	1 ▼	32.8 ▼	19 ▼	12 ▼

Source: EU Member States DCF data submission, 2014.

*Note: Italian labour productivity is not reliable due to an insufficient number of FTE reported.

The economic performance of the freshwater trout enterprises have been decreasing between 2010 and 2011 in terms of GVA to revenue. The net profit margin follows the same development and is positive for all the years.

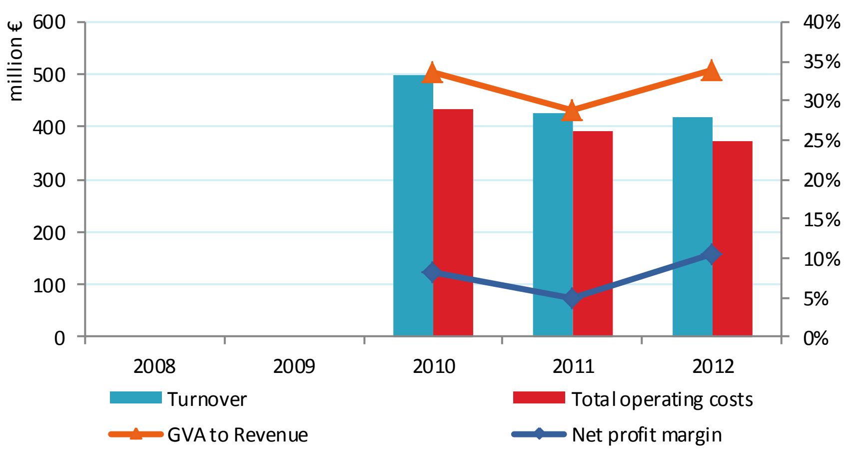


Figure 3.35: Economic performance indicators for trout aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

The economic performance of the on growing enterprises have been increasing in terms of GVA and net profits margins between 2010 and 2012 and have been able to reduce total operating costs in 2012 compared to 2011. The enterprises in the combined segment have experienced a large decrease in GVA and net profit margins from 2010 to 2012. This was mainly due to the fact that total operating cost increased in this segment.

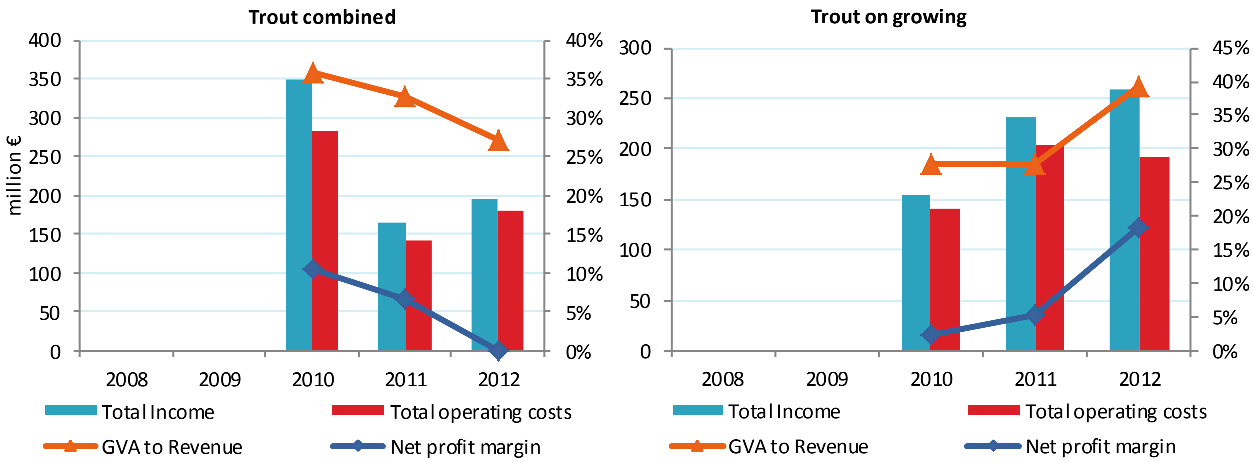


Figure 3.36: Development of economic performance for the EU trout aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

The most important costs of the EU freshwater trout sector are the feed costs, which represented 44% of the total costs in the on growing segment and 36% in the combined segment. Wages and salaries represented a similar share (respectively 16% and 17%), as well as depreciation of capital (respectively 6% and 6%), repair and maintenance (respectively 3% and 5%) and imputed value of unpaid labour (respectively 1% and 3%). The cost of energy is higher in the on growing sector than in the trout combined sector, because most of the intensive production systems using recirculation are placed in this segment. On the other hand, the cost of livestock and other operational cost are lower.

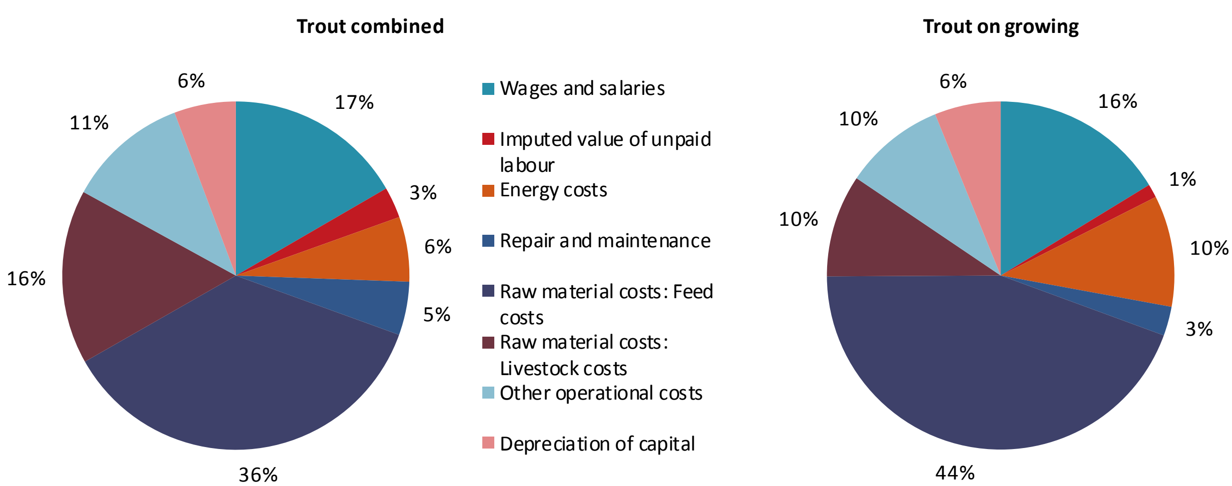


Figure 3.37: Costs breakdown for the EU trout aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

The average prices of rainbow trout have been quite stable over the period examined with a price just below 3 Euros/kg. The group of trout named trout nei is a mixture of different trout species, however; it seem that they are following the same price development as rainbow trout more and more closely, suggesting that this group mostly contains rainbow trout or close substitutes.

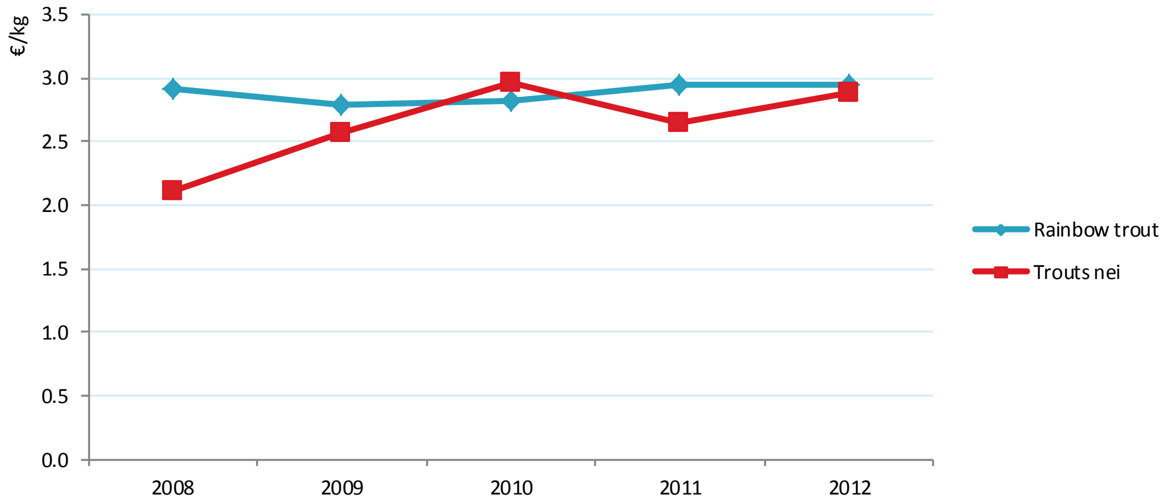


Figure 3.38: Price evolution of the main species of trout group: 2008-2012.

Source: EU Member States DCF data submission, 2014

3.3.2 Carp

Various species of carp are produced in the European aquaculture sector. The main species produced by weight are silver carp, grass carp, common carp, bighead carp and crucian carp.

Due to the lack of freshwater aquaculture data reported under the DCF, especially for landlocked countries, it is difficult to give a detailed picture of the EU carp aquaculture sector. Based on submitted information under the DCF data call, it is possible to analyse only seven countries included in the Table 3.20. Therefore, total sales volume and turnover data from EUROSTAT were combined with the DCF data. The following countries were included in the table as 'Other none DCF' from the EUROSTAT database: Austria, Czech Republic, Germany, Hungary, Latvia, Lithuania and Slovakia. Their share is 46 % and 40% of the total EU turnover and total sales volume, respectively. In 2012, the EU aquaculture sector consisted of 1,379 registered enterprises, with a total sales volume of 34.3 thousand tonnes according to DCF data. The majority of the enterprises (79%) were situated in Poland and Romania. In 2012, the carp segment employed 8,708 people corresponding to 6,613 FTEs (Table 3.20).

DCF and EUROSTAT data show a total sales volume of 57.1 € million, including 22.7 € million from 'Other none DCF countries'. Total turnover was 178.6 € million including 82.6 € million from EUROSTAT data.

Table 3.20: Economic indicators for the EU carp aquaculture: 2012.

Country	Number of enterprises	Total sales volume	Turnover	Employment	FTE	Average wage
	number	*thousand tonnes*	*million €*	*number*	*number*	*thousand €*
Bulgaria	111	0.5	0.7	235	160	3.0
Croatia	20 ▼	3.5 ▼	6.5 ▲	715 ▼	433 ▲	28.8 ▲
Greece	7 ▬	0.0 ▼	0.1 ▼			
Poland	746	20.9	69.7	4703	3546	
Romania	341 ▲	8.8 ▲	13.9 ▲	2668 ▲	2250 ▲	2.1 ▼
Spain	70 ▼	0.4 ▲	0.9 ▲	163 ▲	43 ▼	21.4 ▲
United Kingdom	84	0.3 ▲	4.3 ▲	224	180	24.3
Other none DCF		22.7 ▬	82.6 ▬			
Total DCF reported	***1379***	***34.3***	***96.1***	***8708***	***6613***	***3.5***
Total EU		**57.1**	**178.6**			

Source: EU Member States DCF data submission

Total turnover for carp on growing was around 26 € million in 2012. Carp combined segment shows a better economic performance than the other segments included. Carp combined had a positive EBIT, while carp on-growing shows a negative economic performance in the EBIT. Net profit is negative for both segments.

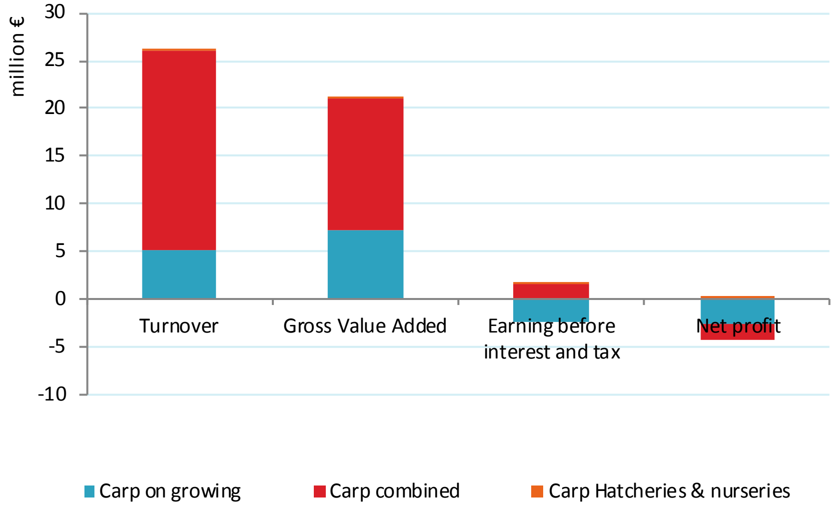


Figure 3.39: Economic performance indicators for carp aquaculture: 2012.

Source: EU Member States DCF data submission, 2014

Table 3.21 only includes data for Bulgaria, Croatia, Romania, Spain and the UK. Due to the lack of data from Croatia, the country was removed from the data series analysis in Figure 3.40.

Table 3.21: Economic performance indicators for EU carp aquaculture: 2012.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Exp. Indicator
	million €	*million €*	*%*	*thousand €*	*%*	*%*
Bulgaria	0.3	-0.2	-6	1.6	7	1
Croatia	6.4 ▼	-6.2 ▲	-7 ▲	14.7 ▼	7 ▼	-1 ▼
Romania	11.9 ▲	5.5 ▬	10 ▲	5.3 ▲	22 ▲	14 ▲
Spain	-1.5 ▲			-35.6 ▲	-84 ▲	0 ▬
United Kingdom	4.2			23.1	32	0 ▬
Total DCF reported	21.2 ▲	-0.9 ▼	-1 ▼	3.2 ▼	13 ▲	4 ▼

Source: EU Member States DCF data submission, 2014

The reported data show a decreasing trend in total income from 2010 to 2012, however GVA to revenue is increasing from 2011 to 2012 and net profit margins is positive in both 2011 and 2012 (Figure 3.40).

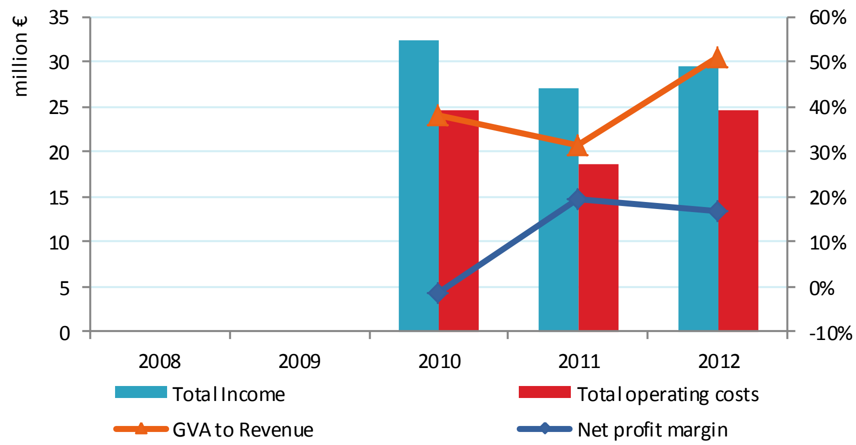


Figure 3.40: Economic performance indicators for carp aquaculture: 2008-2012.

Source: EU Member States DCF data submission, 2014

From the data provided to DCF (4 Member States) it could be stated that carp aquaculture is very extensive in the on growing segment as feed costs were only 16% of the total cost structure. The largest part of costs according to the provided data were wages and salaries varying from 34% to 39% depending on segment, being slightly higher for the carp combined segment. The carp on growing segment had higher livestock costs compared to the carp combined segment (23% vs 15%), as the latter produce juveniles for their own production. The carp combined segment also had lower capital costs. The reason for this might be that the enterprises in this segment consist of old extensive pond systems with low capital value and low needs for further investments in pond infrastructure. Energy costs in both segments were not important in terms of total costs, comprising only 5%.

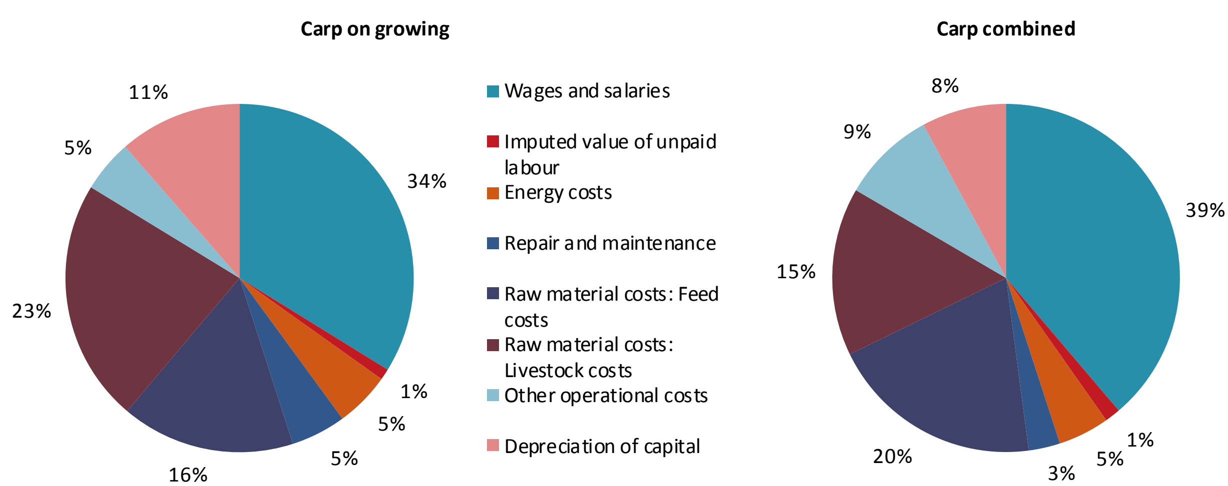


Figure 3.41: Costs breakdown for the EU carp aquaculture: 2012.

Source: EU Member States DCF data submission, 2014; Croatia is excluded, due to a different cost structure in this segment.

The price for cultured common carp shows an increasing trend, as illustrated in Figure 3.43; this is in common with world (FAO) prices for carp. The price on common carp in EU is almost twice as high as the price on the world market. This price differential is likely to reflect the difference between European and Asian consumer incomes, and the incorporation of lower value cyprinid species (big head carp, silver carp and grass carp) within the world price for carp.

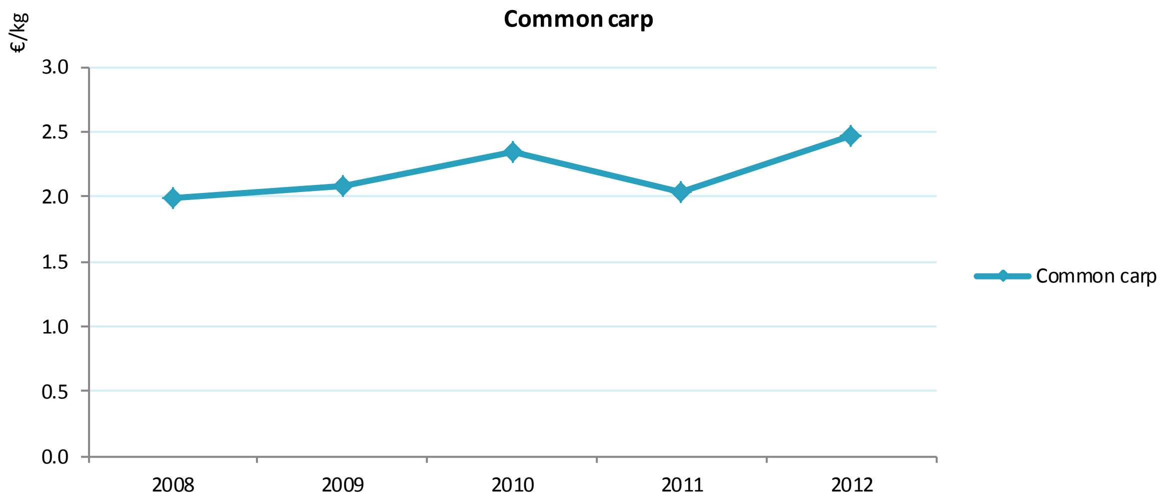


Figure 3.42: Price evolution of the main species of carp group: 2008-2012.

Source: EU Member States DCF data submission, 2014

3.3.3 Other fresh water species

Current DCF segmentation classifies the enterprises according to the main species (or group of species) produced (e.g. salmon, trout, carp, mussels). However, there are a number of enterprises that produce species not specifically identified in the DCF segmentation. These species are grouped within other freshwater fish species.

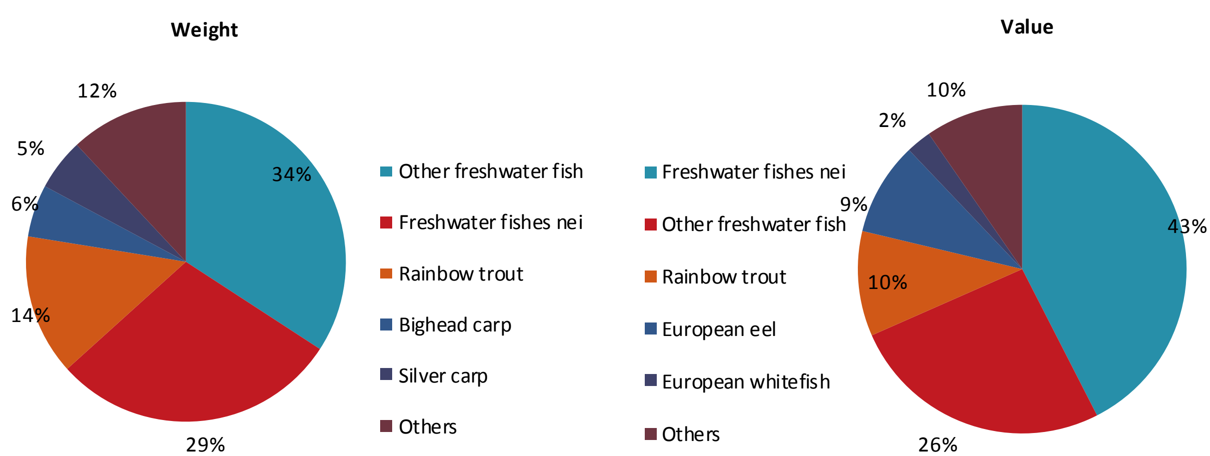


Figure 3.43: Main species, produced in the other freshwater farming facilities: 2012.

Source: EU Member States DCF data submission, 2014

The Figure 3.44 shows the divisions of other freshwater species produced in the EU. The mixed groups of Other freshwater fish and Freshwater fish nei are the most important in terms of volume and value, contributing 63% and 69% of the total, respectively. Other species of carp are also placed in this group. Rainbow trout that are produced in combination with other species dominating the turnover is also added to this group. European eel is one of the important other freshwater species produced. The production was around 1,700 tonnes, valued 17.6 € million in 2012. Main producers in the EU are Denmark and Spain.

4 NATIONAL CHAPTERS

4.1 AUSTRIA

4.1.1 Summary

Austria is a landlocked country producing only freshwater aquaculture products. The freshwater data collection is not mandatory under the DCF, and landlocked countries are therefore not requested to provide economic data for this report.

Production volume and value

The Austrian aquaculture sector produced 2.9 thousand tonnes in 2012 and the estimated production value was 14.6 million Euros (Eurostat, 2014). Austria doesn't have marine or shellfish aquaculture production.

The total weight of production increased 11% from 2011 to 2012, whereas the value of the production decreased by 4%. The development over the last 5 years shows the increase of production, while the value seems to be driven mostly by prices with the highest prices and value of production in 2010 and continuous decrease since then.

Table 4.1.1 Production and sales for Austria: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***2.1***	***2.1***	***2.2***	***2.7***	***2.9***	***4%***	***25%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	2.1	2.1	2.2	2.7	2.9	*4%*	*25%*
Production value (million €)	***12.7***	***13.9***	***20.4***	***16.5***	***14.6***	***-11%***	***-8%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	12.7	13.9	20.4	16.5	14.6	*-11%*	*-8%*
Hatcheries & nurseries (million units)	***0***	***0***	***0***	***8***	***7***	***-13%***	***250%***
Eggs	0	0	0	0	0	*0%*	*0%*
Juveniles	0	0	0	8	7	*-13%*	*250%*

Source: EUROSTAT

Main segments

Rainbow trout was the main species produced by the Austrian aquaculture sector representing 47% of the total weight and 42% of the total value of production in 2012. Other important species are common carp covering 21% of the weight and 18% of the value and brook trout accounting for 15% of the weight and 14% of the value.

Figure 4.1.1 Main species in terms of weight and value in Austrian production: 2012.

Source: EUROSTAT

All aquaculture prices have had a similar trend over the period 2008 to 2012. Prices of the 5 main species (rainbow trout, brook trout, common carp, sea trout and Char nei) have increased almost 50% from 2008 to 2010, however afterwards prices decreases to a level below 2008 in 2011 and 2012.

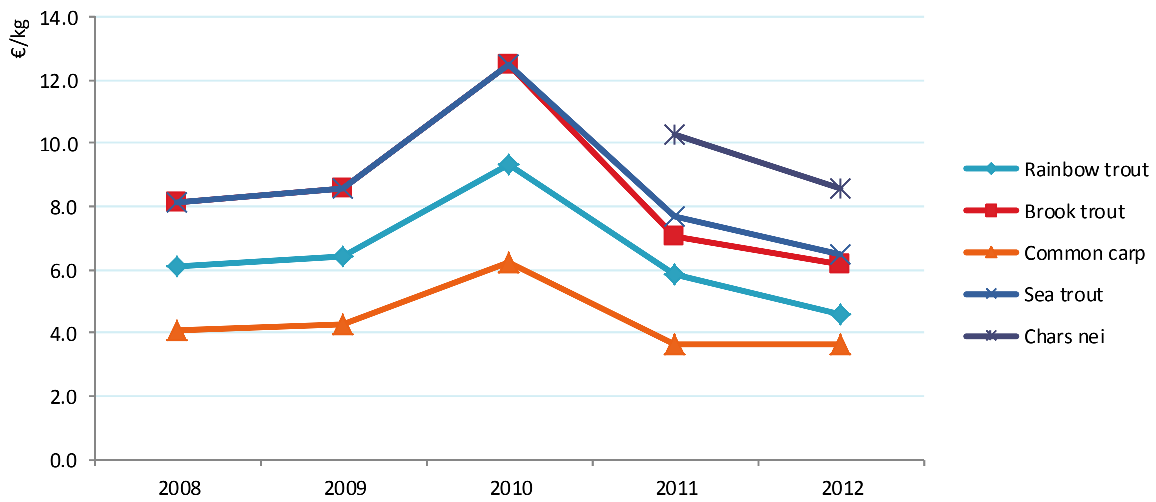


Figure 4.1.2 Average prices for the main species produced in Austria: 2008-2012.

Source: EUROSTAT

4.1.2 Data Coverage and Data Quality

Austria is a landlocked country producing only freshwater aquaculture products. The freshwater data collection is not mandatory under the DCF and landlocked countries are therefore not requested to provide economic data for this report. Data for the Austrian aquaculture sector is therefore provided by Eurostat.

4.2 BELGIUM

4.2.1 Summary

Although not landlocked, Belgium only produces freshwater aquaculture products. The freshwater data collection is not mandatory under the DCF, and therefore Belgium is not obliged to provide economic data for this report. The analysis below is based on the EUROSTAT data. However EUROSTAT does not provide information for 2012 for this country and, due to low disaggregation of the production data, value of production for 2010 and 2011 is considered to be confidential.

Production volume and value

The main product of the Belgian aquaculture sector is rainbow trout, with a total production of 36 tonnes in 2011. Compared to the 39 tonnes produced in 2010, production decreased by 7%.

Table 4.2.1 Production and sales for Belgium: 2008-2012.

Variable	2008	2009	2010	*2011*	2012	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***0.1***	***0.6***	***0.0***	***0.0***			
Marine	0.0	0.0	0.0	0.0			
Shellfish	0.1	0.0	0.0	0.0			
Freshwater	0.1	0.6	0.0	0.0			
Production value (million €)	***0.7***	***4.0***	***0.0***	***0.2***			
Marine	0.0	0.0		0.0			
Shellfish	0.4	0.0		0.0			
Freshwater	0.3	4.0		0.2			
Hatcheries & nurseries (million units)	***0***	***0***	***0***	***0***	***0***	***0%***	*0%*
Eggs	0	0	0	0	0	*0%*	*0%*
Juveniles	0	0	0	0	0	*0%*	*0%*

Source: EUROSTAT

Main segments

Rainbow trout is the main species produced by the Belgian aquaculture sector. Before 2010, some other fresh water species were reported to be produced in the country, but there is no information in EUROSTAT about it since 2010. According to FAO there were 13 tonnes of freshwater species nei reported for 2011, however the rest of the production for Belgium been mostly estimated by FAO organization over the last 10 years.

Figure 4.2.1 Main species in terms of weight and value in Belgian production: 2011.

Source: EUROSTAT

The price of rainbow trout in Belgium is at a stable €4.3 per kilo level.

4.2.2 Data Coverage and Data Quality

Belgium only produces freshwater aquaculture products. The freshwater data collection is not mandatory under the DCF and landlocked countries are therefore not requested to provide economic data for this report.

4.3 BULGARIA

4.3.1 Summary

Production volume and value

In 2009 the turnover was 15 million € in 2012 the turnover has decrease by 71% regarding 2009 and amounted 3.3 million €. The total sales volume decrease by 33 % from 2009 to 2012 and it was 3400 tons in 2009 and 2500 tons in 2012.

Overall industry structure and employment

In 2012 Bulgaria had 151 companies with 5 or less employees, 8 companies with 6-10 employees and 4 companies with more than 10 employees. Total employment in 2012 was estimated at 454 jobs, corresponding to 321 FTEs. The level of employment decreased between 2009 and 2012, with total employed decreasing by 27% while the number of FTEs decreases by 48% over the period. With respect to the gender of those in employment, men are predominated in aquaculture sector. In 2012 only 109 women (24 percent) were involved. Average salary per FTE employees in 2009 was €2100. In 2012 average salary per FTE employees increase for approximately 34 % regarding 2009 and amounted €3100.

Main segments

The production in Bulgaria can be divided into four main segments. The largest segment, regarding sales value and volume is the Trout cages followed by Trout combined, Carp on growing and Mussel long line.

Current production trends and main drivers (Trends and triggers)

The significant part of Bulgarian aquaculture is based on the production of non-native (introduced alien) species. This is a stable trend and started together with the start of the organized fish farming in Bulgaria. First foreign appearance entered permanently into the local aquaculture is rainbow trout (Oncorhynchus mykiss), which remains leader in trout family here.

Outlook

The Strategic approach to national targets of the Member States is reflected in the preparation of strategic documents from the relevant institutions, responsible for the implementation of sector policies in the country.

The main objectives for the development of Bulgaria are set out in the draft partnership agreement in the Republic of Bulgaria and the EU for the period 2014-2020.

4.3.2 Production and sales

Aquaculture sector in Bulgaria is characterized by a significant decrease in sales value in the period 2009-2012.

Table 4.3.1 Production and sales for Bulgaria: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2009-11)
Sales weight (thousand tonnes)		***3.4***	***3.7***	***4.1***	***2.5***	*-38%*	*-33%*
Marine		1.1	1.1		0.9		
Shellfish		0.3	0.5		0.8		
Freshwater		2.0	2.1	0.0	0.8		
Hatcheries & nurseries							
Sales value (million €)		***15.0***	***9.6***	***10.0***	***3.3***	*-67%*	*-71%*
Marine		3.7	3.9		1.1		
Shellfish		0.3	0.4		0.4		
Freshwater		11.1	5.3	0.0	1.9		
Hatcheries & nurseries							

Source: EU Member States DCF data submission

In 2009 the turnover was 15 million € in 2012 the turnover has decrease by 71 % regarding 2009 and amounted 3,3 million €. The total sales volume decrease by 33 % from 2009 to 2012 and it was 3400 tons in 2009 and 2500 tons in 2012.

4.3.3 Industry structure and employment

Aquaculture has emerged as a new activity in Bulgaria, although the rearing of different aquatic species dates back many years. The aquaculture sector began to develop at the end of the 18th century, a period marked by the start of the construction of the first state fish farms for rearing rainbow trout (Oncorhynchus mykiss) . The first carp farms were built in the 1940s. The 1990s marked the beginning of the transition of ownership in the freshwater aquaculture from public to private, the private sector formed on the basis of the existing as well as newly built aquaculture production capacities.

Together with capture fisheries, aquaculture cannot be considered to be one of the sectors which determine the structure of the country’s economy, but it occupies a specific and important position in the economic existence and way of life of the Bulgarian people. Aquaculture can be divided into two main sub-sectors: freshwater aquaculture (warm water and coldwater) and marine aquaculture. In 2004 total output from freshwater and marine aquaculture amounted to approximately 3 300 tonnes. The total water surface area utilized for aquaculture production is approximately 3 000 ha. There is a predominance of farms rearing market-size fish. Semi-intensive production systems are normally used, and intensive systems for rearing fish are applied in the trout fish farms. In 2004 aquaculture constituted 28.65 percent of the total output from capture fisheries and production of farmed fish and other water organisms in Bulgaria. The most popular fish reared are rainbow trout (Oncorhynchus mykiss), common carp (Cyprinus carpio) and Chinese carps (Hypophthalmichthys molitrix, Hypophthalmichthys nobilis, Ctenopharyngodon idellus) whereas the main output from marine aquaculture is the Mediterranean mussel (Mytilus galloprovincialis). Fish farmers sell their aquaculture production mainly on the domestic market. Nearly 100 percent of the sales of the produced quantities of carp fish are sold on domestic markets. The majority of the quantities exported are in the form of frozen fish products.

The main task of the authorities and associations in the sector is currently to adapt the sector successfully in order to effectively apply the requirements of the Common Fisheries Policy of the European Union, to stimulate expansion in the production of fish and fish products and to target foreign markets. It could be pointed out that as a whole existing legislation in the sector has been harmonized as far as the rearing, processing and marketing of fish and other water organisms is concerned. The development of aquaculture in Bulgaria is dependent on the successful application of efficient technologies, innovation and modernization, on the good interaction between fish farmers and research institutes, and on advanced information systems (Source; FAO).

Table 4.3.2 Structure of the Bulgarian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2009-11)
Structure (number)							
Total enterprises		*336*	*347*	*288*	*163*	*-43%*	*-50%*
<=5 employees		316	339	277	151	-45%	-51%
6-10 employees		13	4	7	8	14%	0%
>10 employees		7	4	4	4	0%	-20%
Employment (number)							
Total employees		1,375	218	270	454	68%	-27%
Male employees		930	187	219	345	58%	-23%
Female employees		445	31	51	109	114%	-38%
FTE		1,375	218	270	321	19%	-48%
Male FTE		930	187	219	240	10%	-46%
Female FTE		445	31	51	82	60%	-54%
Indicators							
FTE per enterprise		4.1	0.6	0.9	2.0	110%	4%
Average wage (thousand €)		2.1	2.3	2.4	3.1	30%	34%
Labour productivity (thousand €)		-7.2	34.6	29.9	3.8	-87%	-80%

Source: EU Member States DCF data submission

In 2012 Bulgaria had 151 companies with 5 or less employees, 8 companies with 6-10 employees and 4 companies with more than 10 employees. Total employment in 2012 was estimated at 454 jobs, corresponding to 321 FTEs. The level of employment decreased between 2009 and 2012, with total employed decreasing by 27% while the number of FTEs decreases by 48% over the period. With respect to the gender of those in employment, men are predominated in aquaculture sector. In 2012 only 109 women (24 percent) were involved. Average salary per FTE employees in 2009 was €2100. In 2012 average salary per FTE employees increase for approximately 34 % regarding 2009 and amounted €3100.

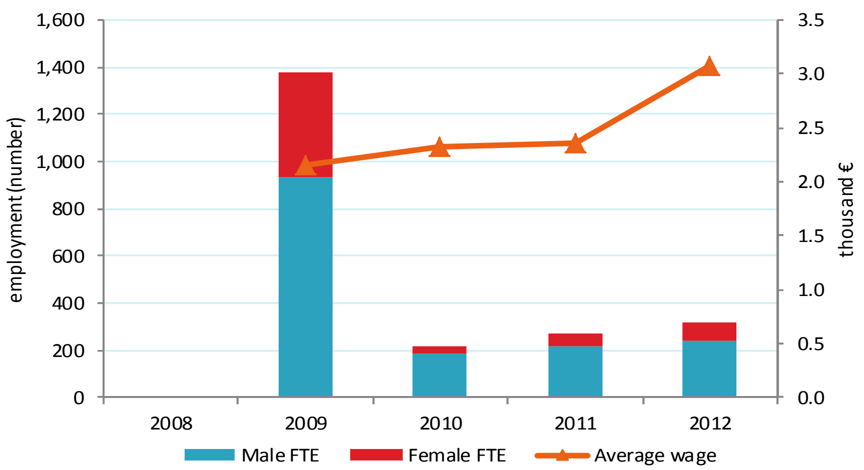


Figure 4.3.1 Employment trends for Bulgaria: 2008-2012.

Source: EU Member States DCF data submission

The labour productivity is measured as gross value added per full time employee. Labour productivity in Bulgarian aquaculture sector was negative in 2009 and amounted €-7200, while in 2012 was positive and amounted €3800.

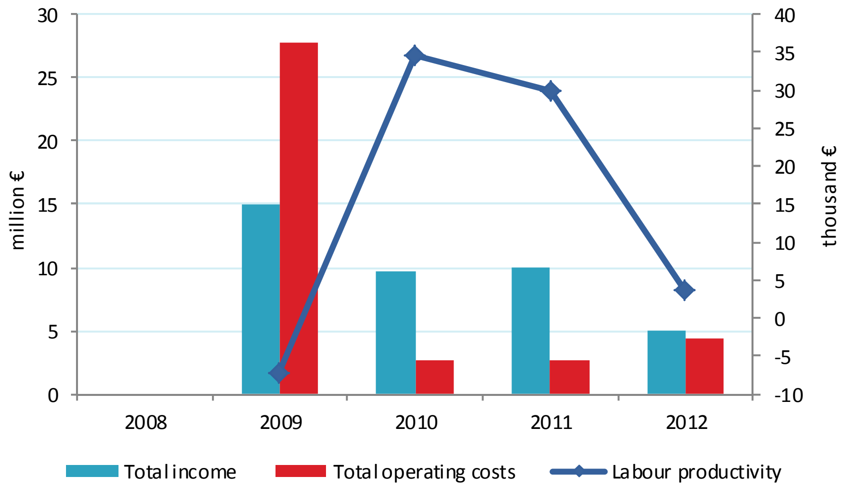


Figure 4.3.2 Income, costs, wages and labour productivity trends for Bulgaria: 2008-2012.

Source: EU Member States DCF data submission

The total amount of income generated by the Bulgarian aquaculture sector in 2012 was €5.1 million. This consisted of €3.3 million in turnover,€ 1.3 million in subsidies and €0,5 million in other income. The total income of the Bulgarian aquaculture sector decreased by 42 % between 2009 and 2012, while turnover decreased by 71 % in the same period.

4.3.4 Economic performance

Total operating costs by the Bulgarian aquaculture sector in 2012 was €4.3 million. The largest expenditure items were wages and salaries and Livestock costs (€0.9 million each) (Table 4.3.3). In 2012 the total operating costs increased by 66% regarding 2011 mostly because increased expenditure of wages and salaries, feed and livestock costs.

Table 4.3.3 Economic performance of the Bulgarian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2009-11)
Income (million €)								
Turnover		15.0	9.6	10.0	3.3	*66%*	▼ *-67%*	▼ *-71%*
Other income		0.0	0.0	0.0	1.3	*25%*		
Subsidies		0.0	0.0	0.0	0.5	*9%*		
Total income		*15.0*	*9.6*	*10.0*	*5.0*	*100%*	▼ *-50%*	▼ *-42%*
Expenditures (million €)								
Wages and salaries		2.5	0.4	0.6	0.9	*17%*	▲ *55%*	▼ *-24%*
Imputed value of unpaid labour		0.5	0.1	0.1	0.1	*2%*	▲ *51%*	▼ *-48%*
Energy costs		0.4	0.1	0.1	0.1	*3%*	▲ *135%*	▼ *-25%*
Repair and maintenance		0.4	0.2	0.1	0.3	*5%*	▲ *87%*	▲ *9%*
Raw material: Feed costs		3.5	1.5	1.4	2.0	*41%*	▲ *51%*	▼ *-4%*
Raw material: Livestock costs		19.5	0.3	0.4	0.9	*17%*	▲ *130%*	▼ *-87%*
Other operational costs		1.0	0.1	0.0	0.0	*1%*	▼ *-7%*	▼ *-88%*
Total operating costs		*27.8*	*2.6*	*2.6*	*4.3*	*86%*	▲ *66%*	▼ *-61%*
Capital Costs (million €)								
Depreciation of capital		0.7	0.3	0.3	0.8	*16%*	▲ *174%*	▲ *90%*
Financial costs, net		1.5	0.2	0.3	0.3	*6%*	▼ *-5%*	▼ *-56%*
Extraordinary costs, net		0.2	0.0	0.0	0.1	*1%*	▲ *12%*	▼ *-49%*
Capital Value (million €)								
Total value of assets		26.0	6.6	6.5	15.8	*314%*	▲ *144%*	▲ *21%*
Net Investments		1.5	0.8	1.2	2.8	*57%*	▲ *134%*	▲ *141%*
Debt		35.9	2.0	2.7	4.9	*99%*	▲ *85%*	▼ *-63%*
Input & Production (thousand tonnes)								
Raw material: Feed		9.3	10.8	0.9	2.9		▲ *241%*	▼ *-58%*
Raw material: Livestock		7.9	9.7	1.2	1.7		▲ *42%*	▼ *-74%*
Performance Indicators(million €)								
Gross Value Added		-9.9	7.5	8.1	1.2	*24%*	▼ *-85%*	▼ *-36%*
Operating cash flow		-12.8	7.0	7.4	0.7	*14%*	▼ *-91%*	▲ *28%*
Earning before interest and tax		-13.5	6.8	7.1	-0.1	*2%*	▼ *-102%*	▼ *-190%*
Net profit		-15.1	6.6	6.8	-0.4	*8%*	▼ *-106%*	▲ *27%*
Capital productivity (%)		-38.1	113.9	125.0	7.7		▼	▼
Return on Investment (%)		-52.2	102.2	110.6	-0.7		▼	▼
Future Expectation Indicator (%)		3.2	7.8	14.2	12.9		▼	▲

Source: EU Member States DCF data submission

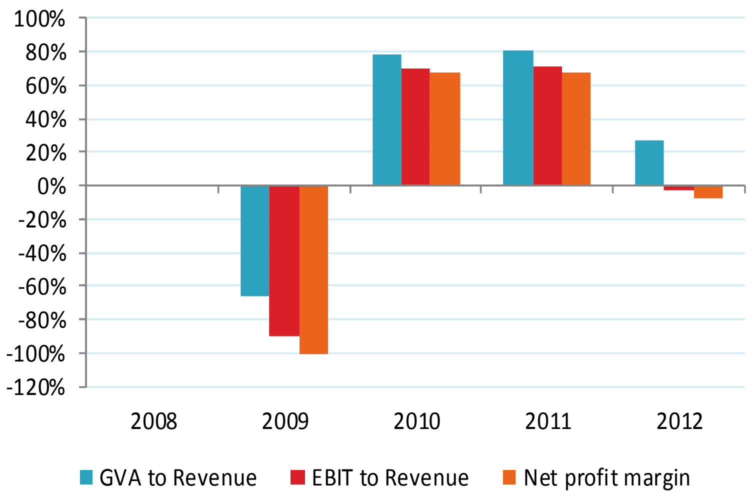


Figure 4.3.3 Economic performance for Bulgaria: 2008-2012

Source: EU Member States DCF data submission

In terms of economic indicators, the amount of GVA, OCF, EBIT and Net profit generated by the Bulgarian aquaculture sector in 2012 was €1.2 million, €0.7 million, €-0.1 million and €-0.4 million respectively, see table 4.3.3. Values of all economic indicators, except Equity ratio, are decreased from 2011, namely due decreased value of turnover in 2012.

4.3.5 Main species produced and economic performance by segment

The production in Bulgaria can be divided into four main segments. The largest segment, regarding sales value and volume is the Trout cages followed by trout combined, carp on growing and mussel long line.

Figure 4.3.4 Main species in terms of weight and value in Bulgarian production: 2012.

Source: EU Member States DCF data submission

In terms of sales volume, sales volume of the Rainbow trout represents 49% of the total sales volume of Bulgarian aquaculture sector in 2012, followed by Mediterranean mussel (20%) and Common carp (14%). Turnover from Rainbow trout represent 70% of the total turnover in the same year, followed by Common carp (12%) and Mediterranean mussel (6%).

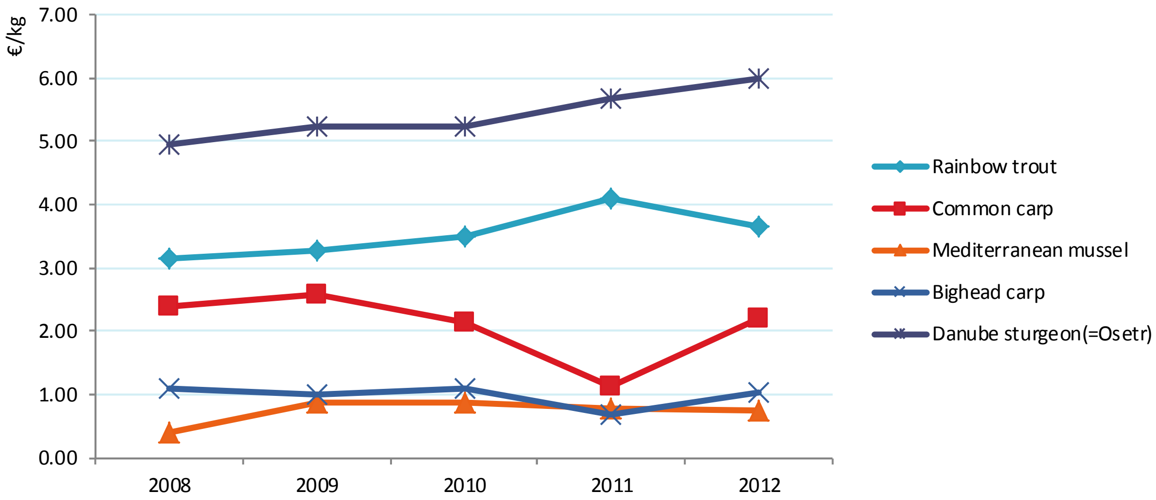


Figure 4.3.5 Average prices for the main species produced in Bulgaria: 2008-2012.

Source: EU Member States DCF data submission

The average price of Rainbow trout was €3.14/kg in 2008. In 2012 average price increase by 16% regarding 2008 and amounted €3.65/kg. The average price of Common carp was €2.21/kg in 2012 and decrease by 8% over the period 2008-2012. The average price of Mediterranean mussel was €0.75/kg in 2012 and increase by 78% over the same period.

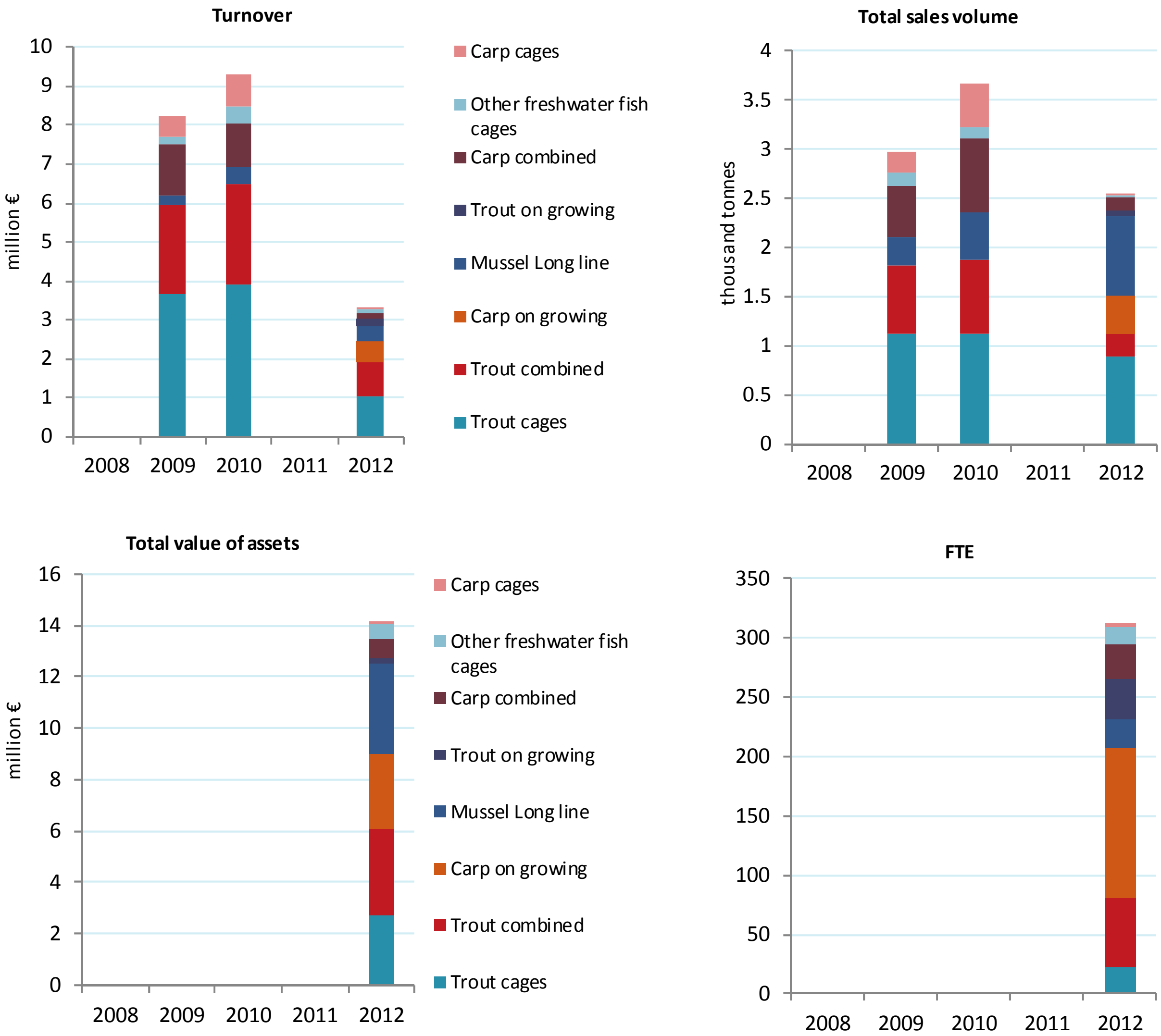


Figure 4.3.6 Structural development of Bulgarian aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

In table 4.3.4, the economic performance of the four Bulgarian segments is shown. The data provided are just for the year 2012, furthermore the data for Mussel long line segment are incomplete.

Table 4.3.4 Economic performance of main Bulgarian aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Trout cages								
Total income					1.7	100%		
Gross Value Added					0.7	41%		
Operating cash flow					0.7	38%		
Earning before interest and tax					0.3	20%		
Net profit					0.2	11%		
Total sales volume (thousand tonnes)		1.1	1.1		0.9			
Trout combined								
Total income		0.0	0.0	0.0	1.0	100%		
Gross Value Added					0.1	9%		
Operating cash flow					0.0	2%		
Earning before interest and tax					0.0	-5%		
Net profit					-0.1	-6%		
Total sales volume (thousand tonnes)		0.7	0.7	0.0	0.2			
Carp on growing								
Total income					1.1	100%		
Gross Value Added					0.3	26%		
Operating cash flow					-0.1	-8%		
Earning before interest and tax					-0.1	-9%		
Net profit					-0.1	-11%		
Total sales volume (thousand tonnes)					0.4			
Mussel Long line								
Total income					0.6	100%		
Gross Value Added					0.3	43%		
Operating cash flow					0.5	70%		
Earning before interest and tax					0.2	24%		
Net profit					0.1	13%		
Total sales volume (thousand tonnes)		0.3	0.5		0.8			

Source: EU Member States DCF data submission

Segment 1: Trout cages

The most important segment regarding sales value and volume. The value of Total income in 2012 was 1.7 million €. In terms of economic indicators, the amount of GVA, OCF, EBIT and Net profit generated by the Trout cages sector in 2012 was €0.7 million, €0.7 million, €0.3 million and €0.2 million respectively. The total sales volume amounted 900 tons in 2012.

Segment 2: Trout combined

The value of Total income in 2012 was 1,0 mio €. In terms of economic indicators, the amount of GVA, OCF, EBIT and Net profit generated by the Trout combined sector in 2012 was €0,1 mio, €0,02 mio, €-0,04 mio and €-0,1respectively. The total sales volume amounted 200 tons in 2012.

Segment 3: Carp on growing

The value of Total income in 2012 was 1.1 million €. In terms of economic indicators, the amount of GVA, OCF, EBIT and Net profit generated by the Carp on growing sector in 2012 was €0.3 million, €-0.1 million, €-0.1 million and €-0.1 million respectively. The total sales volume amounted 400 tons in 2012.

Segment 4: Mussels long line

The value of Total income for Mussels long line sector in 2012 was 0.6 million € and the total sales volume amounted 800 tons in the same year.

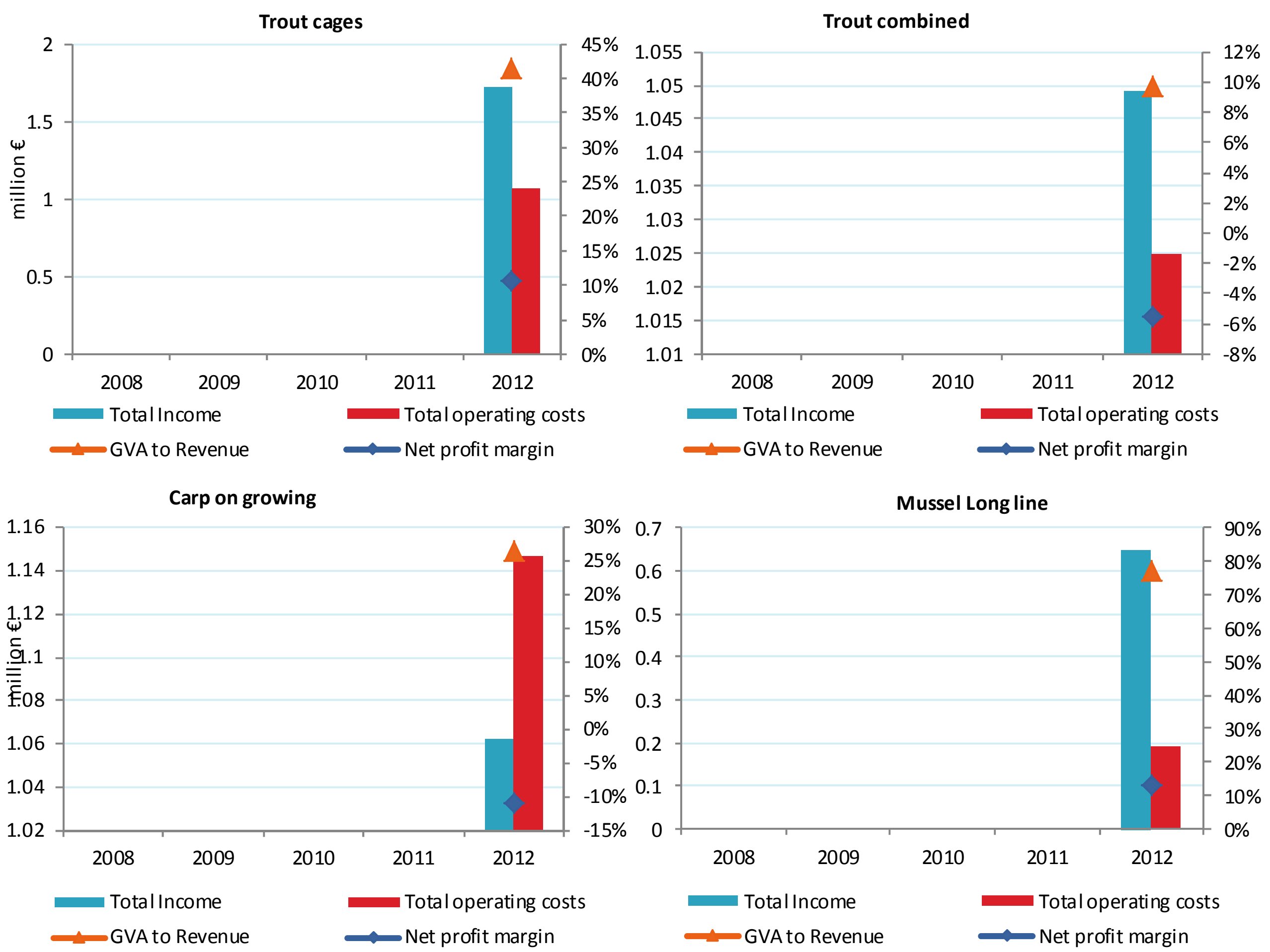


Figure 4.3.7 Economic performance indicators for the main Bulgarian segments: 2008-2012.

Source: EU Member States DCF data submission

Segment 1: Trout cages

The largest cost item of Trout cages sector in 2012 were the Livestock cost, accounted for 45% of the total operational costs. Feed costs made up 27 % of all operational costs and Depreciation of the capital 23%.

Segment 2: Trout combined

The largest cost item of Trout combined sector in 2012 were the Feed cost, accounted for 67% of the total operational costs. Wages and salaries made up 13 % of all operational costs and Depreciation of the capital 7%.

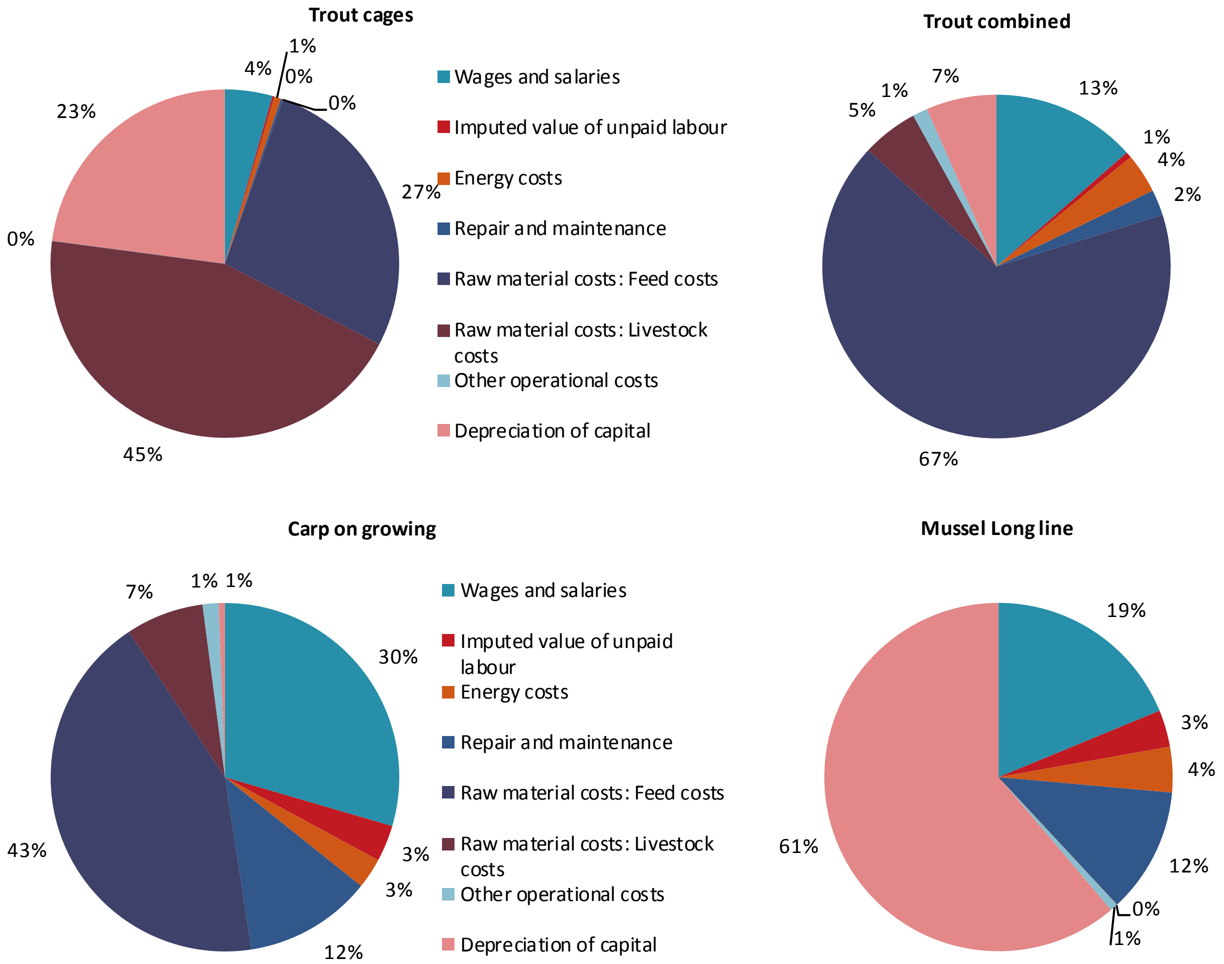


Figure 4.3.8 Cost structure of the main segments in Bulgaria: 2012.

Source: EU Member States DCF data submission

Segment 3: Carp on growing

The largest cost items of Carp on growing sector in 2012 were the Feed cost, accounted for 43% of the total operational costs. Wages and salaries made up 30 % of all operational costs and Repair and maintenance costs 23%.

Segment 4: Mussels long line

The largest cost items of Mussels long line sector in 2012 were the Depreciation of capital, accounted for 61% of the total operational costs. Wages and salaries made up 19 % of all operational costs and Repair and maintenance costs 12%.

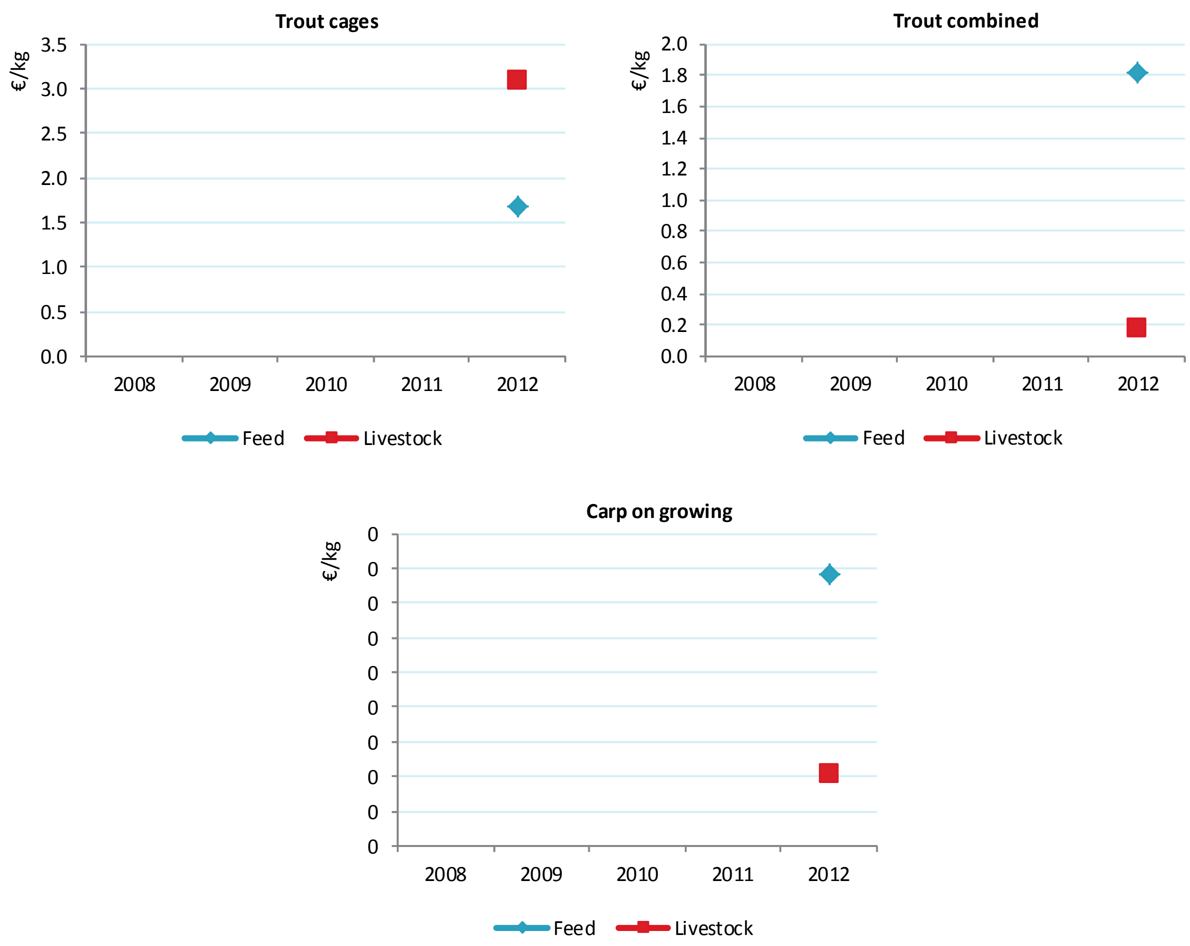


Figure 4.3.9 Feed and livestock prices for the main Bulgarian segments: 2008-2012.

Source: EU Member States DCF data submission

4.3.6 Trends and triggers

Main drivers

The significant part of Bulgarian aquaculture is based on the production of non-native (introduced alien) species. This is a stable trend and started together with the start of the organized fish farming in Bulgaria. First foreign appearance entered permanently into the local aquaculture is rainbow trout (Oncorhynchus mykiss), which remains leader in trout family here.

The reasons for the observed processes of decreasing in volume and value can be: in general – the economic recession in the country and Europe, and the resulting drop in demand and difficulties in small and medium business (the aquaculture farms in Bulgaria are mostly small and medium enterprises).

Market structure

Still marketing infrastructure in the country is not well developed. There is a need for organization and construction of retail stores and wholesale distribution network of fish and fish products, including exchanges and specialized centres for purchasing fish. In some mountain and rural regions where distribution of the latter is absent, so that the consumption of fish in these regions is much lower than the average.

Some manufacturers of fish and aquaculture have their own processing facilities located near production sites, which help improve the quality of the final product. All the EU requirements in the field of veterinary and sanitary control, quality and food safety are applied in this sector.

Trade

According to preliminary data of the NSI in 2011, total imports of fish and fishery products in Bulgaria registered a slight decrease from the previous year by 2.4% to 28,025.5 tonnes. The value of the exports amounted to 68,729.3 thousand USD, which is 14.3% more than the previous year due to higher import prices (up 17.2%). Traditionally, the highest share in the total imports of fish and fishery products is held of frozen fish. About 67% of the imported in 2011 frozen fish is mackerel - 11,523 tonnes - by 12.2% less compared to the previous year, which may be explained by higher import prices. Catches of mackerel in Bulgaria does not take place, so to meet the market demand for direct consumption and for canning annually offset by imports. The largest quantities of frozen mackerel in 2011 were delivered by Spain (2,669.1 tonnes), the Netherlands (2,459.1 tonnes), Canada (2,197.4 tonnes) and Romania (883.1 tonnes).

According to the National Statistical Institute, in 2011 realized a total export of fish, aquatic organisms and fish products amounted to 8,201.8 tonnes, marking a slight increase of 0.6% over the previous year, despite the reported decrease in the catch and production fish and other aquatic organisms in the country. Due to slightly higher average export price (3%), the total value of exported fish products increased by 3.6% compared to 2010, amounting to 29,090 thousand USD. In 2011, exports to the EU increased by 4.5% compared to 2010, to 6,445.3 tonnes and already formed 78.6% of total exports of fish, aquatic organisms and fish products (at 75.6% in 2010). The most significant amounts are targeted for Romania, Sweden, Greece, France, United Kingdom, Poland, Italy and Spain. Exports of fish and fish products to third countries amounted to 1,756.5 tonnes - 11.7% less compared to 2010 Main destinations were the Republic of Korea, Macedonia, Japan, Serbia, Russian Federation, Albania and Croatia. The structure of exports in 2011 include: 7,124.5 tonnes of fish, crustaceans and molluscs - live, fresh, chilled, frozen, smoked or salted and 1,077.1 tonnes processed fishery products (prepared or preserved fish, including caviar, preserved crustaceans and molluscs).

Analyzing the above information shows that Bulgaria has a negative trade balance in trade in fishery products. The reason is mainly the lack of oceanic fishing fleet to supply the processing industry and retail network primarily in frozen filleted pelagic species (mainly mackerel) as well as lack of cultivating of saltwater fish (fresh sea bass and sea bream) in the Black Sea.

Gross value added of the aquaculture sector in 2012 in BGN is about 5 million BGN, according to the National Program for the collection, management and use of data in the fisheries sector. Number of employees (equivalent full-time) in the sector is 469 people, and the gross value of the employee is 10,594 BGN.

Applied economic analysis

In recent years, 17 million BGN from the Operational Programme for the Development of the "Fisheries" of the Republic of Bulgaria, funded by the European Fisheries Fund, were invested in the EU's promotion of aquaculture production and expect results to be more visible in next programming period. The new types Bulgarian aquaculture produced currently as barramundi, African catfish, remain unknown to the local market.

Outlook and future projects

The Strategic approach to national targets of the Member States is reflected in the preparation of strategic documents from the relevant institutions, responsible for the implementation of sector policies in the country.

The main objectives for the development of Bulgaria are set out in the draft partnership agreement in the Republic of Bulgaria and the EU for the period 2014-2020.

Data Coverage and Data Quality of Bulgarian aquaculture sector

The main reason for the discrepancy between the data on DCF program, FAO and Eurostat is that the data of DCF program is reported as information only for indicators of those farmers, who submitted statistical questionnaires. Achieved sample rate for economic data for 2011 was 29%, in 2010 was 70%, in 2009 was 41% and in 2008 was 50%. Not carried out an approximation of the performance of those who have not filled in statistical form. Achieved sample rate for volume and value of fish species is 100%.

For Eurostat, if the data submitted are with source by the Bulgarian National Statistical Institute, from the annual financial statements. In the annual financial statements the companies may be have included incomes and expenses for aquaculture, as well as other economic activities carried out.

If the data for FAO and Eurostat are from the NAFA’s source, should not exist a difference.

It is impossible at this stage other institution, expect NAFA to submit accurate information on production and marketing of aquaculture I think. Because we are able to aggregate the data on production and sales of fish species level.

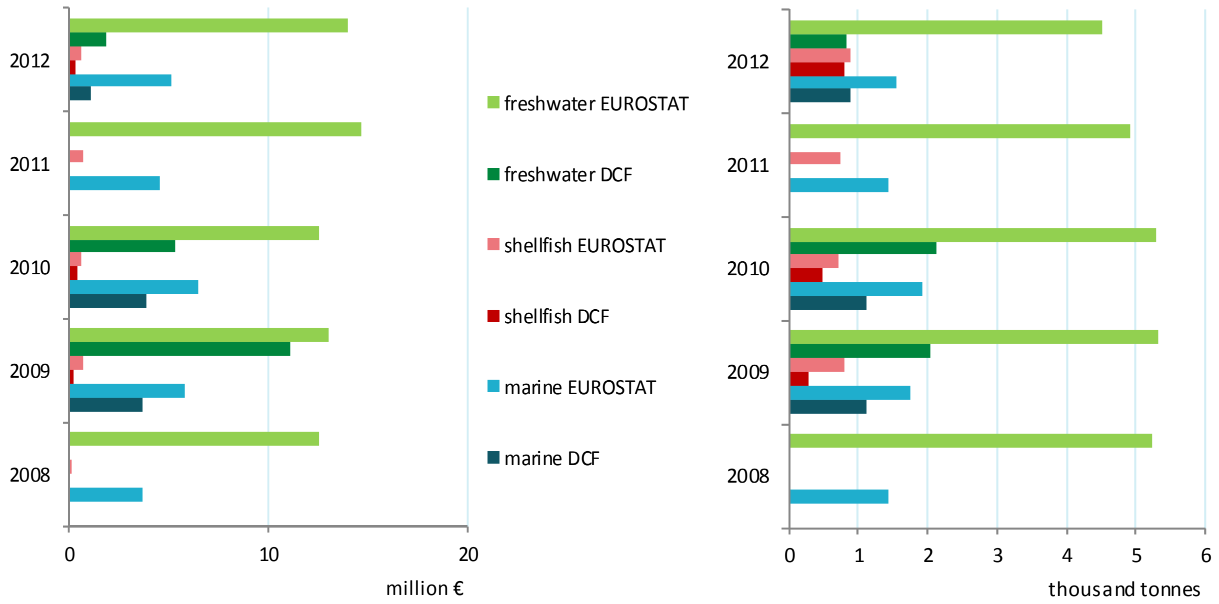


Figure 4.3.10 Comparison of DCF data with EUROSTAT data for Bulgaria: 2008-2012

Until 2011, questionnaires for economic statistics were anonymous and had no possibilities to compare the revenues and costs with those of the annual financial statements of the companies.

From 2012 was changed the Fisheries and Aquaculture act, which indicates that it is obligatory to submit of statistical information for everyone farmer. For non-submission of statistical information is provided sanction from 500 to 750 levs. From 2012 was changed the questionnaire, which is now mandatory to filled in the business name, address and phone number of the farmer. This fact will allow us to compare the information obtained from the questionnaires with that of annual financial statements of the companies.

4.4 CROATIA

4.4.1 Summary

Production volume and value

In total, the Croatian aquaculture sector produced 12.7 tonnes in 2012, which corresponded to a decrease of 13% between 2011 and 2012. The total value of the production was 77.7 million euros in 2012, which correspond to decrease of 1% over the same period. In earlier years there was no data collection under DCF in Croatia as country joined the EU in July 2013.

Overall industry structure and employment

In 2012, the total population of aquaculture farms was distributed on 174 enterprises in marine and freshwater aquaculture. The Croatian aquaculture sector is dominated by small enterprises with less than 5 employees.

Main segments

The production in Croatia can be divided into a few main segments, distributed among marine and freshwater aquaculture. The largest freshwater segment is the land based production of carp, with combination of hatcheries, nurseries and raceways ponds for on growing. Other freshwater segments are trout production in the land based farms, which is mostly small scale production. In freshwater aquaculture main production technique are ponds and raceways.

The second part is the marine production of finfish, Bluefin tuna and shellfish. Only few farms produce a combination of these species. Economically the most important are tuna farms, but this segment consists of only 3 enterprises. Shellfish farms are mainly small-scale family owned production, and they are producing equally Oysters and Mussels. Finfish farms are in general small and are producing seabass and seabram.

Current production trends and main drivers (Trends and triggers)

Croatian main export product is Bluefin tuna, exported to Japan. Other aquaculture products are mostly for the domestic market and some for other EU countries.

Outlook

Croatian aquaculture is still in its infancy and there is lot of room for progress in the future. The Croatia National strategic plan for aquaculture 2014 – 2020 predicts a significant increase of aquaculture production in the future. Main goals are enforcement of social and business-political environment, and increase of national consumption of aquaculture products. This should result in significant growth of total aquaculture production. Beside increase in national consumption, it is also expected that the export to EU market will increase, due to the newly established access to the EU market.

4.4.2 Production and sales

For the last five years aquaculture production in Croatia has been stable or increasing, however from 2011 to 2012 the production decreased by 13%. In the same period the value only decreased by 1%. The most significant decrease was in freshwater aquaculture, where production was reduced by 28% in weight, and 27% in value.

Table 4.4.1 Production and sales for Croatia: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)				***14.6***	***12.7***	*-13%*	
Marine				7.1	6.6	*-7%*	
Shellfish				1.0	1.3	*40%*	
Freshwater				6.6	4.8	*-28%*	
Hatcheries & nurseries				0.0	0.0		
Sales value (million €)				***78.8***	***77.7***	*-1%*	
Marine				67.1	68.4	*2%*	
Shellfish				1.2	1.6	*41%*	
Freshwater				10.6	7.7	*-27%*	
Hatcheries & nurseries				0.0	0.0		

Source: EU Member States DCF data submission

Marin aquaculture production decreased by 7%, whereas the shellfish segment increased by 40% in weight, and 41% in value.

4.4.3 Industry structure and employment

In 2012, the total number of enterprises increased by 3%, from 169 in 2011, to 174. In both years the majority of enterprises were small scale with less than 5 employees, covering 137 in 2012, and 133 in 2011. The majority of these small farms are family owned shellfish farms.

Table 4.4.2 Structure of the Croatian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises				*169*	*174*	*3%*	
<=5 employees				133	137	*3%*	
6-10 employees				15	20	*33%*	
>10 employees				21	17	*-19%*	
Employment (number)							
Total employees				1,885	1,892	*0%*	
Male employees				1,475	1,506	*2%*	
Female employees				410	386	*-6%*	
FTE				1,354	1,464	*8%*	
Male FTE				1,094	1,184	*8%*	
Female FTE				260	280	*7%*	
Indicators							
FTE per enterprise				8.0	8.4	*5%*	
Average wage (thousand €)				14.2	17.6	*24%*	
Labour productivity (thousand €)				21.1	11.9	*-43%*	

Source: EU Member States DCF data submission

The total number of persons employed in the Croatian aquaculture sector was 1,892, corresponding to 1,464 FTEs. The number of employees was almost unchanged, however the FTE increased by 8%.

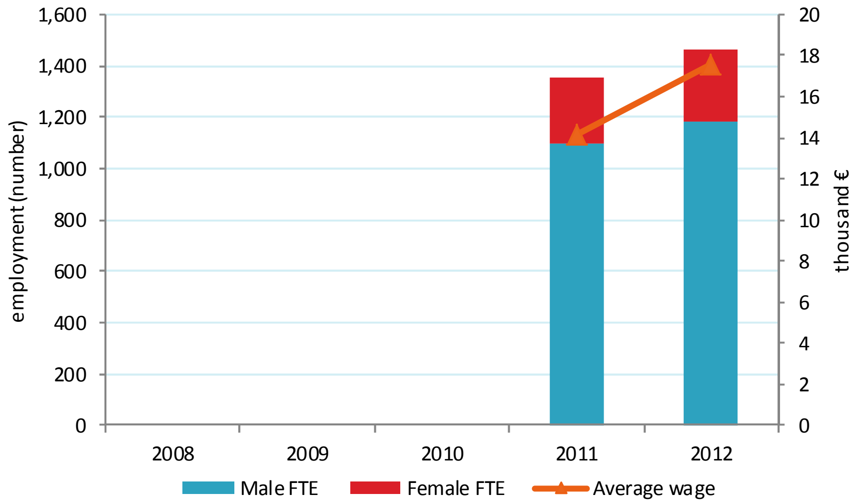


Figure 4.4.1 Employment trends for Croatia: 2008-2012.

Source: EU Member States DCF data submission

The average number of FTEs per enterprise increase of 5%. At the same time, the average wage increased by 24%, but the labour productivity decreased by 43%.

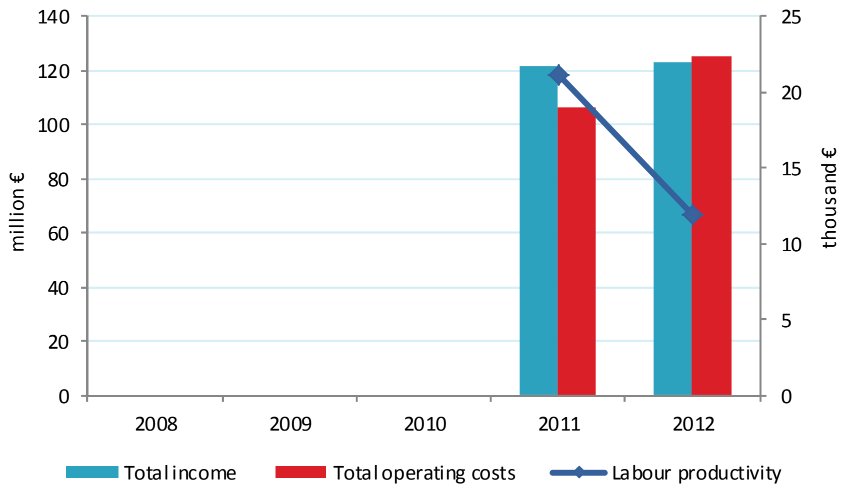


Figure 4.4.2 Income, costs, wages and labour productivity trends for Croatia: 2008-2012.

Source: EU Member States DCF data submission

As it can be seen in Table 4.4.2 the total income for the Croatian aquaculture has been stable from 2011 to 2012, but the total operating costs have increased, which is reflect in the significant drop of the labour productivity. The reason for this might be increased investments in the sector (building of stocks), especially in the marine aquaculture segment.

4.4.4 Economic performance

From 2011 to 2012, the total income increased by 2%, while operational cost increased by 18%. Total income is dominated by the turnover from the sale of fish from the farms, which contributes 63% of total income, while 31% of total income is from other income beside aquaculture. Relatively high contribution of other income was caused by large companies having other types of production beside aquaculture, like agriculture, fishing or fish processing.

Table 4.4.3 Economic performance of the Croatian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	*% of total income*	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover				78.8	77.7	*63%*	*-1%*	
Other income				36.8	38.9	*31%*	*6%*	
Subsidies				5.8	7.0	*6%*	*20%*	
Total income				*121.5*	*123.6*	*100%*	*2%*	
Expenditures (million €)								
Wages and salaries				19.2	25.7	*21%*	*34%*	
Imputed value of unpaid labour				0.0	0.0	*0%*		
Energy costs				5.4	6.7	*5%*	*24%*	
Repair and maintenance				2.0	2.5	*2%*	*26%*	
Raw material: Feed costs				34.8	41.3	*33%*	*19%*	
Raw material: Livestock costs				5.2	6.7	*5%*	*29%*	
Other operational costs				39.6	42.0	*34%*	*6%*	
Total operating costs				*106.2*	*124.9*	*101%*	*18%*	
Capital Costs (million €)								
Depreciation of capital				8.4	8.5	*7%*	*0%*	
Financial costs, net				9.3	9.7	*8%*	*4%*	
Extraordinary costs, net				0.3	1.1	*1%*	*270%*	
Capital Value (million €)								
Total value of assets				250.3	310.4	*251%*	*24%*	
Net Investments				21.9	20.3	*16%*	*-7%*	
Debt				96.9	120.5	*97%*	*24%*	
Input & Production (thousand tonnes)								
Raw material: Feed				63.4	62.8		*-1%*	
Raw material: Livestock				2.4	2.3		*-1%*	
Performance Indicators(million €)								
Gross Value Added				28.6	17.5	*14%*	*-39%*	
Operating cash flow				15.3	-1.2	*1%*	*-108%*	
Earning before interest and tax				6.8	-9.7	*8%*	*-242%*	
Net profit				-2.5	-19.4	*16%*	*-670%*	
Capital productivity (%)				11.4	5.6			
Return on Investment (%)				2.7	-3.1			
Future Expectation Indicator (%)				5.4	3.8			

Source: EU Member States DCF data submission

The expenditures in 2012 are dominated by cost of feed (41%), cost of other operational costs (42%) and cost of wages and salaries (25%). High value for other operational cost is the reflection of other business activities, which we can see by the value of other income which is 39% in 2012. In 2012 the expenditures were higher than total income by 1%.

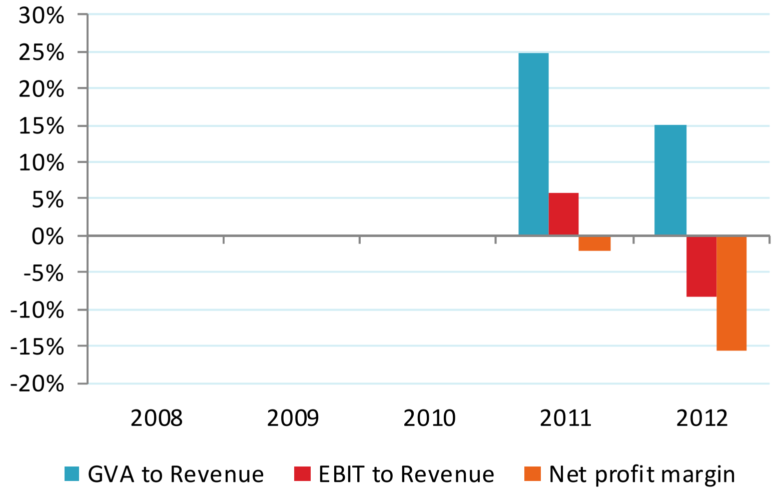


Figure 4.4.3 Economic performance for Croatia: 2008-2012

Source: EU Member States DCF data submission

The gross value added for the sector as a whole decreased by 39% from 2011 to 2012, and in 2012 both EBIT and net profit was negative. One of the reasons for this can be increase in total assets of 24%, and investments. Although investments have dropped by 7%, they are still high and representing 20% of total income.

4.4.5 Main species produced and economic performance by segment

The most important species in Croatian aquaculture is Bluefin tuna, covering 54% of the total value. There were only 3 tuna farms in Croatia, and they are exporting all of their products to Japan. Since tuna farming is based on catching wild juveniles, and it is under the strict ICCAT surveillance, further increase of production is relying on the available quota.

The second most important species is seabass, which is most often farmed in combination with seabream. Most farms are located on the middle part of coast, on the Zadar area. 50% of seabass production has been exported on the EU market, and the rest is sold on the local market. Before Croatia joint the EU export was restricted by quotas. For that reason it is expected that export and production will increase in the next years. Total production of oysters and mussels was sold on the national market due to export restrictions for the non EU members. Almost all shellfish farm are producing both oysters and mussels, but dominated by mussels in value and weight. It is expected that shellfish production will increase in the next years.

The freshwater aquaculture production is mostly sold at the national market, and only 15% are exported to EU the market. Main species in freshwater aquaculture is carp with 23% of total weight and 19% of total aquaculture value. All carp farms are located in inland part of Croatia, and most of enterprises have its own production of eggs and larva with combined production. Second most common species is trout. Beside carp and trout most farms are growing some other freshwater species, like grass carp, bighead carp, silver carp, wels catfish, pike and zander, but in smaller quantities.

Figure 4.4.4 Main species in terms of weight and value in Croatian production: 2012.

Source: EU Member States DCF data submission

The importance of Atlantic blue fin tuna in terms of total value of aquaculture production could be seen from the **Error! Reference source not found.**. But it should be mention that Atlantic blue fin tuna sector depends on the world market and the price can be very different from year to year (**Error! Reference source not found.**). In terms of value it is followed by the seabass and seabream. These three species represents 89% of total Croatian aquaculture production in value.

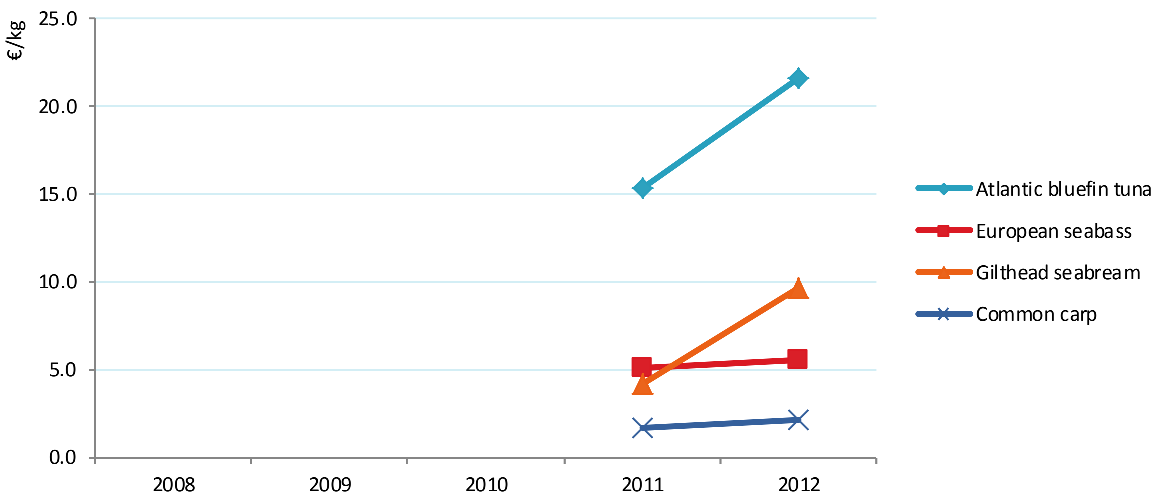


Figure 4.4.5 Average prices for the main species produced in Croatia: 2008-2012.

Source: EU Member States DCF data submission

In Croatia, the aquaculture production has been divided into 9 segments in 2011, and 11 segments in 2012 based on the species produced and the technique used.

There is only a few dominate species in Croatian aquaculture; carp and trout in freshwater; Blue fin tuna, seabass and seabream in marine aquaculture; mussel and oysters in shellfish production. In terms og volume the most important are seabass (25%), carp (23%) and tuna (17%). Seabass is in general grown in combination with seabream and they are represented in two segments. First is cage on growing, and second in combined production. Most of the enterprises belong to the “cage” segment, and only a few is in the “combined” segment.

The most relevant segments in the Croatian aquaculture are analyzed below.

Segment 1: Other marine fish cages: Bluefin tuna

The most important segment in terms of value is tuna farming. Although, it is not the largest segment measured by quantities. Beside value it is also important to point out that large part of small pelagic fishery that is directly related to tuna farming, since tuna can be fed only with the small pelagic fish. The fact that all tuna production is being exported, gives additional importance to this segment. Limiting factor is the fact that this kind of production is based on the catch of wild juvenile tuna, and it is under the strict ICCAT surveillance and restricted by quota. In Croatia there is large potential and interest for this production and it can be expected further growth of this sector in case ICCAT increase quota for Bluefin tuna fishing. In 2012 there were 3 active tuna farms, and they had production of 1,906 tones with value of 41.1 million euro. The value of this production corresponds to 54% of total Croatian aquaculture production.

Segment 2: Seabass and seabream cages

The second most important segment is seabass and seabream cages. Although, all of these farms are growing both seabass and seabream, with a small quantity of other marine finfish species. Seabass represents the largest portion in the total aquaculture production with 23% in weight and 19% in value. Seabream represents 12% in weight and 7% in total value. Increase in production was noted from 2011 to 2012 in terms of weight and value for this segment. The same trend is expected in the following years. Significant increase in production of other marine fish species in this segment should also be noticed. This segment consists of 19 enterprises, which produces 3,012 tons of fish. These enterprises do not have production of eggs and larvae; therefore they are buying juveniles partly from other Croatian hatcheries and partly importing from other EU countries.

Segment 3: Carp combined

Carp production is the second biggest in terms of weight, contributing with 23% of total Croatian production, but in terms of value it corresponds to only 7% of the total aquaculture production. Most of the carp farms have combined production with its own hatcheries and nurseries, . All carp production takes place in large ponds, which are located in the inland part of Croatia. There were 20 enterprises in this segment in 2011, and 16 in 2012, but with more or less same number of farms. Beside carp most of the farm are producing some other freshwater species like grass carp, bighead carp, silver carp, wels catfish, pike and zander.

Segment 4: Mussel long line

Although, the mussel long line segment represents only 12% of total weight, and 2% of the value, it is an important segment in terms of number of enterprises and employees. The segment contains 107 enterprises and 173 employees, but since most of these enterprises are small scale families businesses, it can be assumed that more people are involved and depend on this segment production. Almost all enterprises are producing mussels and oysters, but generally more than 50% of turnover comes from mussel production. The production is based on the collecting of shellfish in early stages from the nature, but some of the producers are buying additional juvenile shellfish's from other farms in order to increase production. The Increase of production of this segment is expected due to Croatian accession to the EU as shellfish export to the EU market has been restricted by regulations for non-member countries.

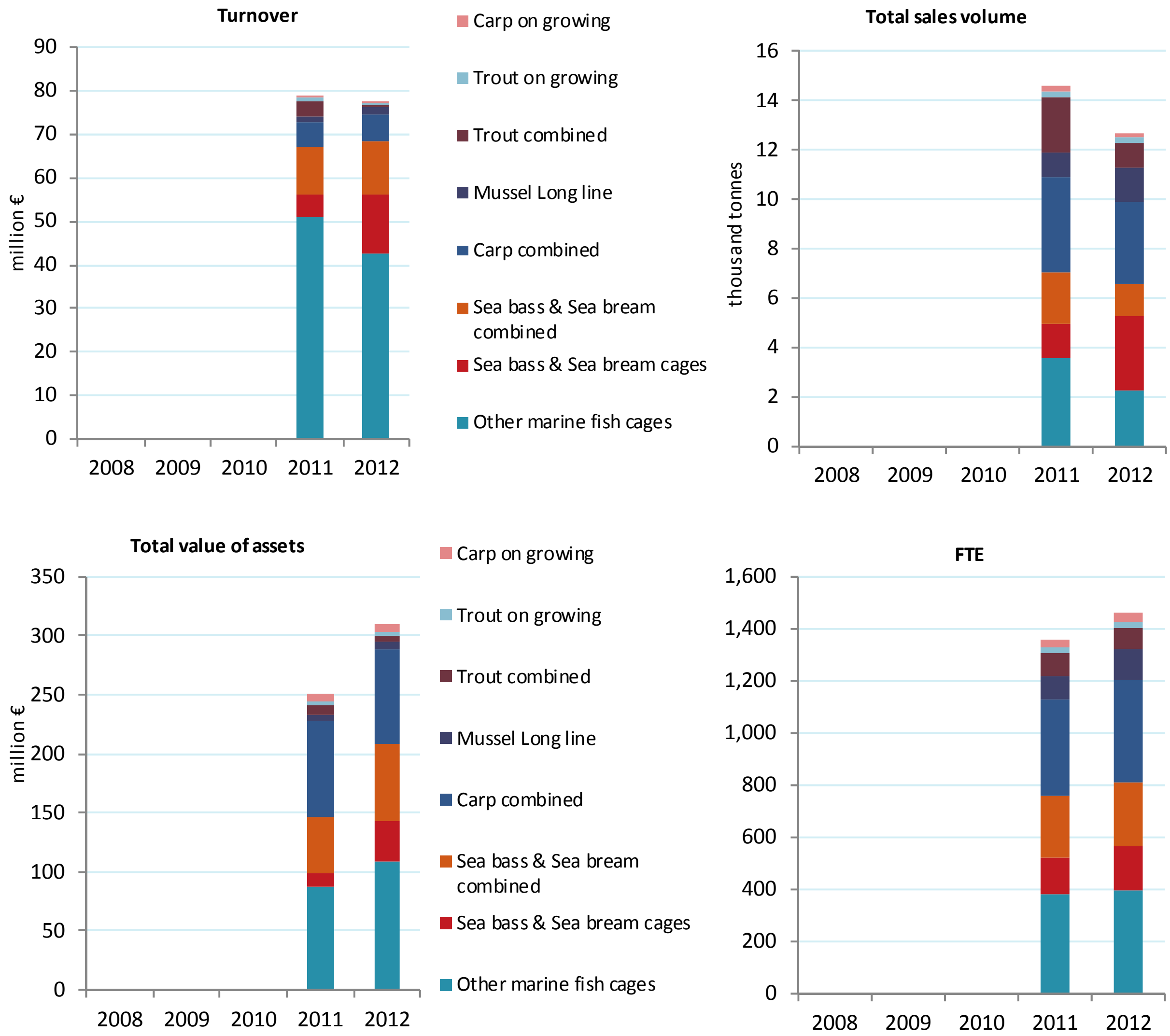


Figure 4.4.6 Structural development Croatian aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

In Table 4.4.4 the economic performance of the four main Croatian segments is shown. From the table it can be seen that the gross value added is positive for all segments, and net profit is negative only in the carp combined segment.

Table 4.4.4 Economic performance of main Croatian aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Other marine fish cages								
Total income				*61.0*	*52.7*	*100%*	*-14%*	
Gross Value Added				*28.6*	*22.3*	*42%*	*-22%*	
Operating cash flow				*23.5*	*16.7*	*32%*	*-29%*	
Earning before interest and tax				*19.0*	*14.2*	*27%*	*-25%*	
Net profit				*14.0*	*8.7*	*17%*	*-38%*	
Total sales volume (thousand tonnes)				*3.6*	*2.2*		*-38%*	
Sea bass & Sea bream cages								
Total income				*14.2*	*21.4*	*100%*	*51%*	
Gross Value Added				*1.4*	*5.4*	*25%*	*295%*	
Operating cash flow				*0.7*	*4.8*	*23%*	*603%*	
Earning before interest and tax				*0.2*	*4.0*	*19%*		
Net profit				*0.1*	*3.2*	*15%*		
Total sales volume (thousand tonnes)				*1.4*	*3.0*		*121%*	
Carp combined								
Total income				*17.2*	*18.2*	*100%*	*6%*	
Gross Value Added				*5.0*	*5.3*	*29%*	*6%*	
Operating cash flow				*0.4*	*1.7*	*10%*	*317%*	
Earning before interest and tax				*-1.7*	*-0.7*	*-4%*	*59%*	
Net profit				*-4.7*	*-3.7*	*-20%*	*21%*	
Total sales volume (thousand tonnes)				*3.9*	*3.3*		*-14%*	
Mussel Long line								
Total income				*2.1*	*2.7*	*100%*	*28%*	
Gross Value Added				*1.1*	*1.6*	*62%*	*54%*	
Operating cash flow				*0.6*	*1.0*	*37%*	*62%*	
Earning before interest and tax				*0.2*	*0.5*	*21%*	*133%*	
Net profit				*0.2*	*0.5*	*20%*	*196%*	
Total sales volume (thousand tonnes)				*1.0*	*1.3*		*40%*	

Source: EU Member States DCF data submission

In Figure 4.4.7, the economic indicators for the four main Croatian segments are presented. From the figures it can be seen that EBIT is positive for all segments except the carp combined segment.

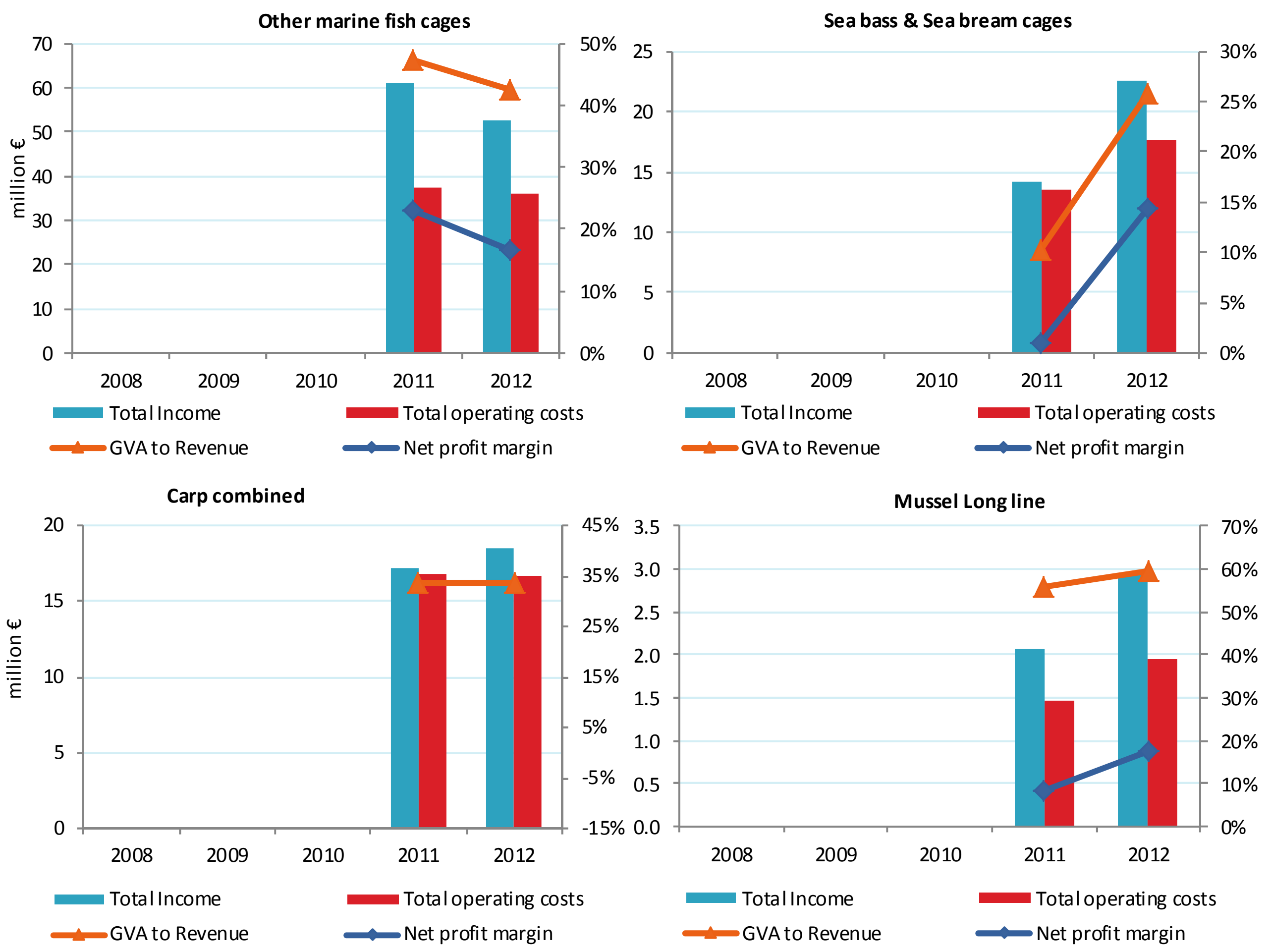


Figure 4.4.7 Economic performance indicators for the main Croatian segments: 2008-2012.

Source: EU Member States DCF data submission

In Figure 4.4.8, the operational cost structures for the four main Croatian segments are presented.

Segment 1: Other marine fish cages: Bluefin tuna

The Bluefin tuna segment show that the main cost components are feed covering 43%, followed by other operational cost 24% and wages and salaries with 16% of total cost.

Segment 2: Seabass and seabream cages

In the seabass and seabream cages segment, cost structure is similar to the Bluefin tuna production, except for the case of livestock material costs covering 13%.

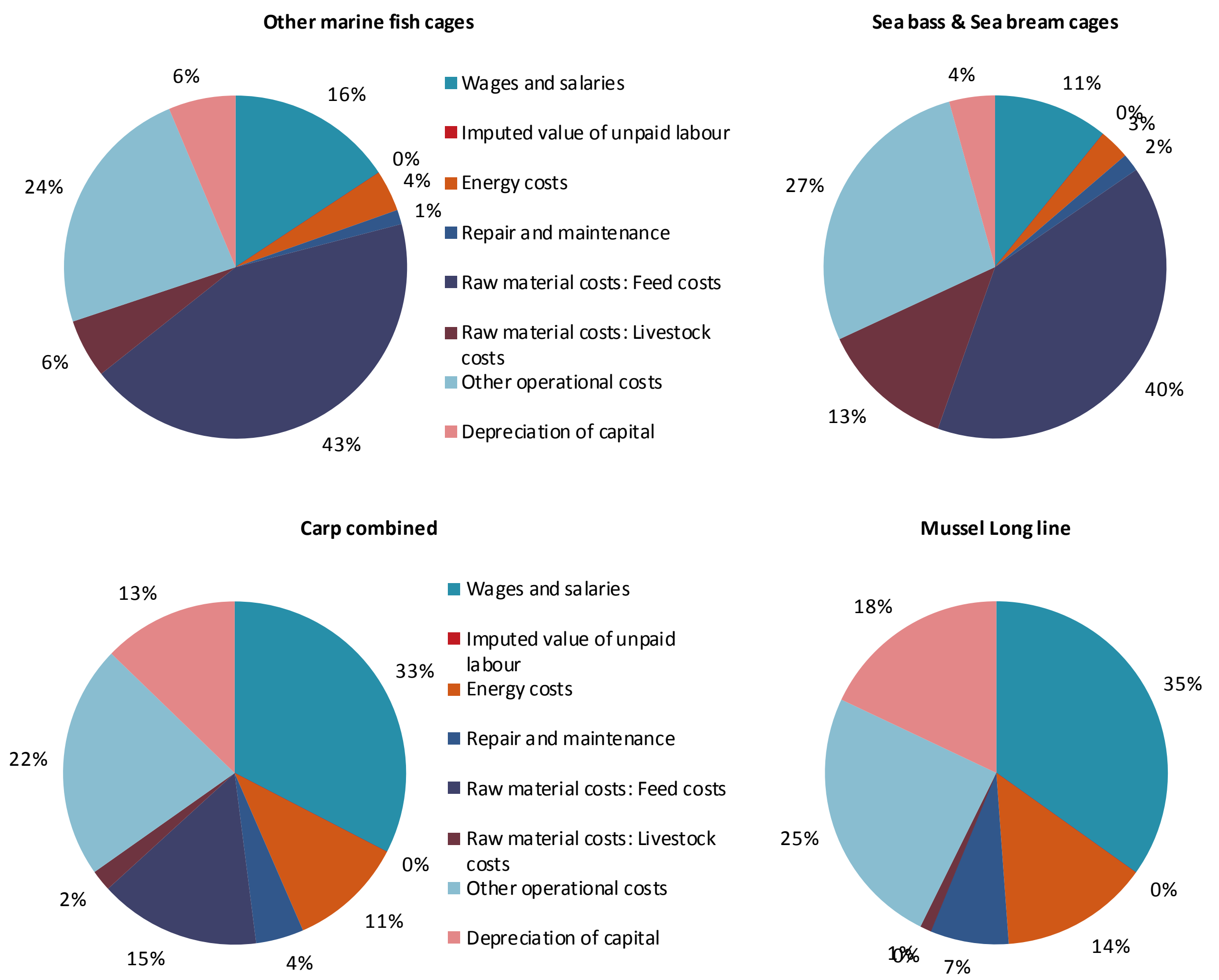


Figure 4.4.8 Cost structure of the main segments in Croatia: 2012.

Source: EU Member States DCF data submission

Segment 3: Carp combined

In the Carp combined segment cost structure is dominated by wages and salaries with 33%, followed by other operational costs with 23% of the total costs. Cost of feed represents 15%. Relatively high percentage of other operational costs, and smaller cost of feed, are result of company's activity in agriculture production for fish feed. Some of the largest companies have their own feed production, along with other agriculture activities.

Segment 4: Mussel long line

In this segment the dominating cost items are wages and salaries with 35%, followed by other operational costs with 25%, and depreciation of capital covering 18%.

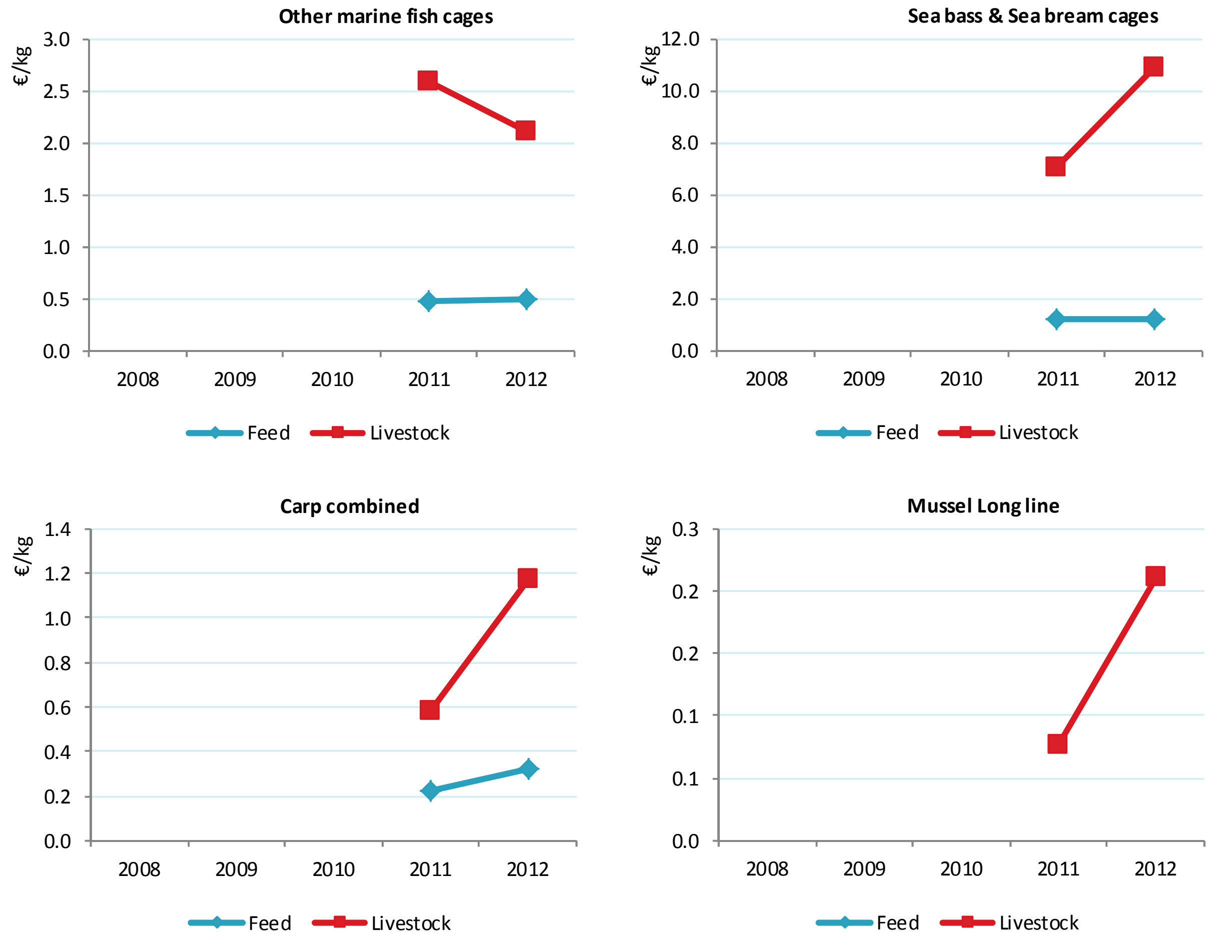


Figure 4.4.9 Feed and livestock prices for the main Croatian segments: 2008-2012.

Source: EU Member States DCF data submission

4.4.6 Trends and triggers

Current production trends and main drivers

Production trends for the past five years were made available based on EUROSTAT data. According to these figures Croatian aquaculture was increasing from 2008 to 2011. The main reason for this was an increase in Bluefin tuna production, but also an increase of other segments in marine and freshwater aquaculture. In 2011, the production decreased mainly because a smaller production in the tuna and the trout segment. Bluefin tuna production is determined by ICCAT quotas and prices on the world market, so this production follows world market trends.

Other marine aquaculture segments are more or less stable or increasing. It can be expected that this trend will continue, or even it will increase more due to Croatian membership of EU, and new market opportunities.

Total freshwater production was increasing until 2011 and carp production continued to grow in 2012. Like in marine segments it can be expected that these segments will increase their production, since most of their production was targeting the domestic market until 2013.

Market structure

The Croatian market went through period of intensive changes and improvements over the last several years. First of all, there has been improvement in public perception of aquaculture products, which is reflected on domestic consumption. Producers are making progress in marketing and production technologies, as well as in processing and placing aquaculture products. This is especially the case with large companies, resulting in increased investments.

The majority of Croatian aquaculture sector consists out of small-scale companies, and the need for joining an producers associations has been recognized. This is necessary for addressing future challenge of approaching the EU market.

In 2012, most of Croatian aquaculture production was sold on the domestic market, except for tuna. The main reason being import restrictions for non EU member countries. Significant changes can be expected in market structure over next several years.

Issues of special interest

Since Bluefin tuna is representing more than half of total Croatian production value, there is strong interest in further development of this sector. Croatian coast line is suitable for further development of mariculture in generally, but it is necessary to establish good practice in coastal zone management in order to ensure sustainable development of aquaculture production. This also applies for seabass and sebream production, and shellfish farms. At the same time it is necessary to improve market organisation and legal framework to assure further development and control.

It is noticed that some mariculture segments have increased their investment in new technologies, and start with introducing new species beside seabass and seabream. It can be expected that this trend will have further development.

In freshwater aquaculture development is restricted by available area, but with successful improvements in production technologies it can be expected to increase in production. Furthermore, technological improvements, and increase of production in all aquaculture segments, have to be followed with better control measures for the pollution of nitrogen, phosphorus and organic material.

Outlook for 2013 and 2014

For the Croatian aquaculture producers the year 2014 is expected to be better than 2012. The main reason is Croatia entrance in the EU and opening of the new market. In the previous years export was limited by quota and other regulations, especially for the seabass, seabream and shellfish. Even in 2011 and 2012 it is evident that these sectors have increased their investments, so we can expect growth in mariculture.

The freshwater aquaculture segment is decreasing in production. However, it is yet to see how the new EU market will influence on this segment.

Data Coverage and Data Quality

Data quality

The account statistics for 2012 is based on a sample of 108 aquaculture enterprises, which covers 80% of the total population of 174 enterprises. Data for all segments have been collected by census, except shellfish farms, where collection has been based on the probability sampling survey. Data collection was performed through questioners created for this purpose. To ensure data consistency for all segments, together with definition of each variable in guidelines, link was made to accounting code in balance sheets. Some of variables were collected from Croatian Directorate of Fishery (DoF) database and subsidies register, since it is mandatory for all aquaculture producers in Croatia to report the production in volume and value each year at the farm level. But some of the variables were taken from questioners although it was planned to use DoF data. It was detected that DoF register is not complete and that some information is not suitable for this purpose. Some other variables, e.g. subsidies, were collected through DoF register and questioner. One of the main problems was low response and cooperation. Since this was the first year of collection, it is foreseen that this situation will improve in the future. This is especially important for some segments with small-scale companies where it will be necessary to put additional effort in future data collection.

The extrapolation of the sample to the total population is done in two steps. In the first step all results from the collected questionnaires are entered into the database. Based on the data collected an average has been calculated for all indicators in each segment. In the second step, a data for the remaining population is estimated based on the average calculated in the first step and the information of production value. In some cases where production value was not available, missing values were calculated based on the average of known part of population. The underlying assumptions for this calculation are that the production function for each farm is identical within each segment.

Data availability

Data for the aquaculture sector is going to be published on the segment level approximately 12 months after the end of the reference year.

Confidentiality

The data for 8 segments that are surveyed in Croatia are presented. To avoid problems with confidentiality, segments with less than 3 enterprises were excluded from data presentation. In 2012 there were 3 segments with less than 3 enterprises, and all three were hatcheries and nurseries for different species.

All segments are distinguished both concerning the species and technique. If an enterprise produces more than one species, then it is allocated to the segment of the species that contributes the most to the turnover.

Some enterprises own more than one farm using different techniques, but these activities are grouped together, because the enterprise is used as data collection unit. There are very few examples of enterprises using more than one production technique.

Differences in DCF data compared with other official data sources

The Croatian data for DCF is, in most cases, in line with both value and production registered in FAO and EUROSTAT. Only in the shellfish production there is significant difference between the data sources. However, explanation for that is probably difference in methodology. While shellfish data delivered for EUROSTAT are result of Croatian Chamber of Economy and Chamber of Trades and Crafts estimates, on the other hand DCF data for shellfish farms are estimation based on the sample. Since shellfish farms in Croatia are mostly small family-run farms, they have poor data sources and large part of result was based on the estimation. This was recognised as one of the main issues in the Croatian annual report and something that has to be improved in the following years. On the other hand EUROSTAT data are as well product of estimation, but methodology is unknown.

Regarding marine and freshwater fish production, data between EUROSTAT and DCF are mostly in line. Differences that appear are again the result of different methodology. While data delivered for EUROSTAT refers only on market size commercial fish for human consumption, in the DCF data eggs, larva and juveniles are also enrolled with result of production per species. Furthermore, data for some of the segments from the freshwater aquaculture could not be presented due to confidently. In some marine fish segments results are also product of estimation based on the field collected data. Since this was first year of collecting and comparing data, it should be paid more attention to occurred differences in order to determent real reasons for this in the next programming period.

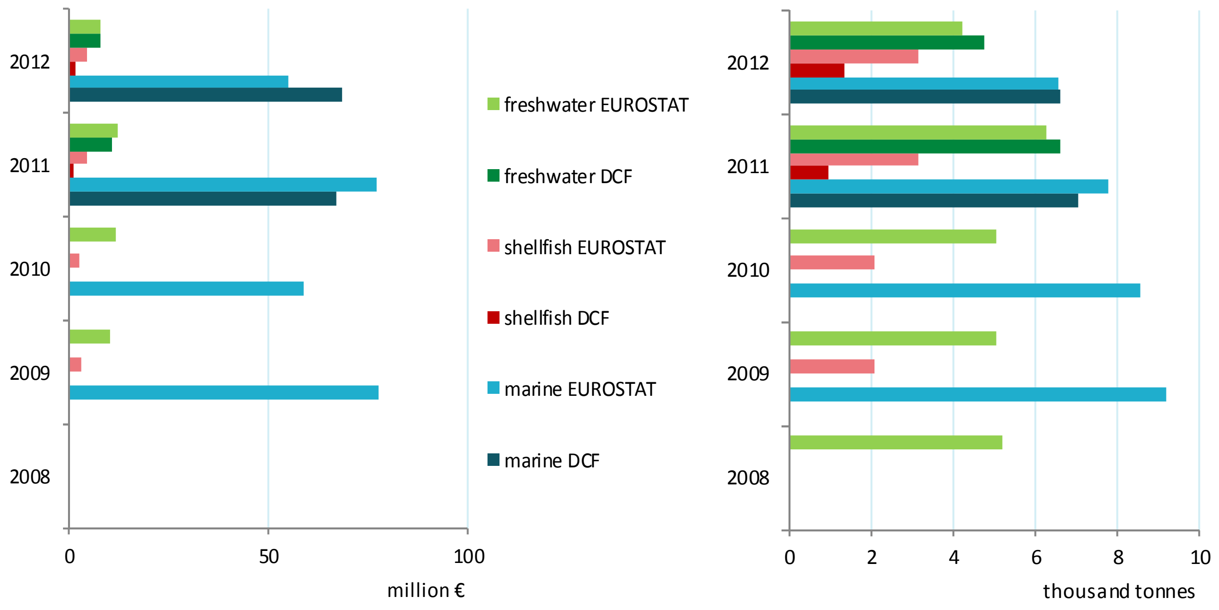


Figure 4.4.10 Comparison of DCF data with EUROSTAT data for Croatia: 2008-2012

4.5 CYPRUS

4.5.1 Summary

Production volume and value

In 2012, the Cypriot aquaculture industry produced a total of 4.7 thousand tonnes which is very similar to the production obtained in 2011 and average overall increase (2008 – 2011) of 16%. The total value of production from the Cypriot aquaculture sector for the year 2012 amounted to 29.2 million Euro, which corresponded to a decrease of 5% from the previous year (2011).

Overall industry structure and employment

In 2012, the total population of aquaculture enterprises in Cyprus was 10. The Cypriot aquaculture sector is dominated by relatively large enterprises with more than 10 employees. 80% of the Cypriot enterprises had more than 10 employees, in 2012..

Main segments

The production in Cyprus can be divided into four main segments, these being ‘Marine Finfish species’, ‘Shellfish’, ‘Finfish fresh water’ and ‘Marine Finfish – hatcheries and nurseries’. The largest segment is by far the ‘Finfish salt water species’ which accounts for more than 90% of the total sales value (for 2012).

Current production trends and main drivers (Trends and triggers)

Production has increased over time (though stable between 2011 and 2012) mainly due to the opening of new export markets as well as due to the support from the European Fisheries Fund. In the recent years substantial investments were made towards the modernization and expansion of the aquaculture farms which resulted among others to the increase of production.

Outlook

The total production of aquaculture products is expected to increase because of the increasing global demand, which resulted in the opening of new export markets as well as the marketing campaigns undertaken by the producers.

4.5.2 Production and sales

The Cypriot aquaculture industry is mainly based on marine fish production. Data on production in weight for the separate sectors was not made available for the production of this report but by analysing the sales value data, it is evident that marine fish production is by far the most important sector accounting for 26.5 million Euro in 2012 out of a total of 29.2 million Euro when combining all segments together. Of secondary importance are the hatcheries and nurseries with the other segments having a very minimal contribution to the global value of sales. The trend in production and sales value of 2012 are very similar to results obtained in the previous year.

Table 4.5.1 Production and sales for Cyprus: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***3.8***	***3.4***	***4.1***	***3.1***	***3.2***	*3%*	*-10%*
Marine	3.7	3.3	4.1	3.1	3.2	*4%*	*-10%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*-45%* ↘	*-53%*
Freshwater	0.1	0.1	0.1	0.1	0.1	*-4%*	*-1%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		*0%*
Sales value (million €)	***35.2***	***18.2***	***28.1***	***30.6***	***25.8***	*-16%*	*-8%*
Marine	34.1	17.3	27.5	30.0	25.1	*-16%*	*-8%*
Shellfish	0.4	0.1	0.0	0.1	0.1	*-11%*	*-52%*
Freshwater	0.7	0.8	0.6	0.6	0.6	*6%*	*-10%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		*0%*

Source: EU Member States DCF data submission

4.5.3 Industry structure and employment

Ten aquaculture enterprises operated in 2012, 90% of which employing more than 10 employees. One enterprise employees employs less or equal to 5..

Table 4.5.2 Structure of the Cyprian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*12*	*10*	*10*	*10*	*10*	*0%*	*-5%*
<=5 employees	1	0	0	0	1		*300%*
6-10 employees	3	1	3	1	0	*-100%*	*-100%*
>10 employees	8	9	7	9	9	*0%*	*9%*
Employment (number)							
Total employees	319	251	228	260	259	*0%*	*-2%*
Male employees	242	176	162	183	190	*4%*	*0%*
Female employees	77	75	66	77	69	*-10%*	*-6%*
FTE	247	223	207	240	248	*3%*	*8%*
Male FTE	172	150	149	166	180	*8%*	*13%*
Female FTE	75	74	59	74	68	*-8%*	*-3%*
Indicators							
FTE per enterprise	20.6	22.3	20.7	24.0	24.8	*3%*	*13%*
Average wage (thousand €)	10.7	15.7	15.1	12.8	11.0	*-13%*	*-19%*
Labour productivity (thousand €)	58.7	24.4	72.7	52.1	28.5	*-45%*	*-45%*

Source: EU Member States DCF data submission

The number of employees remained the same over the years 2011 and 2012. , whereas fulltime equivalents increased by 3%. The FTE per enterprise indicator increased also s by 3% from the previous year (2011). Employment was dominated by males, accounting for ca. 73% of total employment. The average wage obtained for 2012 is consistent with that of 2011, while fluctuations were observed on earlier years.

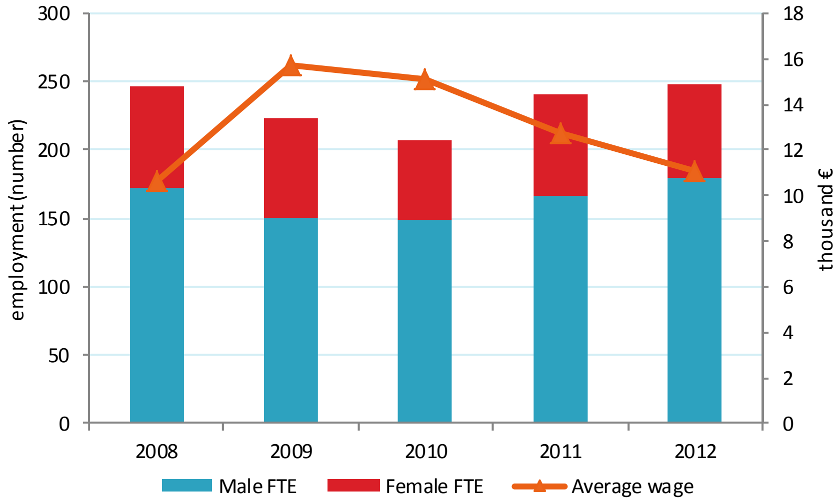


Figure 4.5.1 Employment trends for Cyprus: 2008-2012.

Source: EU Member States DCF data submission

The labour productivity is measured as gross value added per full time employee. In 2012, the Labour productivity indicator decreased by 7% when compared to the previous year.

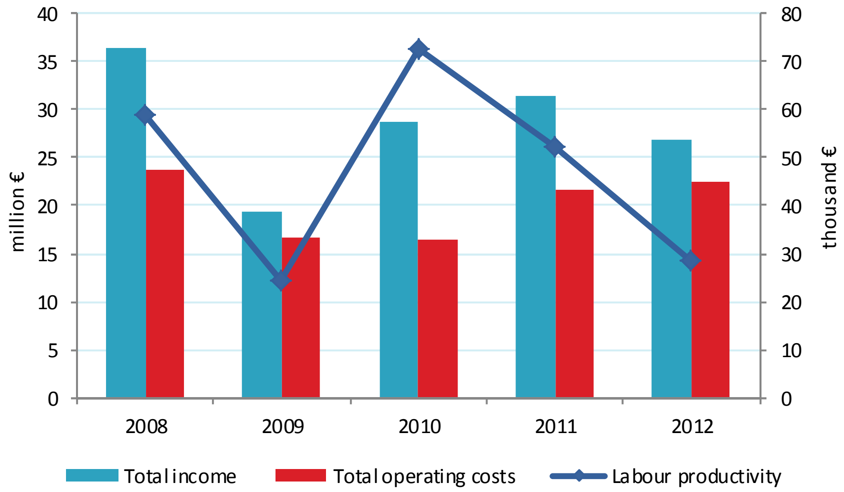


Figure 4.5.2 Income, costs, wages and labour productivity trends for Cyprus: 2008-2012.

Source: EU Member States DCF data submission

In 2012, total income decreased slightly (by 3%) when compared to 2011. Fluctuations are evident when one considers data across the years 2008 – 2012. Total operating costs have gradually increased in the recent three years. The Labour productivity indicator was fluctuating over the years with a slight decrease in 2012 when compared to 2010-2011.

4.5.4 Economic performance

Total income in 2012 amounted to 26.8 million Euro, with 96% of this income originating from turnover. The rest was attributed to other income. From 2011 to 2012, total income decreased by 14%, while the total operating costs increased by 4%. The greatest proportion of costs was due to the raw material required: feed and livestock. Significant variations in some variables: debt and other operational costs have been observed when comparing to previous years.

Table 4.5.3 Economic performance of the Cyprian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	35.2	18.2	28.1	30.6	25.8	*96%*	*-16%*	*-8%*
Other income	0.4	0.5	0.4	0.4	1.1	*4%*	*173%*	*151%*
Subsidies	0.8	0.6	0.2	0.3	0.0	*0%*	*-95%*	*-97%*
Total income	*36.5*	*19.3*	*28.7*	*31.3*	*26.8*	*100%*	*-14%*	*-7%*
Expenditures (million €)								
Wages and salaries	2.6	2.9	2.5	3.1	2.7	*10%*	*-11%*	*-1%*
Imputed value of unpaid labour	0.0	0.6	0.7	0.0	0.0	*0%*	*0%*	*-100%*
Energy costs	1.1	0.4	0.4	0.4	0.4	*1%*	*-15%*	*-38%*
Repair and maintenance	0.3	0.3	0.3	0.4	0.3	*1%*	*-16%*	*-4%*
Raw material: Feed costs	9.6	7.4	8.8	10.7	13.3	*50%*	*25%*	*45%*
Raw material: Livestock costs	6.4	3.5	1.7	4.7	4.7	*17%*	*-1%*	*15%*
Other operational costs	3.7	1.6	2.2	2.3	1.1	*4%*	*-52%*	*-54%*
Total operating costs	*23.8*	*16.7*	*16.6*	*21.6*	*22.5*	*84%*	*4%*	*14%*
Capital Costs (million €)								
Depreciation of capital	0.7	0.0	1.0	0.9	0.7	*3%*	*-20%*	*9%*
Financial costs, net	0.2	0.3	0.2	0.2	0.2	*1%*	*16%*	*-6%*
Extraordinary costs, net	1.4	1.4	0.0	0.0	0.1	*0%*	*819%*	*-87%*
Capital Value (million €)								
Total value of assets	23.8	35.5	36.6	26.3	36.5	*136%*	*39%*	*19%*
Net Investments	2.8	2.6	1.4	2.0	1.6	*6%*	*-18%*	*-27%*
Debt	8.8	2.6	4.0	4.5	8.6	*32%*	*93%*	*74%*
Input & Production (thousand tonnes)								
Raw material: Feed	9.9	8.5	9.6	10.3	9.5		*-7%*	*0%*
Raw material: Livestock	0.7	0.1	0.1	0.1	0.1		*9%*	*-54%*
Performance Indicators(million €)								
Gross Value Added	14.5	5.5	15.1	12.5	7.1	*26%*	*-43%*	*-41%*
Operating cash flow	12.7	2.6	12.1	9.8	4.3	*16%*	*-56%*	*-53%*
Earning before interest and tax	12.0	2.5	11.1	8.9	3.6	*13%*	*-59%*	*-58%*
Net profit	11.7	2.3	10.9	8.7	3.4	*13%*	*-61%*	*-59%*
Capital productivity (%)	60.9	15.4	41.2	47.5	19.4			
Return on Investment (%)	50.3	7.2	30.4	33.7	9.9			
Equity ratio (%)	63.2	92.8	89.1	83.0	76.4			
Future Expectation Indicator (%)	8.8	7.2	1.2	4.0	2.4			

Source: EU Member States DCF data submission

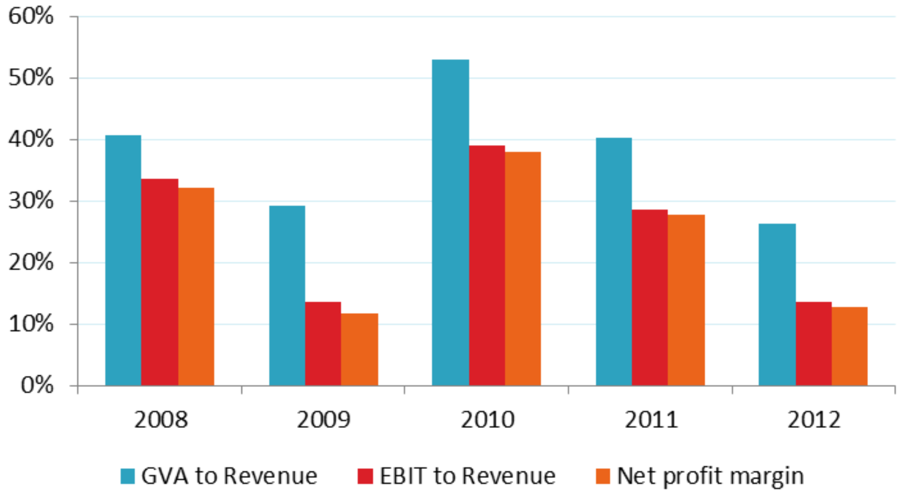


Figure 4.5.3 Economic performance for Cyprus: 2008-2012

Source: EU Member States DCF data submission

The gross value added to revenue ratio for the sector has gradually decreasing in 2010-2012 and in 2012 it decreased by 14% when compared to 2011. The other indicators, namely Earning before interest and tax to revenue and the Net profit margin decreased by 15% between 2011 and 2012.

4.5.5 Main species produced and economic performance by segment

The main cultured marine species in Cyprus are seabream (*Sparus aurata*) ,seabass (*Dicentrarchus labrax*), meagre (*Argyrosomus regius*) and other fish in much smaller quantities (such as *Siganus rivulatus* and *Pagellus erythrinus)* and in fresh water aquaculture: rainbow trout (*Oncorhynchus mykiss*) and sturgeon (*Asipenser baeri*).

Aquaculture in Cyprus is a very important activity of the Fisheries sector since it constitutes 80-85 % both in terms of value and in volume of the total national fisheries production. At the same time it offers other socio-economic benefits like employment opportunities, contribution to local coastal economies etc.

The production in Cyprus can be divided into four main segments. The largest segment is the marine finfish production (excluding hatcheries and nurseries) which accounts for over 90% of total value, followed by three other segments of minimal importance, these being marine hatcheries and nurseries finfish freshwater production (excluding hatcheries and nurseries) and shellfish, in the order presented.

Seabream is the main specie cultured in Cyprus makes up 72% of the total volume and 65% of value of production. The Seabass constitute by 26% of the total weight and 32% of the value. The other species are of less importance.

In Cyprus there is only one combined marine unit and two independent marine hatcheries. It has to be noted that because of confidentiality reasons one cage fattening unit and 3 marine hatcheries are included in the Sea bream – Sea bass combined segment. Therefore the values are not fully corresponding to the real economic performance related to the hatcheries/combined segments. The inclusion of the fattening unit creates a distortion of the total values for the marine hatcheries.

Figure 4.5.4 Main species in terms of weight and value in Cyprus production: 2012.

Source: EU Member States DCF data submission

Average prices of Gilthead seabream, European seabass and Rainbow trout seem to be higher for 2011 and 2012 compared with 2010.. Prices of meagre have decreased significantly in the three-year period for which data was presented (2010 – 2012).

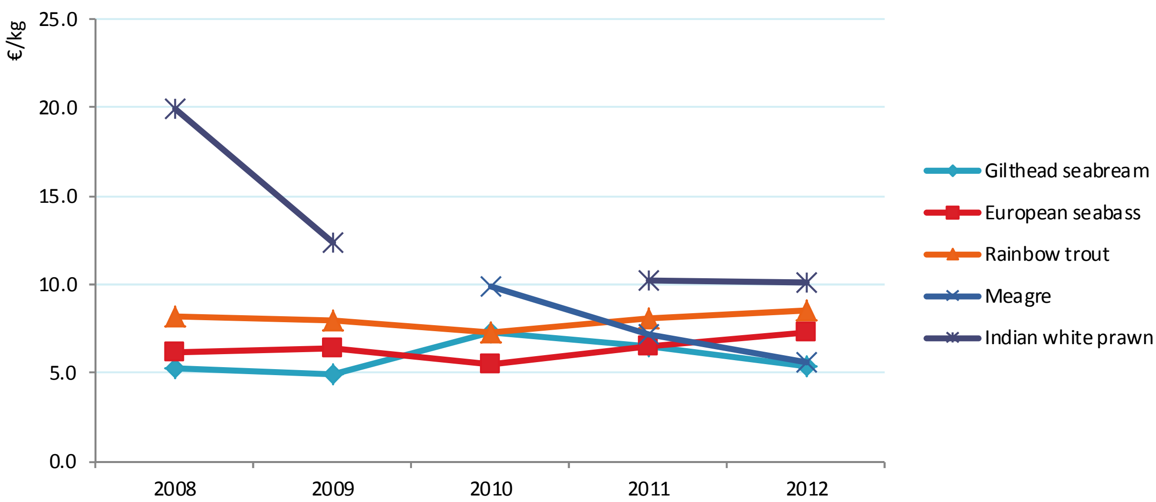


Figure 4.5.5 Average prices for the main species produced in Cyprus: 2008-2012.

Source: EU Member States DCF data submission

As already explained, the Cypriot aquaculture sector comprises of four main units; marine finfish production (excluding hatcheries and nurseries) which accounts for over 90% of total value, followed by three other units of minimal importance, these being marine hatcheries and nurseries, finfish freshwater production (excluding hatcheries and nurseries), and shellfish, in the order presented.

The most relevant segments in Cyprus aquaculture are analyzed below.

Segment 1: Sea bass and Sea bream on growing

The most important segment in the marine finfish aquaculture is sea bass and sea bream cage culture. The equipment used is marine offshore fish cages that are anchored with moorings at the seabed. The products from this segment are whole fish, mainly sea bream and sea bass of several sizes with the most common being the 300 – 400g size. The production sales value of this sector accounts for over 90% of the total Cyprus aquaculture sales value. All the products are marketed as fresh whole.

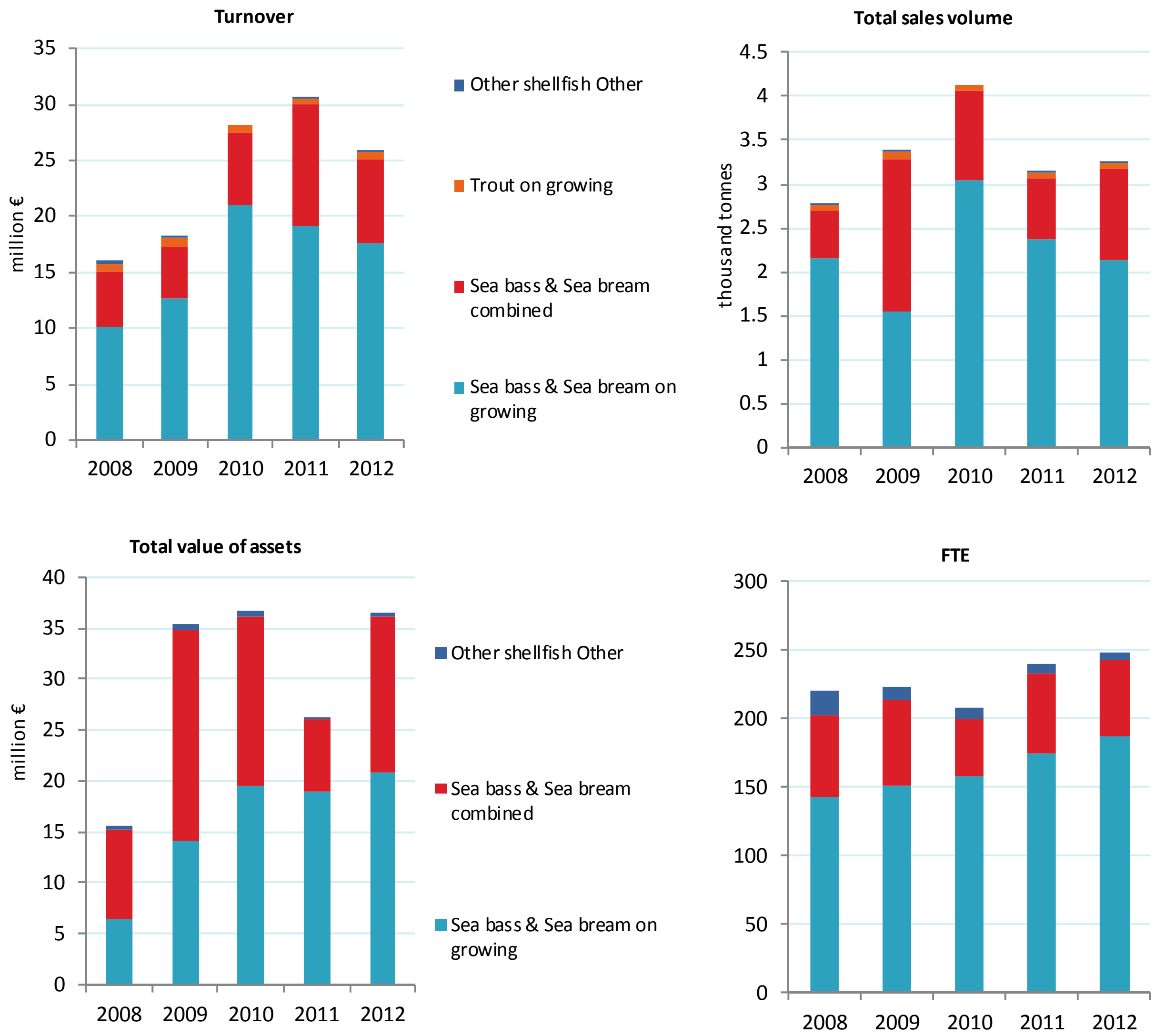


Figure 4.5.6 Structural development Cyprian aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

Segment 2: Sea bass and sea bream combined

This is the second most important segment for Cyprus aquaculture in terms of value. The segment is represented by one enterprise, using combined aquaculture technique, which means, using its own hatchery and nursery for production and 2 hatcheries and nurseries, which are specialized in juveniles production for sea bass and sea bream farming. The hatcheries and nurseries are land based units located in coastal areas using tanks, raceways and limited recirculation systems for production. Usually using water pumped from wells or directly from the sea. The main production of these hatcheries is sea bream and sea bass. They supply the local grow-out units or exporting the fry to other EU and non EU countries. The fry is usually marketed at a size of about 2 grams. There are three marine hatcheries out of which one operates in combination with a open sea cage unit.

Segment 3: Trout on growing

This segment is a relatively small segment. The fish produced are rainbow trout and sturgeon. The techniques used are raceways, tanks and recirculation systems. These units are small family owned businesses and some of them operate in conjunction with on site restaurants. Most of the production is marketed fresh whole but also some small quantities are marketed as smoked either whole or filleted. One of the most important problems that act as an inhibiting factor for the further development of this segment in Cyprus are the limited fresh water resources.

Table 4.5.4 Economic performance of main Cyprian aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	*% of total income*	Change 2012/11	Development 2012/(2008-11)
Sea bass & Sea bream on growing								
Total income	*11.1*	*13.4*	*21.4*	*19.7*	*17.8*	*100%*	*-10%*	*9%*
Gross Value Added	*2.0*	*4.4*	*12.5*	*8.0*	*4.6*	*26%*	*-43%*	*-32%*
Operating cash flow	*1.8*	*2.9*	*10.6*	*6.7*	*2.6*	*15%*	*-61%*	*-52%*
Earning before interest and tax	*1.5*		*9.9*	*5.8*	*2.0*	*11%*	*-66%*	*-66%*
Net profit	*1.4*		*9.7*	*5.6*	*1.7*	*10%*	*-69%*	*-69%*
Total sales volume (thousand tonnes)	*2.1*	*1.6*	*3.0*	*2.4*	*2.1*		*-10%*	*-6%*
Sea bass & Sea bream combined								
Total income	*5.0*	*5.1*	*6.7*	*11.0*	*8.4*	*100%*	*-24%*	*21%*
Gross Value Added	*-1.5*	*0.2*	*1.9*	*3.9*	*1.8*	*22%*	*-52%*	*66%*
Operating cash flow	*-2.7*	*-1.2*	*1.0*	*2.5*	*1.1*	*13%*	*-56%*	*1063%*
Earning before interest and tax	*-3.0*	*-1.2*	*0.6*	*2.4*	*1.0*	*12%*		
Net profit	*-3.1*	*-1.3*	*0.6*	*2.4*	*1.0*	*12%*		
Total sales volume (thousand tonnes)	*0.6*	*1.7*	*1.0*	*0.7*	*1.0*		*51%*	*4%*

Source: EU Member States DCF data submission

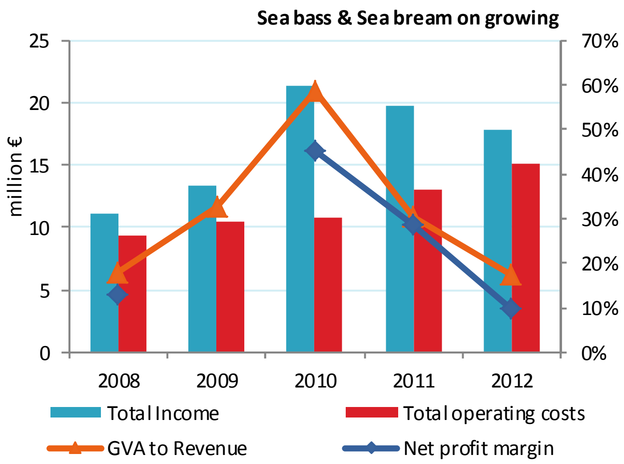


Figure 4.5.7 Economic performance indicators for the main Cyprian segments: 2008-2012.

Source: EU Member States DCF data submission

In Figure 5.7.8, the operational cost structures for the most important Cyprus aquaculture segment is presented .

Segment 1: Marine finfish

The marine grow out units show the traditional cost composition for an open sea cage farm. The main cost components are feed, livestock, and wages which cover 91% of the total operational cost.

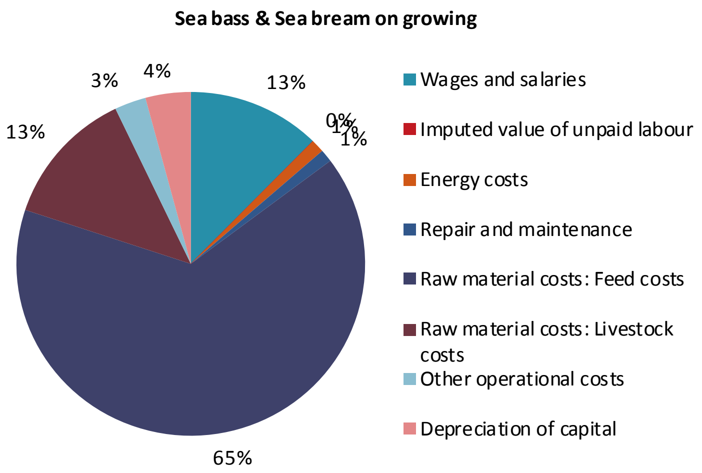


Figure 4.5.8 Cost structure of the main segments in Cyprus: 2012.

Source: EU Member States DCF data submission

4.5.6 Trends and triggers

Current production trends and main drivers

The production has increased over time (though stable between 2011 and 2012) mainly due to the opening of new export markets as well as due to the support from the European Fisheries Fund. The production is expected to increase further, however the extent of the increase is unknown since the prospects and the stability of the new found markets are also unknown and difficult to predict. In the recent years substantial investments were made towards the modernization and expansion of the aquaculture farms which resulted among others to the increase of production.

Meagre (*Argyrosomus regius)* and Sturgeon (*Asipenser baeri*) have been recently introduced in the Cyprus aquaculture sector. The efficiency of Recirculation Aquaculture Systems (RAS) is also being examined.

Market structure

The Cypriot aquaculture sector consists of a limited number of producers (a total of 10 in 2012), with the majority of these (80%) employing more than 10 employees.

There are no organic aquaculture companies established in Cyprus at the moment.

Issues of special interest

The implementation of the EFF has contributed towards the sustainable development of the sector by providing support for the establishment of new units as well as the modernization and the expansion of the production of the existing ones.

The Department of Fisheries and Marine Research, operates two research stations which promote scientific research and technological development on aquaculture. These are the Cyprus Marine Aquaculture Research Center (CyMARC) and the Freshwater Aquaculture Research Station at Kalopanayiotis (Troodos).

The research programmes that have been undertaken at CyMARC focused mainly on new candidate species for fish farming, such as rabbit fish (*Siganus rivulatus*), common pandora (*Pagellus erythrinus*), greater amberjack (*Seriola dumerili*) and meagre (*Argyrosomus regius)*. The main objective of research work is the diversification of aquaculture production with new species, a task that will contribute to the sustainability of the sector.

Outlook for 2013 and 2014

The total production of aquaculture products is expected to increase because of the increasing demand due to the opening of new export markets as well as the marketing campaigns undertaken by the producers.

By 2013 it is expected that the production will increase by 10% compared to 2011.

4.5.7 Data Coverage and Data Quality

Data quality

The national database for aquaculture started to operate in 2009 and it showed that the cohesion of data sent from 2009 and onward to the different institutions has been greatly improved. Data submission issues are however present and a lot of the requested data has not been sent. During 2014 data call for aquaculture Cyprus first time submitted the data on aquaculture segment level, but due to the late submission (after the EWG 14-10 meeting) the data set was not finalised and after some checks appeared, that there are mistakes in the data set and it has to be resubmitted. As resubmission was not possible due to closure of the data base 10 working days after EWG 10-14 meeting, the resubmission of full data set for Cyprus on aquaculture segment level is foreseen in 2015 data call. For this reason, data provided is not enough to evaluate most trends.

Data availability

Cypriot aquaculture data was provided by segment in 2014, however due to the late submission of disaggregated data only national totals were available during the EWG 14-10 meeting. Data on employment, weight by species and total values were made available. Due to lack of important data, certain conclusions could not be made and some trends could not be observed and analysed also since some of the data was not provided for the earlier years (2008 – 2010).

Confidentiality

The number of aquaculture enterprises in Cyprus is limited, for example in 2012 only 10 enterprises existed. Moreover, these enterprises are involved in different aquaculture activitites and can be split in at least to four different segments. With the current DCF segmentation, the number of enterprises is very low and could not be published separately due to confidentiality issues, therefore some segments, e.g. sea bass & sea bream hatcheries and sea bass & sea bream combined been clustered in order to be able to publish the data. To avoid problems with confidentiality, segments should in general include more than 3 enterprises.

Differences in DCF data compared with other official data sources

In some occasions before 2009 there were some differences between the data submitted to different institutions. This is due to the fact that the new national data base for aquaculture started to operate in 2009 which clearly shows that the cohesion of data sent from 2009 and onward to the different institutions has been greatly improved. Furthermore some parameters are submitted in different units. For example for FAO and EUROSTAT the amount of fry is submitted in number of individuals while as for the DCF they are submitted in weight. Another problem encountered is the fact of double counting of some quantities of fish. Some aquaculture companies are supplied fish from other aquaculture companies in order to satisfy the needs of their clients. This quantity is not double counted in the production but is double counted in the sales because both companies issue invoices for the fish so as a result the same fish being counted twice in the turnover of the companies.

The comparison between DCF and EUROSTAT data is presented in the Figure 4.5.10. 2008 marine and shellfish production data is missing in EUROSTAT for Cyprus, therefore no comparison could be available for 2008 data sets.

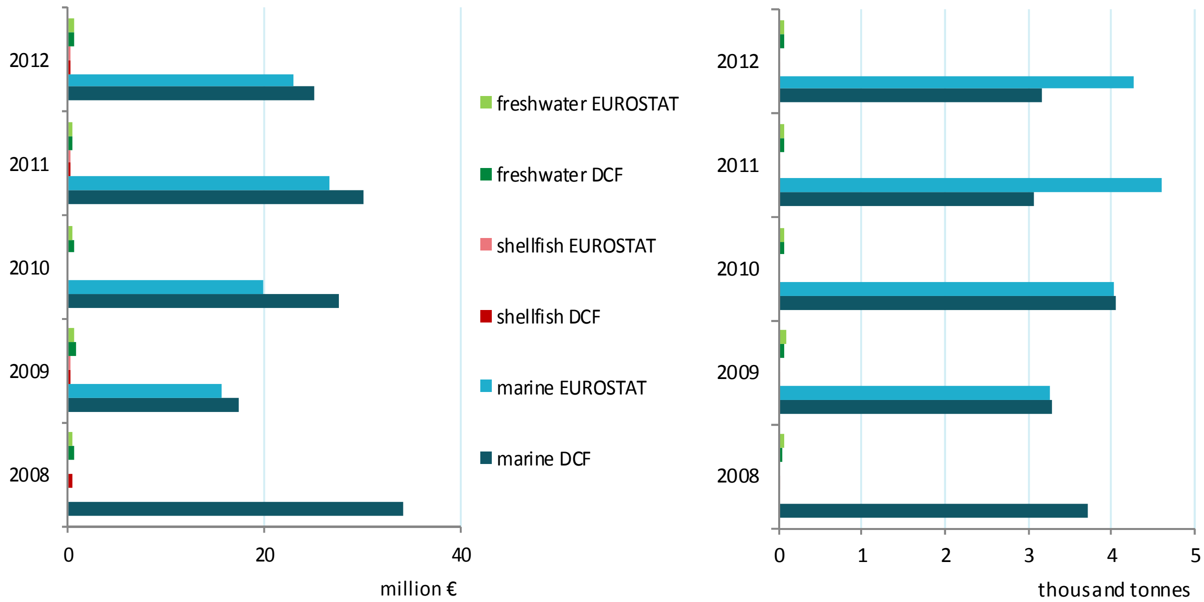


Figure 4.5.9 Comparison of DCF data with EUROSTAT data for Cyprus: 2008-2012

4.6 CZECH REPUBLIC

4.6.1 Summary

Aquaculture in the Czech Republic is a highly traditional activity starting in the late middle age and supported by the religious authorities for several centuries. Being a landlocked country only freshwater species can be risen in the country, being common carp (*Ciprinius carpio*), farmed in extensive pond aquaculture, the most relevant species in the country.

Carp aquaculture is based on a seasonal demand, with the peek in Christmas and very low sale levels in the rest of the year. This activity results in an important seasonal employment demand and additional sources of income in rural areas.

The freshwater data collection is not mandatory under the DCF, and landlocked countries are therefore not requested to provide economic data for this report. However, data on production volume and value are available from FAO Fishstat databases.

Production volume and value

Total aquaculture production in the Czech Republic was 20.8 thousand tonnes in 2012 which represents a small 1% decrease with regard the previous year, but maintains the production levels around 20 thousand tonnes in the period between 2008 and 2011.

The stable trend in production volumes is not replicated in the case of value. A decrease of 8% in the last observed year, 7% in the full period, indicates a drop in prices. Imports from inside and outside the EU, have contributed to an increase in supply of fish in the last years. As fish consumption appears to remain stable a decrease in price is a direct consequence of the increase in supply.

Table 4.6.1 Production and sales for Czech Republic: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***20.4***	***20.1***	***20.4***	***21.0***	***20.8***	***-1%***	***1%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*-67%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	20.4	20.1	20.4	21.0	20.8	*-1%*	*1%*
Production value (million €)	***41.5***	***39.3***	***37.1***	***39.9***	***36.8***	***-8%***	***-7%***
Marine	0.0	0.0	0.0	0.0	0.0	*7%*	*-54%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	41.5	39.2	37.1	39.9	36.8	*-8%*	*-7%*
Hatcheries & nurseries (million units)	***0***	***620***	***520***	***534***	***306***	***-43%***	***-27%***
Eggs	0	620	125	129	50	*-61%*	*-77%*
Juveniles	0	0	395	405	256	*-37%*	*28%*

Source: EUROSTAT

Egg production is always difficult in extensive inland aquaculture. Despite the majority of farmers produce their own eggs, there is an active market for freshwater fish eggs in Eastern Europe which includes human consumption and other usages. This alternative market for carp eggs may help understanding the variations in the production levels recorded in the table. A yearly production of 20 thousand tonnes of adult carps would require approximately 100 million eggs. This estimation is consistent with the reported data for 2010 and 2011, but the figures for 2009 and 2012. The causes of these deviations are, therefore, external to the aquaculture industry and out of the scope of this report.

Main segments

Beyond common carp, which concentrates 86% of the total aquaculture production, other species farmed in the country are other carps like grass or bighead carps and trout. Trout production is also formed of rainbow and brook trout. The contribution to total production of these minor species is lower than 2% in every case. Finally, production of pike perch has been introduced in the last years not yet reaching 1% of the total domestic aquaculture production. However, a higher price of around

Figure 4.6.1 Main species in terms of weight and value in Czech Republic production: 2012.

Source: EUROSTAT

Despite the reduced volume of pike perch production an average price was around 8.5 euro per kilo, much higher than the other species results in an important increase in the contribution of this species to total value compared with the relative lack of importance in terms of volume. Following pike perch, the highest prices are observed for trout species, with an average around 3.2 euros per kilo. Finally, as it may be expected from the previous chart of production value, the lowest prices, less than 2 euro per kilo, correspond to the different species of carps harvested in the country.

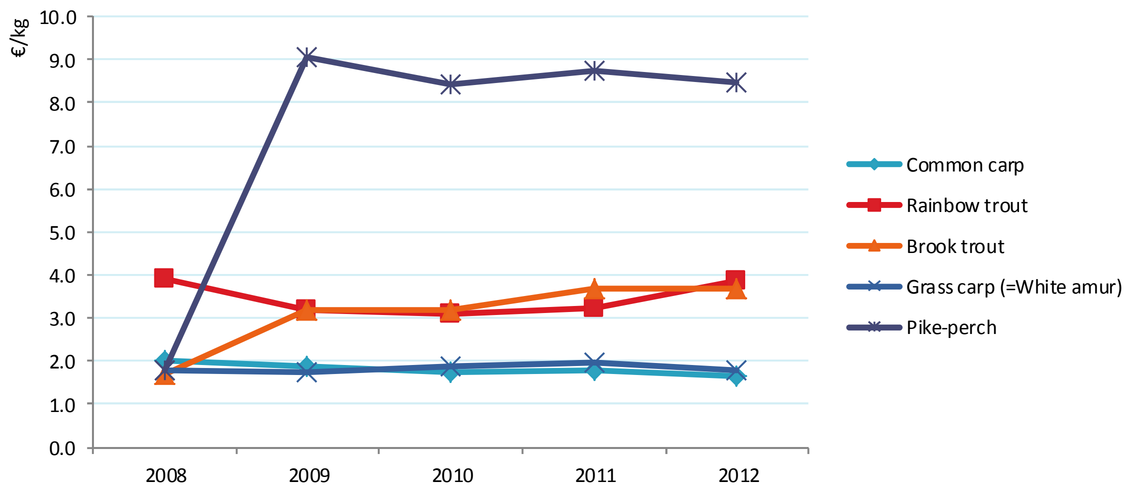


Figure 4.6.2 Average prices for the main species produced in Czech Republic: 2008-2012.

Source: EUROSTAT

4.6.2 Data Coverage and Data Quality

The Czech Republic is a landlocked country producing only freshwater aquaculture products. The freshwater data collection is not mandatory under the DCF and landlocked countries are therefore not requested to provide economic data for this report.

4.7 DENMARK

4.7.1 Summary

Production volume and value

In total, the Danish aquaculture sector produced 43,700 tonnes in 2012, which correspond to an increase of 8% from 2011. The total value of the production was 155 million euros in 2012, which correspond to an increase of 6% from 2011. Compared to the average from 2008 to 2011, the total volume increased by 1%, whereas the total value increased by 13%.

Overall industry structure and employment

In 2012 the total population of aquaculture farms was 229, which was distributed on 127 enterprises. The Danish aquaculture sector is dominated by small enterprises with less than 5 employees. 87% of the Danish enterprises had less than 5 employees in 2012.

Main segments

The production in Denmark can be divided into four main segments. The largest segment is the land based production of trout, which consists of a combination of hatcheries, nurseries and grow-out farms. The production in the land based farms is typically small portion size trout for consumption. The production techniques used are primarily ponds, tanks, raceways and recirculation systems.

The second most important segment is the marine production of trout and trout eggs, which are produced in sea cage farms. The third segment consists of land based recirculation farms producing European eel, pike-perch, salmon and turbot. Finally, the forth segment is producing blue mussels on long lines.

Current production trends and main drivers (Trends and triggers)

The portion sized fresh water rainbow trout is mainly exported to Germany (90%), whereas the trout eggs harvested from the marine sea cage farms are exported to Japan. Eel, pike perch and turbot are exported to other EU countries.

Outlook

For the Danish trout producers 2013 is expected to be better than 2012. The reason is that the Danish regulation for aquaculture production has changed in 2012. The change in regulation should provide the producers with an incentive to introduce more environmental friendly technology in order to raise production. However, it is questionable if the production increase will influence on the production in 2013 and 2014.

The eel farmers are expected to decrease production due to the restriction on the harvesting of glass eels. Furthermore, this restriction drives up prices on glass eels making it less profitable to produce eel. The mussel farmers are expected to increase production and turnover, but it is still questionable if the profit will be positive.

4.7.2 Production and sales

In total, the Danish aquaculture sector produced 43.700 tonnes in 2012, which corresponded to an increase of 8% from 2011 to 2012. The total value of the production was 155 million euros in 2012, which correspond to an increase of 8% over the same period. Compared to the average from 2008 to 2011, the total volume increased by 1%, whereas the total value increased by 13%.

Table 4.7.1 Production and sales for Denmark: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***45.3***	***45.9***	***42.1***	***40.5***	***43.7***	*8%*	*1%*
Marine	8.9	10.3	10.0	10.6	12.9	*22%*	*30%*
Shellfish	1.5	2.5	1.3	1.0	1.1	*4%*	*-32%*
Freshwater	34.2	32.6	30.4	28.6	29.3	*2%*	*-7%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		*0%*
Sales value (million €)	***130.0***	***135.0***	***136.1***	***145.8***	***155.0***	*6%*	*13%*
Marine	36.2	41.3	45.9	49.8	57.2	*15%*	*32%*
Shellfish	1.3	1.7	0.7	0.5	0.9	*77%*	*-16%*
Freshwater	89.6	90.5	87.9	93.6	95.1	*2%*	*5%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		*0%*

Source: EU Member States DCF data submission

4.7.3 Industry structure and employment

In 2012, the total population of aquaculture farms was 229, which was distributed on 127 enterprises. The Danish aquaculture sector is dominated by small enterprises with less than 5 employees. 87% of the Danish enterprises had less than 5 employees, in 2012.

Table 4.7.2 Structure of the Danish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*162*	*160*	*154*	*135*	*127*	*-6%*	*-17%*
<=5 employees	146	141	135	116	110	*-5%*	*-18%*
6-10 employees	9	10	11	11	9	*-18%*	*-12%*
>10 employees	7	9	8	8	8	*0%*	*0%*
Employment (number)							
Total employees	528	465	436	437	432	*-1%*	*-7%*
Male employees	467	410	386	393	387	*-2%*	*-7%*
Female employees	61	55	50	44	45	*2%*	*-14%*
FTE	359	318	291	299	311	*4%*	*-2%*
Male FTE	318	281	258	269	278	*3%*	*-1%*
Female FTE	41	37	33	30	33	*10%*	*-6%*
Indicators							
FTE per enterprise	2.2	2.0	1.9	2.2	2.5	*11%*	*18%*
Average wage (thousand €)	66.4	74.4	78.8	70.4	70.7	*1%*	*-2%*
Labour productivity (thousand €)	85.2	88.1	121.1	123.4	124.2	*1%*	*19%*

Source: EU Member States DCF data submission

The total number of persons employed in the Danish aquaculture sector was 432, corresponding to 311 FTEs. From 2011 to 2012, the number of employees decreased by 1%, however, compared to the average from 2008 to 2011, the number of persons employed decreased by 7%. In 2012, only 10% of the employees in the sector were women. The average FTE per enterprise increased 11% from 2011 to 2012, whereas the average wage only increased from 70.4 to 70.7 thousand euros, corresponding to an increase of 1% over the same period.

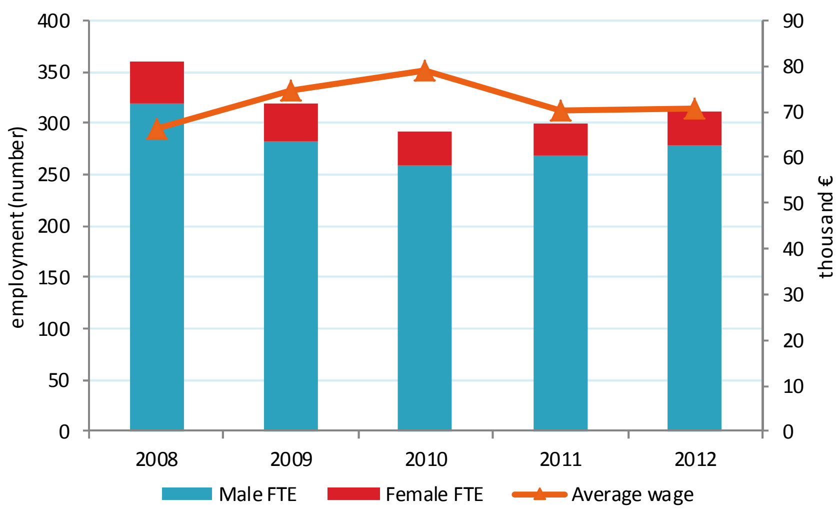


Figure 4.7.1 Employment trends for Denmark: 2008-2012.

Source: EU Member States DCF data submission

The number of enterprises and FTEs has decreased from 2008 to 2012, but the average number of FTE per enterprise has been slightly increasing over the same period. At the same time, the average wage has been slightly decreasing; however, the enterprises have managed to increase labour productivity. The labour productivity is measured as gross value added per full time employee. From 2011 to 2012 the labour productivity increased by 1% and compared to the average from 2008 to 2011 the labour productivity increased by 19% in 2012.

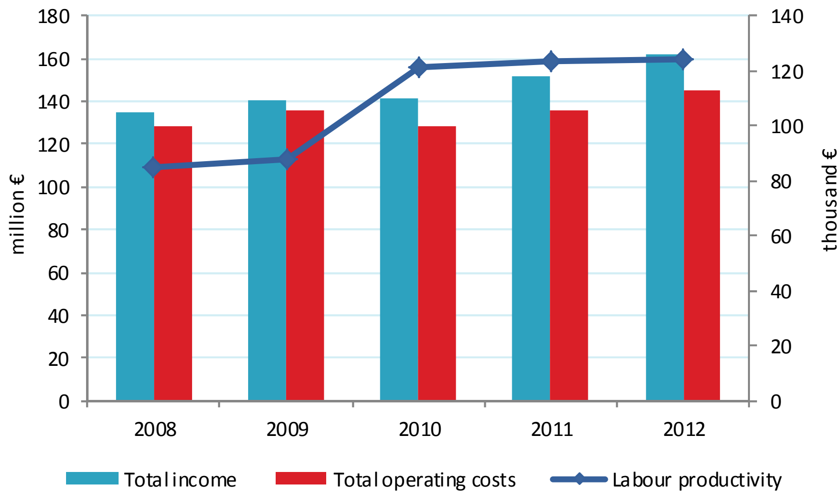


Figure 4.7.2 Income, costs, wages and labour productivity trends for Denmark: 2008-2012.

Source: EU Member States DCF data submission

4.7.4 Economic performance

From 2011 to 2012, total income increased by 6%, while the operational cost increased by 7%. The total income is dominated by the turnover from the sale of fish from the farms, which contributes 96% of total income, leaving only 4% to other sources of income.

Table 4.7.3 Economic performance of the Danish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	130.0	135.0	136.1	145.8	155.0	*96%*	*6%*	*13%*
Other income	4.8	5.2	4.8	6.0	6.5	*4%*	*8%*	*25%*
Subsidies	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*	*0%*
Total income	*134.8*	*140.1*	*140.9*	*151.8*	*161.5*	*100%*	*6%*	*14%*
Expenditures (million €)								
Wages and salaries	18.4	17.8	17.3	15.8	17.0	*11%*	*8%*	*-2%*
Imputed value of unpaid labour	5.4	5.9	5.6	5.2	5.0	*3%*	*-5%*	*-10%*
Energy costs	6.4	6.8	6.5	7.1	7.7	*5%*	*8%*	*15%*
Repair and maintenance	12.3	11.8	12.1	13.1	13.3	*8%*	*1%*	*8%*
Raw material: Feed costs	45.7	43.3	41.3	49.7	50.7	*31%*	*2%*	*13%*
Raw material: Livestock costs	24.1	34.9	32.0	31.2	34.8	*22%*	*12%*	*14%*
Other operational costs	15.7	15.3	13.8	13.8	16.4	*10%*	*19%*	*12%*
Total operating costs	*128.1*	*135.8*	*128.6*	*136.0*	*144.8*	*90%*	*7%*	*10%*
Capital Costs (million €)								
Depreciation of capital	6.5	7.9	7.2	6.3	7.3	*5%*	*15%*	*4%*
Financial costs, net	7.0	6.1	6.5	3.9	4.2	*3%*	*6%*	*-29%*
Extraordinary costs, net	-0.2	-0.2	-0.4	-0.2	0.0	*0%*	*76%*	*83%*
Capital Value (million €)								
Total value of assets	193.8	188.1	175.7	168.1	165.8	*103%*	*-1%*	*-9%*
Net Investments	13.1	7.9	9.1	10.7	5.5	*3%*	*-49%*	*-47%*
Debt	152.6	151.1	138.8	125.5	118.6	*73%*	*-5%*	*-16%*
Input & Production (thousand tonnes)								
Raw material: Feed	42.8	38.5	39.3	39.4	42.3		*7%*	*6%*
Raw material: Livestock	7.3	11.2	9.5	8.6	9.0		*5%*	*-2%*
Performance Indicators(million €)								
Gross Value Added	30.6	28.0	35.2	36.9	38.6	*24%*	*5%*	*18%*
Operating cash flow	6.7	4.3	12.3	15.9	16.6	*10%*	*5%*	*70%*
Earning before interest and tax	0.2	-3.6	5.0	9.5	9.4	*6%*	*-2%*	*232%*
Net profit	-6.8	-9.6	-1.5	5.6	5.2	*3%*	*-7%*	*269%*
Capital productivity (%)	15.8	14.9	20.1	22.0	23.3			
Return on Investment (%)	0.1	-1.9	2.9	5.7	5.7			
Future Expectation Indicator (%)	3.4	0.0	1.0	2.6	-1.1			

Source: EU Member States DCF data submission

In 2012 the expenditures are dominated by cost of feed (31%), cost of livestock (22%) and cost of wages and salaries (11%). The expenditures on feed and livestock have increased by 13% and 14% respectively, whereas expenditures on wages and salaries have decreased by 2% compared to the average from 2008 to 2011. The total expenditures make up for 90% of the total income.

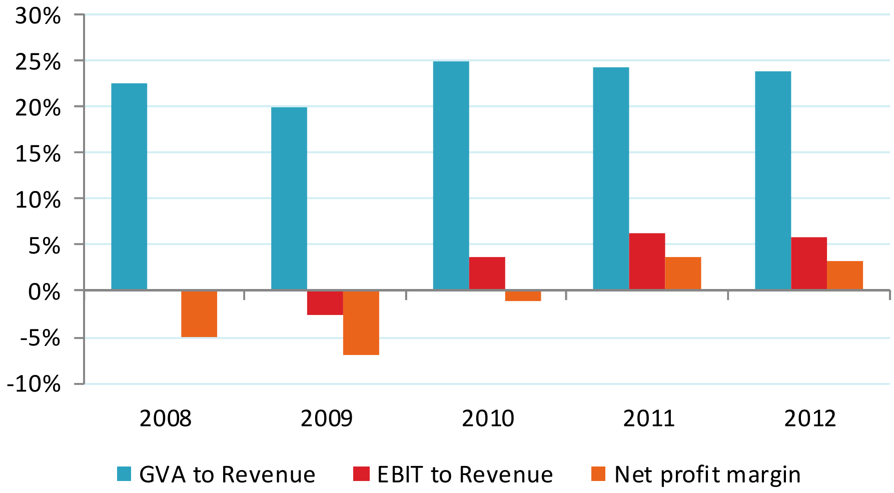


Figure 4.7.3 Economic performance for Denmark: 2008-2012

Source: EU Member States DCF data submission

The gross value added for the sector as a whole increased by 5% and both EBIT and net profit was positive. The total value of assets and debts decreased by 1% and 5% respectively. This is mainly due to the decreasing number of farms in Denmark. The net investment decreased 49% and is now 47% below the average from 2008 to 2011.

4.7.5 Main species produced and economic performance by segment

The production in Denmark can be divided into four main segments. The largest segment is the land based production of trout, which consists of a combination of hatcheries, nurseries and grow-out farms. The production in the land based farms is typically small portion size trout for consumption. The production techniques used are primarily ponds, tanks, raceways and recirculation systems.

The second most important segment is the marine production of trout and trout eggs, which are produced in sea cage farms. The third segment consists of land based recirculation farms producing European eel, pike-perch, salmon and turbot. Finally, the forth segment is producing blue mussels on long lines.

In Denmark, the land based fresh water aquaculture production is mainly located in Jutland. The marine production of trout is located in the Baltic Sea along the southern cost of Jutland and a few production sites along the cost of Zealand. The production of blue mussels is located in the Baltic Sea and fjords along the cost of Jutland.

The portion sized fresh water rainbow trout is mainly exported to Germany (90%), whereas the trout eggs harvested from the marine sea cage farms are exported to Japan. Eel, pike perch and turbot are exported to other EU countries.

The main species produced in Denmark is rainbow trout, which makes up more than 90% of the total volume and value of production. The second most important species is European eel, which makes up 9% of the total value but only 3% of the volume. Blue mussels make up 3% of the total weight of production, but the value is only 1%.

Figure 4.7.4 Main species in terms of weight and value in Danish production: 2012.

Source: EU Member States DCF data submission

Large trout produced in cages in marine waters follow the price of salmon, which has been increasing over the period from 2008 to 2011 but decreased slightly in 2012. However, some of the income from the Danish sea cage farms is coming from the production of trout eggs, which are sold to Japan.

The price of blue mussels has been decreasing from 2008 to 2011 but increased in 2012. Still, the mussel farmers in Denmark are struggling to survive.

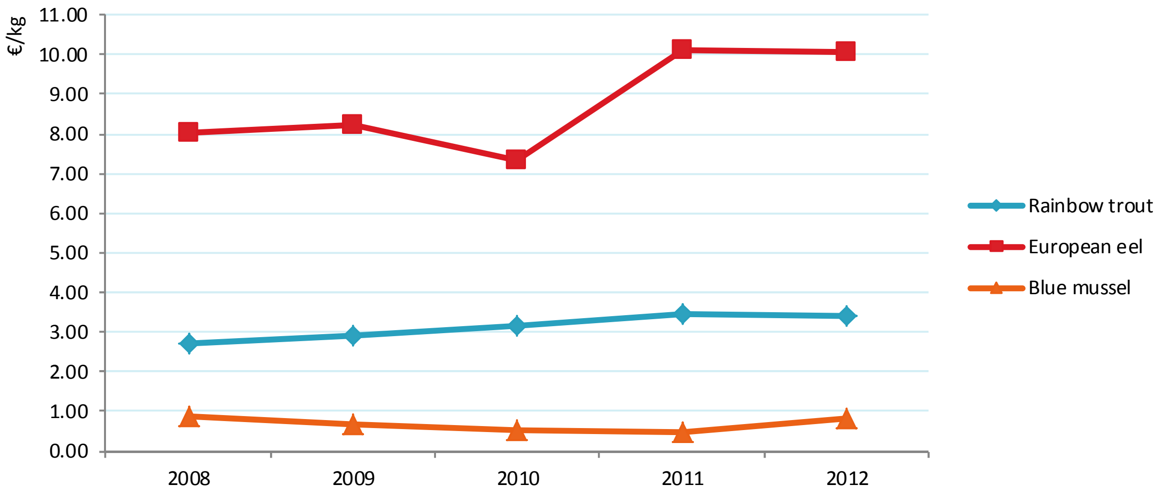


Figure 4.7.5 Average prices for the main species produced in Denmark: 2008-2012.

Source: EU Member States DCF data submission

In Denmark, the aquaculture production is divided into four segments based on the species produced and the technique used.

The Danish sector is dominated by one species; rainbow trout. The production volume of trout was 41,000 tonnes with a corresponding income of 138 million euro in 2012. The production of trout covers 94% of the volume and 90% of the total value. The production of trout is divided into two segments based on technique and production environment.

The most relevant segments in the Danish aquaculture are analyzed below.

Segment 1: Trout combined

The most important segment is land based fresh water trout farms (trout combined). In most cases enterprises in Denmark combine the production in hatcheries and nurseries with grow out farms. The techniques used are ponds, raceways and recirculation systems. The product from theses farms are mainly portion size trout 300 to 400 grams with white meat. The segment consists of 103 enterprises running 186 farms. The production volume was 27,900 tonnes with a corresponding income of 86.1 million euro. The production volume accounts for 64% and the value accounts for 53% of the total Danish production.

Segment 2: Trout cages

The second most important segment is the sea cage farms producing trout (Trout cages). The main product, besides the fish meat, is trout eggs. In 2012 there were 17 farms distributed among 6 enterprises. The production volume was 12,900 tonnes bringing about a total income of 58.2 million euro. The segment covers 30% of the volume and 37% of the value of total Danish production.

Segment 3: Other freshwater fish species combined

Denmark also has a minor land based production of other freshwater species (Other freshwater fish combined). The main species produced in this segment is European eel in land based recirculation farms. The eel production enterprises are dependent on wild caught glass eel for production. There are 8 enterprises producing eel representing one farm each. In this segment there is also a minor production of pike-perch, turbot and salmon. The production technique is intensive recirculation where more than 95% of the water is recirculated. The production volume was 1,400 tonnes with a corresponding income of 14.1 million euro in 2012.

Segment 4: Mussels long line

The last segment is blue mussels on long lines, which has been introduced in recent years. The production was 1,100 tonnes with a corresponding income of 1.1 million euro in 2012. The segment had 10 enterprises representing 11 farms. The farms are mostly located in Limfjorden in the northern part of Jutland and in fjords along the Baltic cost of Jutland. Blue mussel farming is a relatively new and small segment both in terms of volume and value in the Danish aquaculture sector. The segment is struggling to increase production and productivity, but so far the conditions and competition in this sector have not been favorable to the Danish producers. The blue mussel farmers have been represented in The Danish Account Statistics for Aquaculture since 2006, but so far without a positive net profit.

From Figure 4.7.6 it can be seen that the turnover from the Danish aquaculture sector has been increasing constantly since 2008, whereas sales volume, the total value of assets and the total number of FTE has increased in 2012 after a period of decrease.

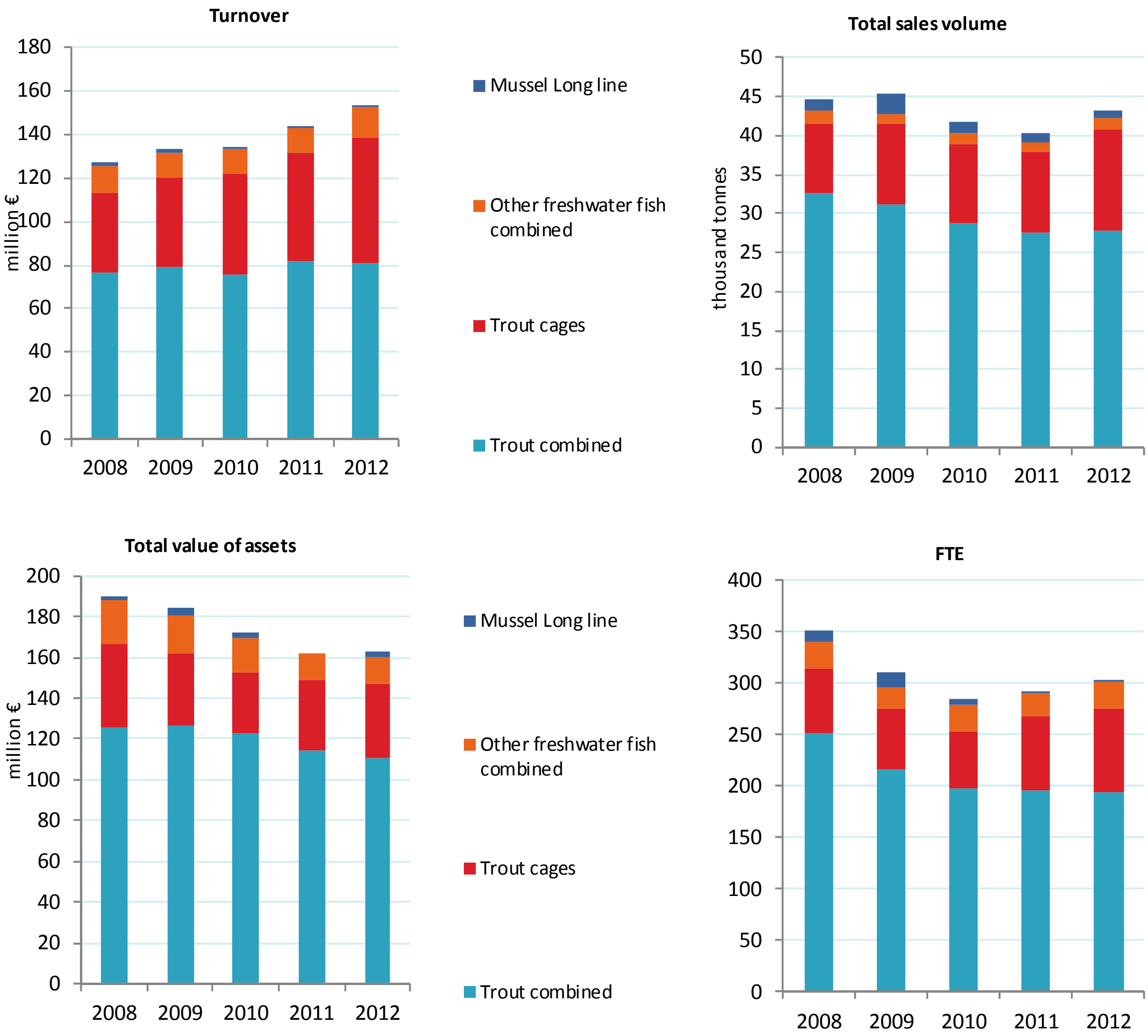


Figure 4.7.6 Structural development Danish aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

In Table 4.7.4, the economic performance of the four Danish segments is shown. From the table it can be seen that the gross value added is positive for all segments, but the net profit is negative in most years from 2008 to 2012 except for the Trout cages segment.

Table 4.7.4 Economic performance of main Danish aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Trout combined								
Total income	81.0	82.6	79.9	85.6	86.1	100%	1%	5%
Gross Value Added	21.9	20.7	22.5	22.0	23.0	27%	4%	6%
Operating cash flow	4.6	4.0	6.1	7.3	8.2	9%	11%	47%
Earning before interest and tax	0.3	-1.5	1.2	2.9	3.7	4%	25%	417%
Net profit	-4.6	-6.3	-3.0	-0.3	1.1	1%	499%	131%
Total sales volume (thousand tonı	32.6	31.2	28.8	27.5	27.9		2%	-7%
Trout cages								
Total income	36.4	42.7	46.7	51.3	58.2	100%	13%	32%
Gross Value Added	4.3	3.8	9.5	11.5	11.3	19%	-2%	55%
Operating cash flow	1.2	0.5	6.1	7.5	6.6	11%	-11%	74%
Earning before interest and tax	0.0	-0.6	4.8	6.2	5.0	9%	-19%	94%
Net profit	-1.5	-1.0	3.5	5.8	3.8	7%	-34%	124%
Total sales volume (thousand tonı	8.9	10.3	10.0	10.6	12.9		22%	30%
Other freshwater fish combined								
Total income	12.9	11.5	12.0	12.4	14.1	100%	14%	16%
Gross Value Added	3.0	2.8	2.3	2.4	3.0	21%	24%	14%
Operating cash flow	0.9	0.7	0.1	0.9	1.2	8%	35%	86%
Earning before interest and tax	0.4	0.1	-0.6	0.5	0.8	6%	67%	752%
Net profit	-0.1	-0.3	-1.3	0.2	0.6	4%	211%	275%
Total sales volume (thousand tonı	1.6	1.4	1.6	1.2	1.4		16%	-5%
Mussel Long line								
Total income	1.4	1.8	0.7		1.1	100%		-14%
Gross Value Added	0.7	0.6	0.2		0.7	64%		40%
Operating cash flow	-0.1	-0.5	-0.3		0.5	44%		255%
Earning before interest and tax	-0.3	-0.9	-0.4		-0.1	-12%		76%
Net profit	-0.4	-1.2	-0.7		-0.3	-25%		63%
Total sales volume (thousand tonı	1.5	2.5	1.3	1.0	1.1		4%	-32%

Source: EU Member States DCF data submission

In Figure 4.7.7 the economic indicators for the four Danish segments are presented. From the figures it can be seen that EBIT is positive for all segments including the blue mussel farms in 2012. Furthermore, net profit margin is positive for the sea cage farms, trout combined farms and other fresh water farms combined in 2012.

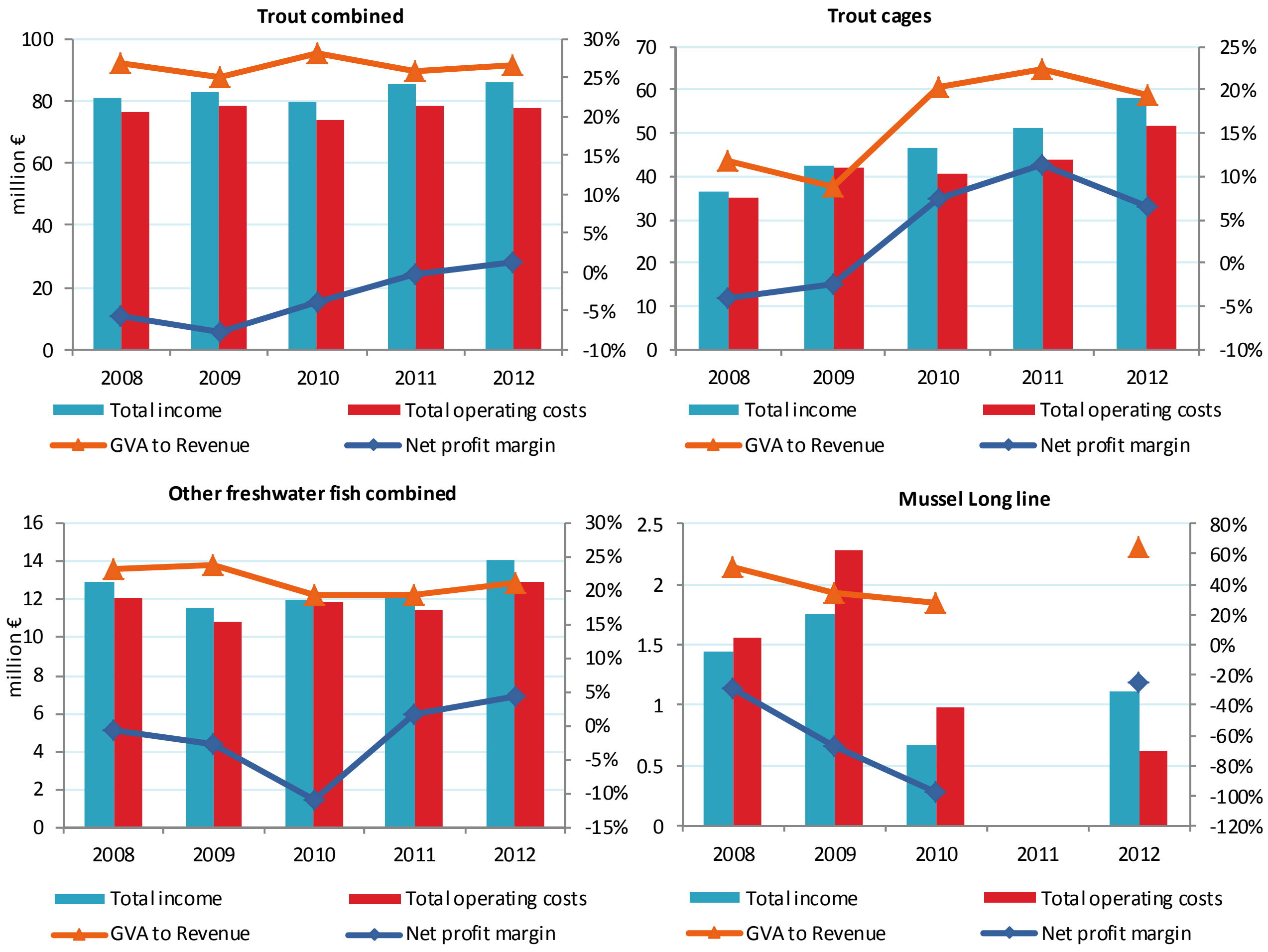


Figure 4.7.7 Economic performance indicators for the main Danish segments: 2008-2012.

Source: EU Member States DCF data submission

In Figure 4.7.8 the operational cost structures for the four Danish segments are presented.

Segment 1: Trout combined

The *Trout combined* segment show the traditional cost composition for a land based finfish aquaculture industry, where the main cost components are feed and livestock, which covers 54% of the total operational costs.

Segment 2: Trout cages

In the *Trout cages* at sea, the cost components feed and livestock are also the most important covering 62% of the total operational costs. In sea cage farming, the cost of livestock is more important than feed, which is the opposite of the composition in the land based farms. The fish (smolt) bought for sea cage production are larger than for land based production, which explains the difference in the cost compositions. Also the other operational costs are higher due to the cost associated with the transport of feed, fish and equipment to the production site.

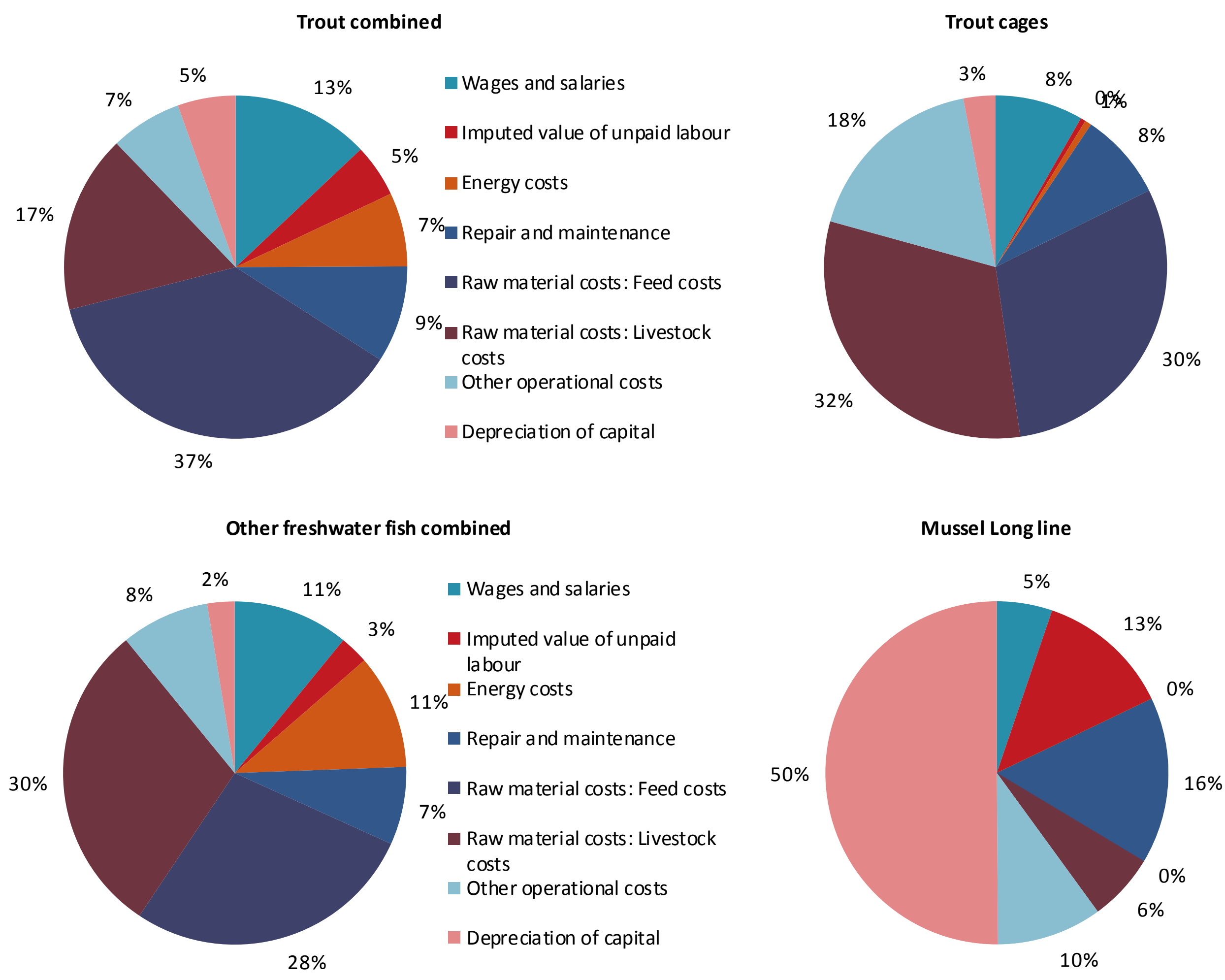


Figure 4.7.8 Cost structure of the main segments in Denmark: 2012.

Source: EU Member States DCF data submission

Segment 3: Other freshwater fish combined

In the segment *Other freshwater fish combined*, the main cost components are also feed and livestock, which covers 58% of the total operational costs. The energy cost covers 11% of the total cost, which is twice as much as the segment Trout combined. The reason for the higher energy cost is the use of highly recirculated systems in this segment.

Segment 4: Mussel long line

The segment *Mussel long line* has a completely different cost structure because the production costs do not include the cost of feed and livestock. The most single important cost item is depreciation of capital which in 2012 covers 50% of the costs. This is mainly due to an increase in depreciations of 151 % compared to the average from 2008 to 2011, but also to a decrease in the sum all other costs of 62% compared to the same period.

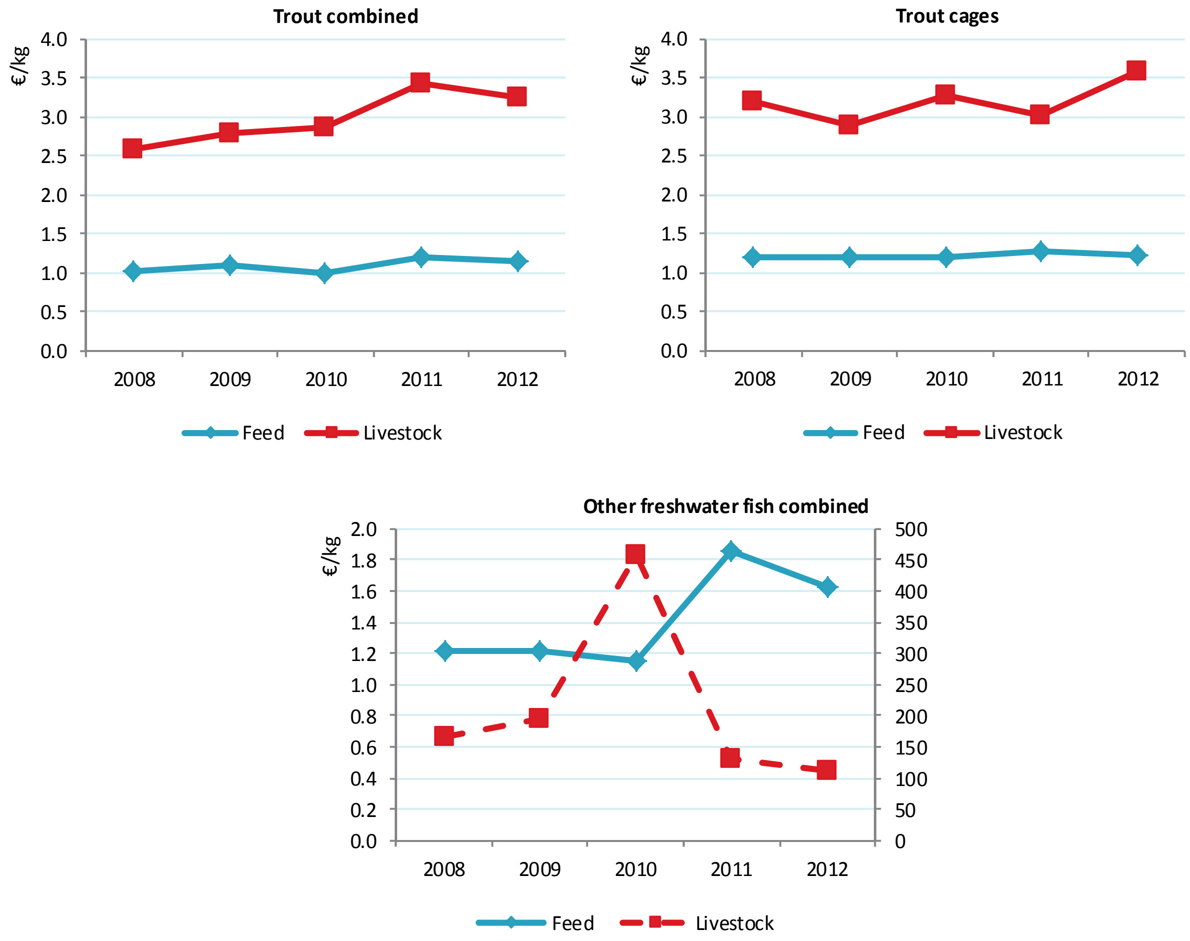


Figure 4.7.9 Feed and livestock prices for the main Danish segments: 2008-2012.

Source: EU Member States DCF data submission

4.7.6 Trends and triggers

Current production trends and main drivers

The main reason for the increase in the marine production in Denmark is the higher prices on larger trout produced in sea cages. The price is driven by the salmon price, which has been high since the disease crises in Chile. However to expand the production further the industry needs new licenses. If no new licenses are issued the industry production will stay at the current level around 10,000 tonnes.

The land based production has shown a downward trend of production over the years. The production is expected to increase slightly when the new regulation going from feed quotas to nitrogen quotas are fully implemented, however, the transition takes time and the results of the change will most likely first show in a couple of years. Furthermore, if the sector is to expand more than a few thousand tonnes, new licenses have to be given to the farmers.

Mussel farming in Denmark is struggling and the future for this segment is very unpredictable. However, mussel and sea weed farming as a mean to reduce the environmental impact from the sea cage farms are expected to grow, if the farms are allowed to expand production.

Market structure

The Danish aquaculture sector has managed to increase labour productivity over the period investigated. The labour cost per unit of output is also relatively low compared to other countries producing trout.

The Danish sector consists of many small producers at the primary level, where there are only two enterprises buying and processing the trout. This market structure can be a hindrance because the market is not well functioning and competitive.

In recent years a segment of organic aquaculture producers has been established. In total, there are eight land based farms producing trout, one blue mussel farm and one sea cage farm producing trout. The organic producers have higher costs for feed and fry, but they are also receiving a price premium for their products. The segment is producing a little more than 300 tonnes which is an increase of 300% compared to 2011. It is, however, questionable how large the production volume can grow before the price premium will disappear.

Issues of special interest

In Denmark, a few farms are experimenting on the production of new species and using new technology. So far, the most successful project is the production of pike perch in recirculating systems. Furthermore a minor production of turbot fingerlings exists, where the fingerlings are used for restocking and some are exported to Holland and Spain. Two new large land based recirculation systems have been set up for the production of Atlantic salmon. In a land based facility the control of the production process is higher than in a sea cage farm and there is a better opportunity to control the pollution of nitrogen, phosphorus and organic material etc., on the other hand, the operational cost is expected to be higher than in the sea cage farms. When the two farms are fully operational they will produce up to 8,000 tonnes.

Outlook for 2013 and 2014

Under the existing regulation, the farmer's main focus is to optimize production based on the feed quota, whilst he has no incentive to reduce the pollution discharged from the farm, because there is no feedback between this, and production and profit. A regulatory change to individual pollution rights on nitrogen can ensure that the most efficient farmers will be the ones who produce. This can potentially increase production and profit, without increasing pollution. Furthermore, it would provide the farmers with an incentive to reduce pollution in order to increase production and profitability, which would lead to further development and the adoption of new environmentally friendly production methods and technologies. It is important to identify the possible gains and losses of regulatory changes, as in this paper, because if a regulation is not optimal, it can lead to welfare losses for the society and individual producers.

For the Danish trout producers 2013 is expected to be better than 2012. The reason is that the Danish regulation for aquaculture production has changed in 2012. The change in regulation should provide the producers with an incentive to introduce more environmental friendly technology in order to raise production. However, it is questionable if the production increase will influence on the production in 2013 and 2014.

The eel farmers are expected to decrease production due to the restriction on the harvesting of glass eels. Furthermore, this restriction drives up prices on glass eels making it less profitable to produce eel. The mussel farmers are expected to increase production and turnover, but it is still questionable if the profit will be positive.

4.7.7 Data Coverage and Data Quality

Data quality

The account statistic for 2012 is based on a sample of 118 aquaculture farms, which covers 52% of the total population of 229 farms. The sample covers 76% of the total income of the population. Furthermore, data on sales volume and value, purchase of livestock raw material of fish are available for all farms.

The Danish AgriFish Agency (formerly The Danish Directorate of Fisheries) has registered the total population of farms and enterprises engaged in aquaculture production in Denmark. It is mandatory for all aquaculture producers in Denmark to report the production in volume and value each year at the farm level. Furthermore, the species produced and the technique used in the production is reported.

The data for The Danish Account Statistics for Aquaculture is collected by Statistics Denmark. The collection is based on the total population of farms provided by The Danish AgriFish Agency. The data is collected at farm level, and can be aggregated to the enterprise level. The data is collected at farm level to get the most homogeneous segments in terms of species and technique. The Danish Account Statistics for Aquaculture collects economic data for costs and earnings and balance sheets. Data is collected on a voluntary basis from the owner's chartered accountant. The accountant's task is to report the accounts of his aquaculture clients to Statistics Denmark in a special form where the account information is harmonized for statistical use. Statistics Denmark validates the data from each account in a specially designed data system for quality control.

The extrapolation of the sample to the total population is done in two steps. In the first step all results from the collected accounts are entered into a database containing information on all existing aquaculture producers in Denmark. From the collected accounts an average is calculated for all indicators in each segment. In the second step, an account for the remaining population is estimated based on the average calculated in the first step and the information collected by the The Danish AgriFish Agency. The underlying assumption for this calculation is that the production function for each farm is identical within each segment. When the production function is identical, the costs and earnings can be distributed from the sales volume and value in each account.

Data availability

Data for the aquaculture sector is published once a year on both an aggregated farm and enterprise level for each segment. The aquaculture statistics are published on Statistics Denmark's website approximately 12 months after the end of the reference year.

Confidentiality

The 4 segments that are surveyed in Denmark are presented in Table 4.7.4. To avoid problems with confidentiality, segments should in general include more than 10 enterprises. In Denmark, both the production of the sea cages farms and the production of eel and other species in land based recirculation systems are quite significant in terms of value, and even though these two segments include less than 10 companies, they are surveyed. In order to present detailed data collected from these two segments, nearly all enterprises have agreed to participate in the survey.

Input of experts about the segmentation on enterprise level, the homogeneity of the segments in terms of techniques and species

All segments provided by Statistics Denmark have a high degree of homogeneity both concerning the species and technique. The separation of species into segments is 100%, but if an enterprise produces more than one species, then it is allocated to the segment of the species that contributes the most to the turnover.

Some enterprises own more than one farm using different techniques. In Denmark these activities are split up, because the farm is used as data collection unit. When farms are aggregated into enterprises again, the enterprise is allocated to the segment, where its turnover is highest. There are very few examples of enterprises using more than one technique.

Differences in DCF data compared with other official data sources

The Danish data for DCF is, in most cases, in line with both value and production registered in FAO and EUROSTAT. However the Danish data for the freshwater sector provided for the DCF also contains value and volume for the Danish hatcheries and nurseries and production of smolts for the sea cage farms. The volume and value therefore exceeds the volume and value registered in FAO and EUROSTAT, which only contains the value and volume for fish for consumption. Furthermore, the value registered for the marine production is also a bit higher due to the income registered for DCF is turnover where the calculated value for the fish in FAO and EUROSTAT is first sale prices of the fish sold. Marine data from EUROSTAT on value 2010 is incorrect.

Furthermore, there are some differences in the volume and value collected by the Danish Directorate of Fisheries, which reports to EUROSTAT and FAO, and Statistics Denmark which reports to DCF. In general, both volume and value are higher in Statistics Denmark Aquaculture Account Statistics. The reason is that the value and volume in the Account Statistics are measured in enterprise sales, while the numbers from the Danish Directorate of Fisheries are measured as farm production and revenue as production value in farm gate prices. Secondly, the data collected by Statistics Denmark are account data and the account year does not necessarily coincide with the calendar year.

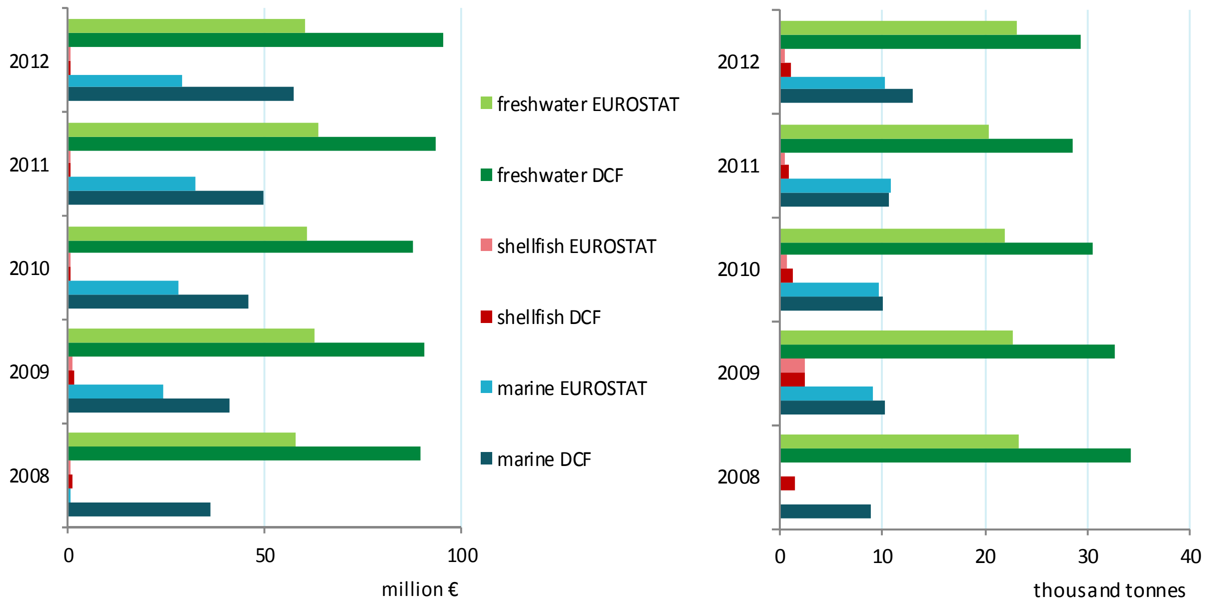


Figure 4.7.10 Comparison of DCF data with EUROSTAT data for Denmark: 2008-2012

4.8 ESTONIA

4.8.1 Summary

Production volume and value

Enterprises whose primary activity was defined “Fish farming” produced 217 tonnes rainbow trout in 2012, which corresponded to an increase of 15% from 2011 to 2012. On the other hand, the total value of the production was 883 thousand euros in 2012, which correspond to an increase of 21% over the same period. From 2008 to 2012, the total volume decreased by 29%, whereas the total value decreased by 21%.

Overall industry structure and employment

In 2012, the total population of primary trout farming enterprises was 6 and dominated by small enterprises with less than 5 employees. 86% of those enterprises had less than 5 employees. The total number of persons employed was 22, corresponding to 17 FTEs.

Main segments

The production of trout is divided into two segments based on fish farming technique. The largest segment is the land based fresh water trout combined farms, which consists of a combination of hatcheries, nurseries and grow-out farms. The second segment is the land based fresh water trout on growing farms.

Current production trends and main drivers (Trends and triggers)

Due to the small volume the rainbow trout are mainly marketed domestically. The current production volume of primary trout farming sector has been greatly affected by the decrease in the number of enterprises and weather conditions. The production of Estonian aquaculture sector decreased significantly in 2011. The reason for that was heat wave in 2010 which caused a great loss in rainbow trout production. Undoubtedly this event has had an impact on production also in the following (2012-2014) years.

Outlook

Preliminary data show that production volumes of the Estonian trout producers are recovering. In addition to operating fish farms the production from the new farms, which have been created with support from the European Fisheries Fund, is expected.

4.8.2 Production and sales

Enterprises whose primary activity was defined “Fish farming” produced 217 tonnes rainbow trout in 2012, which corresponded to an increase of 15% from 2011 to 2012, see the Table 4.8.1. On the other hand, the total value of the production was 883 thousand euros in 2012, which correspond to an increase of 21% over the same period. From 2008 to 2012, the total volume decreased by 29%, whereas the total value decreased by 21%.

Table 4.8.1 Production and sales for primary trout farming enterprises in Estonia: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***0.3***	***0.4***	***0.3***	***0.2***	***0.2***	*15%*	*-29%*
Marine	0.0	0.0	0.0	0.0	0.0		
Shellfish	0.0	0.0	0.0	0.0	0.0		
Freshwater	0.3	0.4	0.3	0.2	0.2	*15%*	*-29%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		
Sales value (million €)	***1.4***	***1.3***	***1.1***	***0.7***	***0.9***	*21%*	*-21%*
Marine	0.0	0.0	0.0	0.0	0.0		
Shellfish	0.0	0.0	0.0	0.0	0.0		
Freshwater	1.4	1.3	1.1	0.7	0.9	*21%*	*-21%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		

Source: EU Member States DCF data submission.

4.8.3 Industry structure and employment

In 2012, the total population of primary trout farming enterprises was 6 and dominated by small enterprises with less than 5 employees, see the Table 4.8.2. 86% of those enterprises had less than 5 employees.

Table 4.8.2 Structure of the Estonian aquaculture sector (primary trout farming enterprises): 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*8*	*8*	*7*	*7*	*6*	*-14%*	*-20%*
<=5 employees	8	8	7	7	5	*-29%*	*-33%*
6-10 employees	0	0	0	0	1		
>10 employees	0	0	0	0	0		*0%*
Employment (number)							
Total employees	24	20	20	21	22	*5%*	*4%*
Male employees	17	14	14	15	16	*7%*	*7%*
Female employees	7	6	6	6	6	*0%*	*-4%*
FTE	15	12	14	16	17	*6%*	*19%*
Male FTE	11	9	10	12	13	*8%*	*24%*
Female FTE	4	3	4	4	4	*0%*	*7%*
Indicators							
FTE per enterprise	1.9	1.5	2.0	2.3	2.8	*24%*	*48%*
Average wage (thousand €)	9.4	9.6	8.3	9.5	9.3	*-1%*	*2%*
Labour productivity (thousand €)	48.7	34.7	15.6	3.6	20.1	*460%*	*-22%*

Source: EU Member States DCF data submission

The total number of persons employed was 22, corresponding to 17 FTEs. From 2011 to 2012, the number of employees increased by 1 person and from 2008 to 2012, the development trend of total employees increased by 4%. In 2012, 27% of the employees in the sector were women. The average FTE per enterprise increased also by 1 person from 2011 to 2012, whereas the average wage decreased from 9.5 to 9.3 thousand euros, corresponding to a decrease of 1% over the same period.

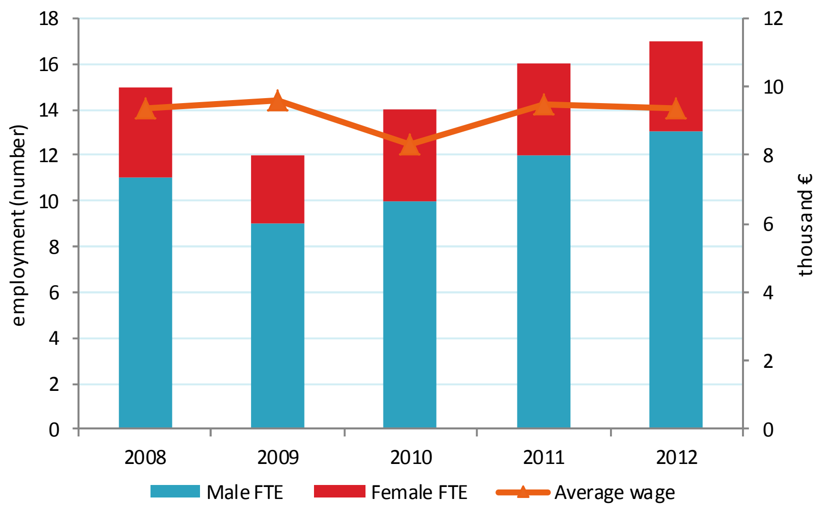


Figure 4.8.1 Employment trends for Estonia (primary trout farming enterprises): 2008-2012.

Source: EU Member States DCF data submission

Although the number of enterprises decreased from 2008 to 2012, the average number of FTE per enterprise has been increased. From 2011 to 2012 the labour productivity increased by 460%, but from 2008 to 2012 the labour productivity decreased by 22%.

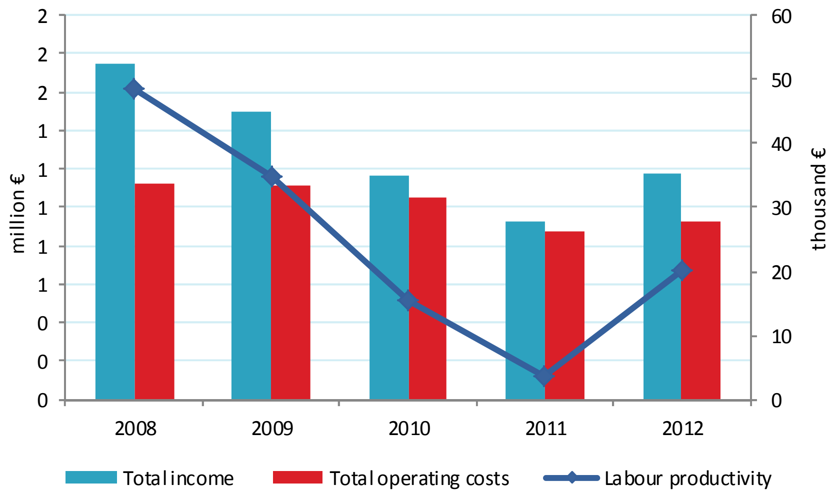


Figure 4.8.2 Income, costs, wages and labour productivity trends for primary trout farming enterprises in Estonia: 2008-2012.

Source: EU Member States DCF data submission

4.8.4 Economic performance

Economic performance of primary trout farming sector has been greatly affected by the decrease in the number of enterprises and especially by the heat wave in 2010 which caused a great loss in rainbow trout production. Undoubtedly this event has had an impact on economic performance in the following years. This effect is also observed in the following figures and tables.

Table 4.8.3 Economic performance of the Estonian aquaculture sector (primary trout farming enterprises): 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	1.4	1.3	1.1	0.7	0.9	*79%*	*21%*	*-21%*
Other income	0.3	0.1	0.1	0.1	0.2	*21%*	*344%*	*57%*
Subsidies	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*	*0%*
Total income	*1.7*	*1.4*	*1.2*	*0.8*	*1.1*	*100%*	*42%*	*-12%*
Expenditures (million €)								
Wages and salaries	0.1	0.1	0.1	0.1	0.1	*12%*	*13%*	*33%*
Imputed value of unpaid labour	0.0	0.0	0.0	0.0	0.0	*2%*	*-31%*	*-25%*
Energy costs	0.1	0.1	0.1	0.1	0.1	*10%*	*5%*	*4%*
Repair and maintenance	0.0	0.1	0.1	0.0	0.0	*3%*	*28%*	*-40%*
Raw material: Feed costs	0.7	0.6	0.6	0.4	0.4	*38%*	*5%*	*-25%*
Raw material: Livestock costs	0.1	0.0	0.1	0.0	0.0	*3%*	*14%*	*-41%*
Other operational costs	0.1	0.1	0.1	0.2	0.2	*15%*	*7%*	*37%*
Total operating costs	*1.1*	*1.1*	*1.0*	*0.9*	*0.9*	*84%*	*6%*	*-10%*
Capital Costs (million €)								
Depreciation of capital	0.1	0.1	0.1	0.1	0.1	*9%*	*26%*	*-3%*
Financial costs, net	0.1	0.1	0.0	0.1	0.1	*6%*	*12%*	*25%*
Extraordinary costs, net	0.0	0.0	0.5	0.0	0.0	*0%*	*-100%*	*-100%*
Capital Value (million €)								
Total value of assets	3.5	3.4	3.0	3.4	3.3	*301%*	*-3%*	*1%*
Net Investments	0.1	0.1	0.1	0.6	0.2	*15%*	*-73%*	*-21%*
Debt	1.4	1.5	1.2	2.2	2.1	*192%*	*-1%*	*37%*
Input & Production (thousand tonnes)								
Raw material: Feed	0.5	0.5	0.4	0.3	0.4		*6%*	*-21%*
Raw material: Livestock	0.1	0.1	0.1	0.0	0.0		*-23%*	*-71%*
Performance Indicators(million €)								
Gross Value Added	0.7	0.4	0.2	0.1	0.3	*31%*	*495%*	*-4%*
Operating cash flow	0.6	0.3	0.1	-0.1	0.2	*16%*	*293%*	*-19%*
Earning before interest and tax	0.5	0.2	0.0	-0.2	0.1	*8%*	*150%*	*-32%*
Net profit	0.4	0.1	-0.1	-0.2	0.0	*2%*	*107%*	*-76%*
Capital productivity (%)	21.0	12.4	7.3	1.7	10.2			
Return on Investment (%)	14.0	5.8	-0.3	-5.0	2.6			
Future Expectation Indicator (%)	-1.4	0.4	-1.5	16.1	2.3			

Source: EU Member States DCF data submission

From 2011 to 2012, total income increased by 42%, while the operational cost increased by 6%, see the Table 4.8.3. Taking into account the share to the total income the expenditures are dominated by cost of feed (38%), other operational costs (15%) and cost of wages and salaries (12%), in 2012. The total expenditures make up for 84% of the total income. Compared to 2011 the total operating costs increased 6% in 2012. The expenditures to wages and salaries, energy and other operational costs have been increased, whereas the expenditures for raw material and repair and maintenance have been declining from 2008 to 2012.

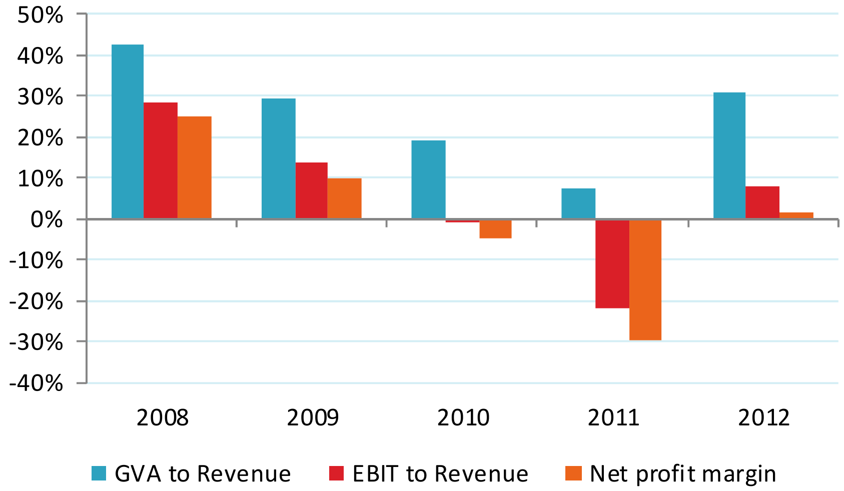


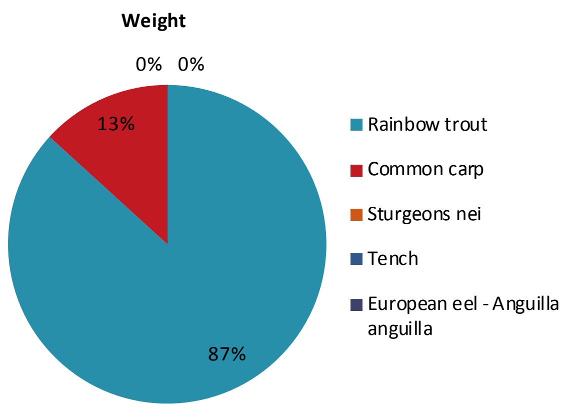
Figure 4.8.3 Economic performance for Estonia (primary trout farming enterprises): 2008-2012

Source: EU Member States DCF data submission

From 2011 to 2012, the gross value added (GVA) increased by 495% and both EBIT and net profit was positive. The total value of assets and debts decreased by 3% and 1%, respectively. The net investment decreased 73%.

4.8.5 Main species produced and economic performance by segment

According to the Eurostat (Figure 4.8.4) the rainbow trout is the main species produced by the Estonian aquaculture sector, representing almost 87% in quantity and 90% in value of total production in 2012. The share of the second important fish - common carp, is already only around 13% and 10%, respectively. Other less important fish species are sturgeons and eel. Additionally, a few enterprises provide very limited production of some local fish species mainly for restocking. Salmonids are reared for restocking by two state-financed farms. Also some crayfish farms are operating in Estonia.



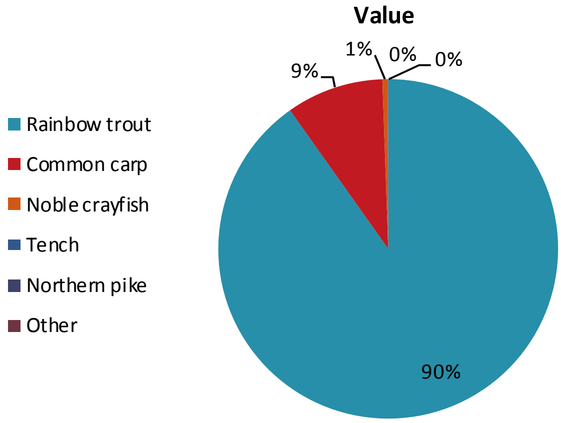


Figure 4.8.4 Main species in terms of weight and value in Estonia production: 2012.

Source: EUROSTAT, 2014

The average price for trout produced in Estonia decreased in 2009, see the Figure 4.8.5. This decrease was probably due to economic crisis. However, the average price has been slightly increasing over the period from 2009 to 2012.

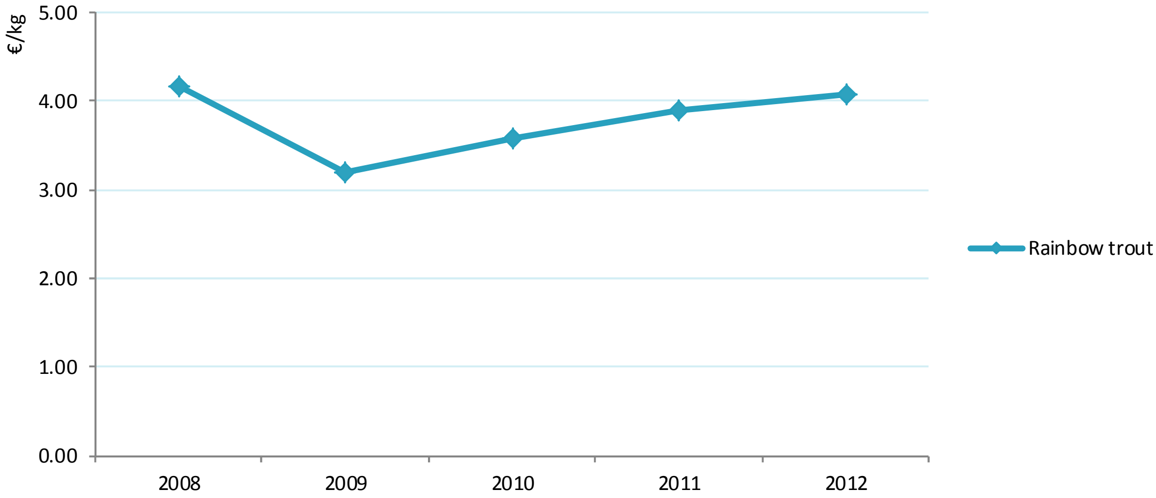


Figure 4.8.5 Average prices for the main species produced in Estonia: 2008-2012.

Source: EU Member States DCF data submission

The production of trout is divided into two segments based on technique. Those segments are described below.

Segment 1: Trout combined

The most important segment was land based fresh water trout combined farms in 2012. In most cases enterprises in Estonia combine the production in hatcheries and nurseries with grow out farms. The segment consists of 4 enterprises. The production volume was 180 tonnes with a corresponding income of 0.7 million euros. The production volume accounts for 83% and the value accounts for 81% of the total trout production.

Segment 2: Trout on growing

The second segment was land based fresh water trout on growing farms in 2012. The segment consists of 2 enterprises. The production volume was 37 tonnes with a corresponding income of 0.2 million euros.

Observing the structural development of primary trout farming enterprises in the Figure 4.8.6 it can be seen that the share of trout combined segment increase in 2012. Reason for that was the moving of a larger enterprise from the trout on growing segment to the trout combined segment.

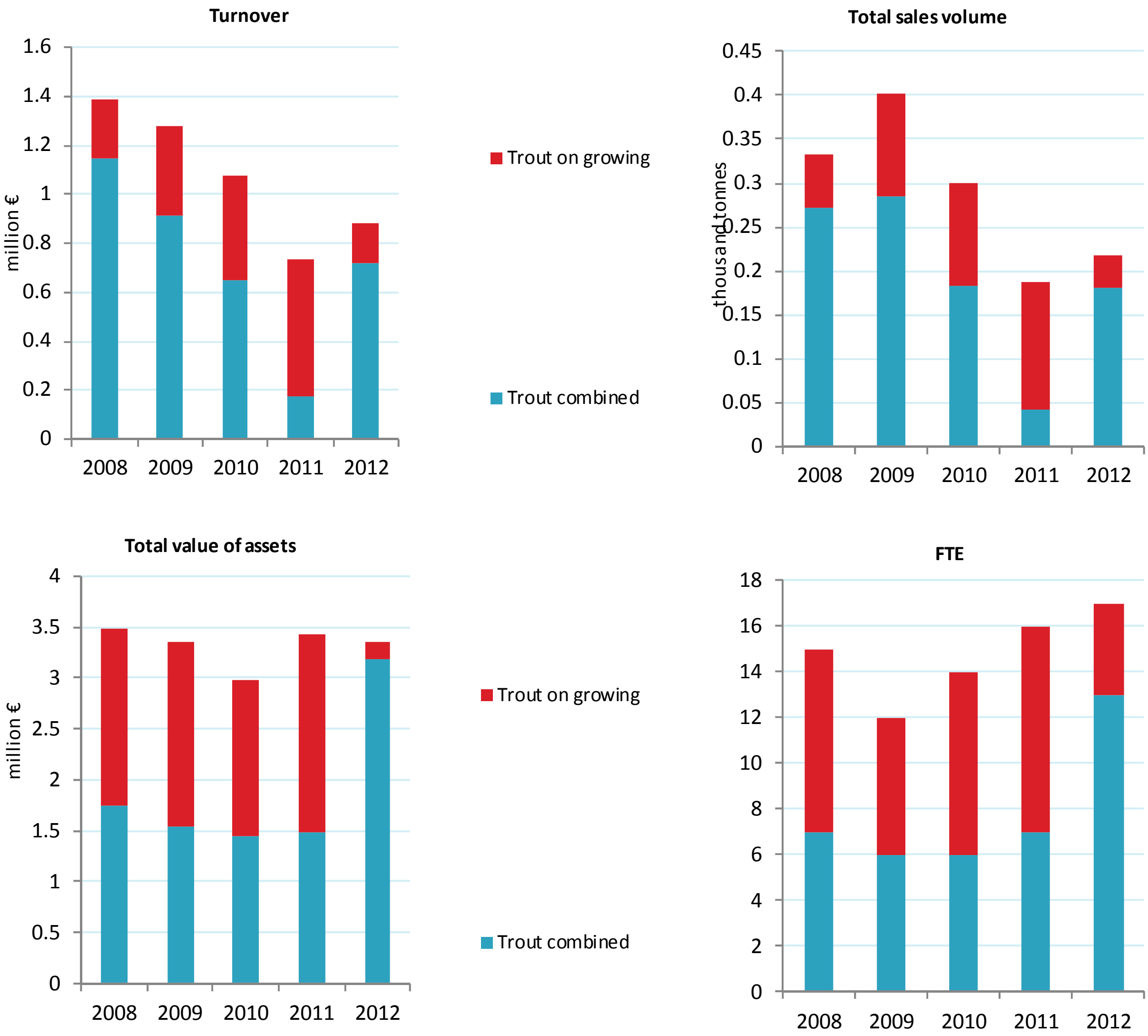


Figure 4.8.6 Structural development Estonian aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

The economic performance of the two Estonian segments is shown in the Table 4.8.4 and the Figure 4.8.7. It can be seen that the development trend for values of variables are quite different. The economic performance of trout combined segment was mainly affected by heat wave in 2010. The economic performance of trout on growing segment was mainly affected by the economic crisis and changes of enterprises between the segments.

Table 4.8.4 Economic performance of main Estonian aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Trout combined								
Total income	1.3	1.0	0.7	0.2	1.0	100%	402%	29%
Gross Value Added	0.6	0.4	0.1	-0.1	0.3	29%	350%	22%
Operating cash flow	0.5	0.3	0.1	-0.2	0.2	17%	193%	-7%
Earning before interest and tax	0.5	0.3	0.0	-0.2	0.1	7%	134%	-46%
Net profit	0.5	0.2	0.0	-0.2	0.0	1%	103%	-95%
Total sales volume (thousand tonn	0.3	0.3	0.2	0.0	0.2		329%	-8%
Trout on growing								
Total income	0.5	0.5	0.5	0.7	0.2	100%	-77%	-70%
Gross Value Added	0.1	0.1	0.1	0.2	0.0	29%	-72%	-58%
Operating cash flow	0.1	0.0	0.0	0.1	0.0	10%	-81%	-66%
Earning before interest and tax	0.0	-0.1	-0.1	0.0	0.0	7%	-76%	185%
Net profit	0.0	-0.1	-0.1	0.0	0.0	7%	271%	120%
Total sales volume (thousand tonn	0.1	0.1	0.1	0.1	0.0		-75%	-66%

Source: EU Member States DCF data submission

In the Figure 4.8.7 it can be seen that compared to 2011 the GVA% and net profit margin increased in both segment in 2012.

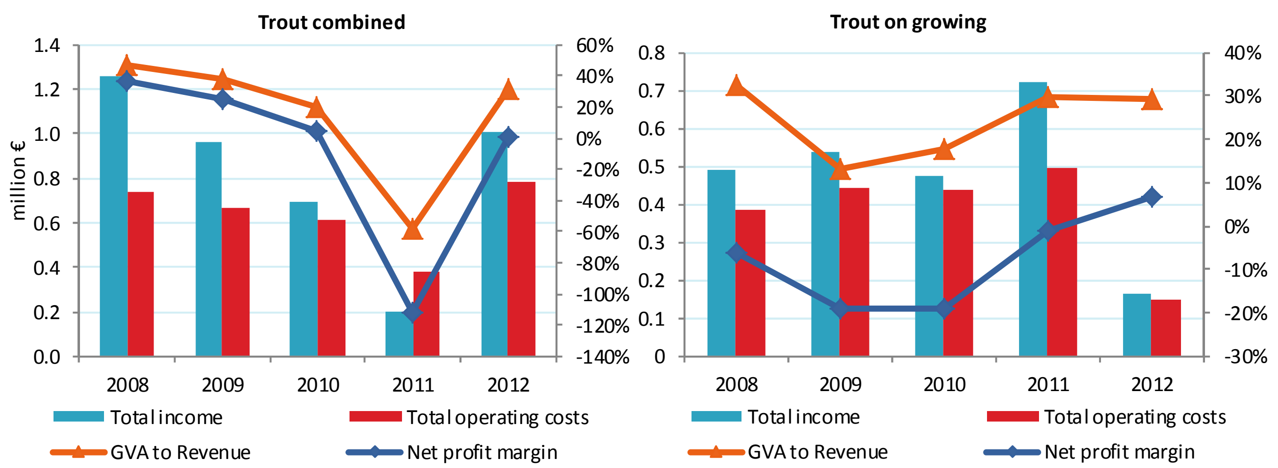


Figure 4.8.7 Economic performance indicators for the main Estonian segments: 2008-2012.

Source: EU Member States DCF data submission

In Figure 4.8.8, the operational cost structures for the two segments are presented.

Segment 1: Trout combined

The main cost components are feed costs (41%), other operational costs (15%) and costs of wages and salaries and energy costs (each 13%).

Segment 2: Trout on growing

The shares of cost components are rather similar to previous segment. The feed costs are also the most important covering 42% of the total operational costs. However, the share of energy cost (3%) is much lower.

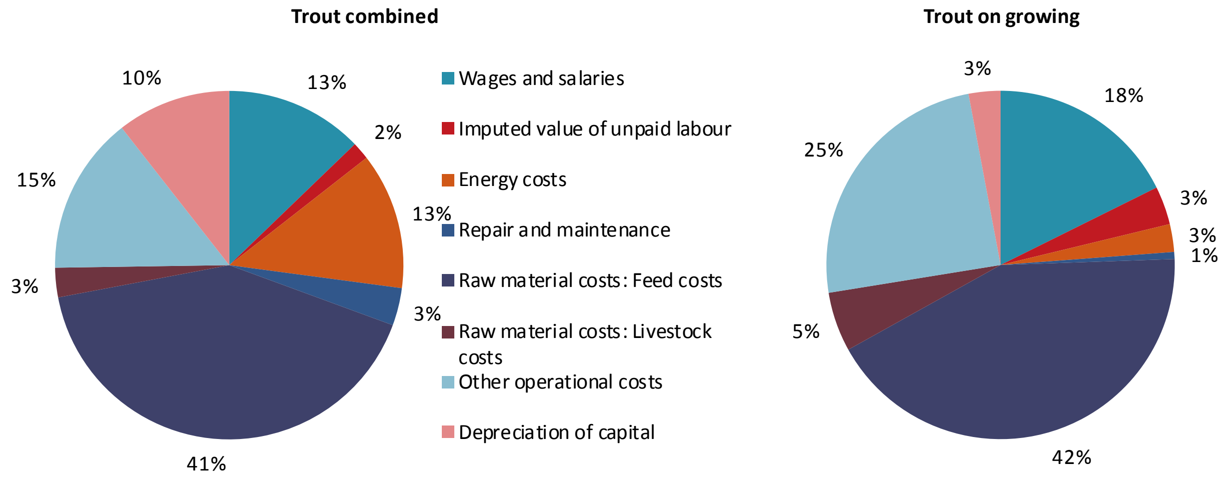


Figure 4.8.8 Cost structure of the main segments in Estonia: 2012.

Source: EU Member States DCF data submission

In Figure 4.8.9, the feed and livestock prices for the two segments are presented. Figures reveal that the price of feed has maintained its level through the years 2008-2012, but same time the price of livestock has increased.

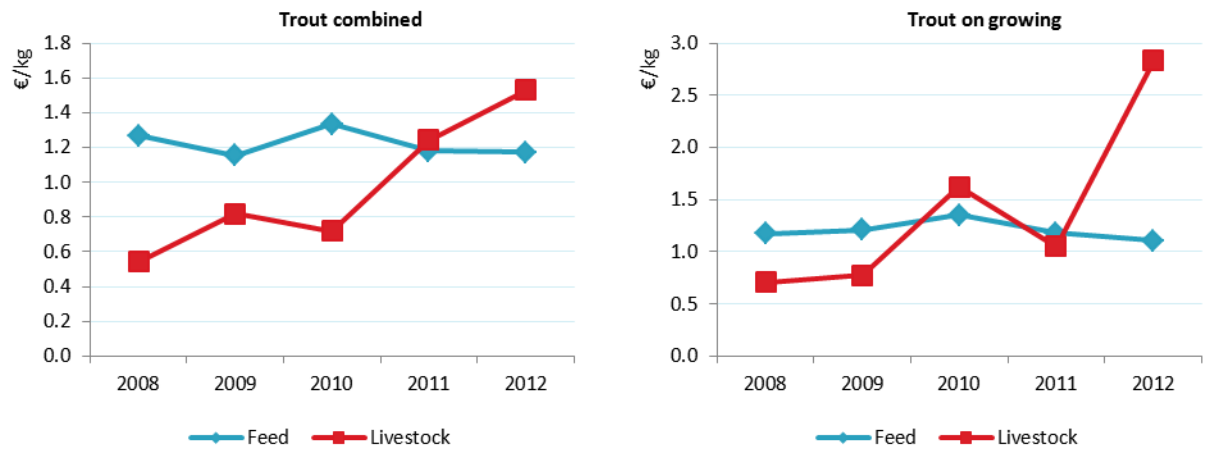


Figure 4.8.9 Feed and livestock prices for the main Estonian segments: 2008-2012.

Source: EU Member States DCF data submission

4.8.6 Trends and triggers

Current production trends and main drivers

The current production volume of primary trout farming sector has been greatly affected by the decrease in the number of enterprises and weather conditions. The production of Estonian aquaculture sector decreased significantly in 2011. The reason for that was heat wave in 2010 which caused a great loss in rainbow trout production. Undoubtedly this event has had an impact on production also in the following (2012-2014) years.

Natural resources such as water and land do not limit development of fish farming in Estonia. However, the lack of investment capital and know-how has been the main factors restricting the development of fish farming in Estonia. The majority of Estonian fish farms are family owned and run, therefore success depends on the owner's knowledge and financial capacity. To some extent support from European Fisheries Fund (EFF) helps to solve the problem of investment capital. Around 12 million euros was allocated from EFF Measure 2.1 (investment support for aquaculture) for the establishment and modernization of fish farms until 2012.

Market structure

Due to its small size, the aquaculture sector has little influence on the national economy in Estonia. Low production volumes cannot secure year-round supply for large supermarket chains or attract the interest of exporters. The relatively high production cost of red-flesh trout makes it difficult to compete with similar products imported from Norway. However, some fish farms have started to add value for products through processing and increasing the quality (filleting, salting, marinating, smoking) which can help to broaden the market and raise profitability. The rainbow trout and common carp are mainly marketed domestically. Eel production has decreased significantly and most is exported. Aquaculture has a little more influence on the economy through tourism, because they supply put-and-take ponds which are an attractive part of leisure time activities in many holiday houses. There are over 60 fishing tourism enterprises in Estonia that buy fish from fish farms and offer angling services in their ponds. Some enterprises are testing the cultivation of new fish species which may also expand marketing possibilities (e.g. African catfish, Arctic char, tilapia).

Issues of special interest

There was completed the aquaculture development strategy for the next seven years (2014-2020) in Estonia. The preparation of the strategy was initiated by the Estonian Fish Farmers Association and it supported through the European Fisheries Fund. The most important areas to be addressed for production growth are following:

- Strengthen the competitiveness through targeting investments to the technologies and solutions that improve the efficiency and quality of production;
- The use of domestic market advantage;
- Aquaculture business collaboration and strategic partnership;
- Development of higher value-added and differentiated products;
- Cultivation of species which are suitable for Estonian natural conditions and have high foreign demand;
- Development of supportive business environment for the promotion of aquaculture;
- Specific knowledge and skills acquisition.

Outlook for 2013 and 2014

Preliminary data show that production volumes of the Estonian trout producers are recovering. In addition to operating fish farms the production from the new farms, which have been created with support from the European Fisheries Fund, is expected.

4.8.7 Data Coverage and Data Quality

Due to the small number of commercial fish farming companies it was reasonable to collect data only concerning rainbow trout (enterprises whose primary activity was defined “Fish farming”); concerning other species the value of production was too small to justify any sampling activities. There was also a threat to confidentiality. That is a reason why DCF and EUROSTAT data may be different (Figure 4.8.10). The data were collected through the questionnaires by Estonian Marine Institute and then compared with the data in the financial statements.

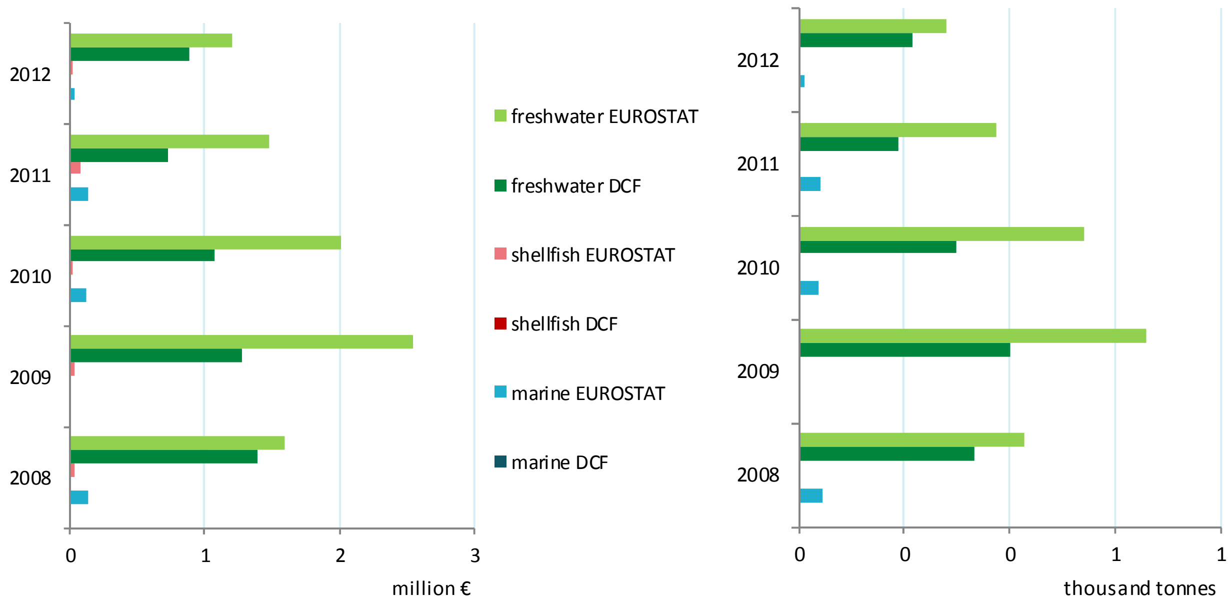


Figure 4.8.10 Comparison of DCF data with EUROSTAT data for Estonia: 2008-2012

4.9 FINLAND

4.9.1 Summary

Production volume and value

The Finnish aquaculture sector produced 11,050 tonnes of fish and fry in 2012, while the total value of the production was 53 million euros. The volume of production increased by 10%, but the value of production decreased by 7% compared to 2011. The aquaculture sector has been increasingly concentrated in the recent years. The ten biggest companies in the sector in terms of turnover made up 64% of the total revenues in 2012.

The food fish supply has consisted mainly of rainbow trout. Around 70% of the production value and 88% of the production volume was rainbow trout in 2012. European whitefish production is also important part of the Finnish food fish supply. European whitefish accounted for 15% of the production value and 8% of the total production volume in 2012. The production of fry in fish farms consists mainly of rainbow trout fry for food fish farming. Fish farms produce also Baltic salmon, landlocked salmon, brown trout, sea trout, char and brook trout fry. Hatcheries and nurseries generated 16% of the total turnover of the sector.

Overall industry structure and employment

There were 120 main activity aquaculture companies in operation in 2012 in Finland. This was 9% less than in 2011. Also the employment of the sector decreased. The aquaculture sector employed 326 FTEs which was 7% less than in 2011.

Main segments

Finnish aquaculture sector has been disaggregated into 4 segments. Three of them are segments of other fresh water fish; the combined production of juveniles and food fish, food fish production inland (on growing) and hatcheries and nurseries. The fourth and important segment is the marine aquaculture of trout (in cages). The hatcheries and nurseries segment includes natural food ponds. The trout-cages segment includes also rainbow trout production at sea and the European whitefish production in fresh water cages.

Current production trends and main drivers (Trends and triggers)

The Finnish environmental policy has been preventing the intensifying of the Finnish aquaculture production and consequently the sector has not been able to benefit from the economies of scale. The tight environmental permit policy has forced some of the Finnish aquaculture producers to move their production to Sweden where the environmental regulation is more favorable for the aquaculture production.

Finland has a national spatial planning program of aquaculture in order to direct the aquaculture production into areas where it is suitable for both the environment and the aquaculture industry. In this way, the environmental effects can be minimized together with creating possibilities for production growth and improving the profitability of the sector.

The competitiveness and performance of the sector is mostly connected to the price developments of fish, mainly rainbow trout and salmon, but also developments of the feed cost play an important role. Almost all aquaculture production in Finland is consumed in the domestic market and the demand for domestic aquaculture products is growing. Imports of aquaculture product account for about 40% of the total fish consumption in Finland.

Outlook

The total food fish production was 13,600 tonnes and 56 million Euros in 2013. There was an increase in both, the value and volume of production, but the value increased significantly (by 11 million euros) thanks to advantageous price evolution of rainbow trout. These figures include all aquaculture fish production for human consumption in Finland, not only the production of the main activity companies. In addition to food fish, fish culture produced fry totaling 54 million individuals of different ages, both for stocking and further rearing.

The administration of national environmental control system is being developed and reorganized in order to make the system more predictable to attract more investments in the sector. This could reduce the amount of aquaculture producers moving to abroad.

Recirculating aquaculture systems have become more common in Finland in the recent years. The recirculating systems have a great potential as the nutrient load can be easily managed while it is possible to maintain optimal culturing conditions all year round. However, high production costs as well as risks related to introducing new technologies impose challenges for this technology. Also transferring marine aquaculture production in big production units further to the open sea has potential for increasing the aquaculture production.

4.9.2 Production and sales

The Finnish aquaculture sector produced 11,050 tonnes of fish and fry in 2012 with the total production value of 53 million euros. The volume of production increased by 10%, but the value of production decreased by 7% compared to 2011. While the volume of production has increased in the 2008-2012 period, the sales value has decreased. The price of rainbow trout have decreased in the period and affected unfavourably the profitability of the Finnish marine aquaculture.

Table 4.9.1 Production and sales for Finland: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***9.3***	***8.9***	***8.4***	***10.1***	***11.1***	*10%*	*21%*
Marine	5.4	4.4	4.9	4.0	4.3	*8%*	*-9%*
Shellfish	0.0	0.0	0.0	0.0	0.0		
Freshwater	3.5	4.1	3.0	5.6	6.3	*11%*	*54%*
Hatcheries & nurseries	0.4	0.3	0.4	0.5	0.5	*7%*	*28%*
Sales value (million €)	***65.8***	***57.4***	***50.3***	***56.7***	***52.9***	*-7%*	*-8%*
Marine	34.0	26.3	25.7	20.4	12.4	*-39%*	*-53%*
Shellfish	0.0	0.0	0.0	0.0	0.0		
Freshwater	23.3	22.9	20.9	26.6	32.3	*21%*	*38%*
Hatcheries & nurseries	8.5	8.2	3.7	9.7	8.2	*-15%*	*9%*

Source: EU Member States DCF data submission

The food fish supply has consisted mainly of rainbow trout. Around 70% of the production value and 88% of the production volume was rainbow trout in 2012. The rainbow trout production is mainly combined freshwater production of food fish and juveniles, but there is also some rainbow trout food fish production in the cages at sea. European whitefish production is also important part of Finnish food fish supply.

European whitefish accounted for 15% of the production value and 8% of the total production volume in 2012.

The hatcheries and nurseries produced fry totalling 500 tonnes for stocking and further rearing. The production of rainbow trout fry on fish farms was supplied almost exclusively for food fish farming. Fish farms also produced fry of Baltic salmon, landlocked salmon, sea trout, brown trout, char and brook trout.

4.9.3 Industry structure and employment

There were 120 main activity aquaculture companies in operation in Finland in 2012. The number of aquaculture companies has decreased steadily in the period of 2008-2012. In 2011 the number decreased by 9%. Due to methodological changes the number of enterprises by size category has changed greatly in 2012.

Table 4.9.2 Structure of the Finish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*162*	*157*	*146*	*132*	*120*	*-9%*	*-20%*
<=5 employees	152	147	136	123	98	*-20%*	*-30%*
6-10 employees	4	4	4	3	12	*300%*	*220%*
>10 employees	6	6	6	6	10	*67%*	*67%*
Employment (number)							
Total employees	443	421	359	445	402	*-10%*	*-4%*
Male employees	338	313	276	336	297	*-12%*	*-6%*
Female employees	105	108	83	109	105	*-4%*	*4%*
FTE	362	349	290	349	326	*-7%*	*-3%*
Male FTE	275	259	223	264	241	*-9%*	*-6%*
Female FTE	87	90	67	85	85	*0%*	*3%*
Indicators							
FTE per enterprise	2.2	2.2	2.0	2.6	2.7	*3%*	*20%*
Average wage (thousand €)	36.2	35.4	37.3	38.0	38.1	*0%*	*4%*
Labour productivity (thousand €)	57.6	56.9	57.7	50.0	47.5	*-5%*	*-14%*

Source: EU Member States DCF data submission

The aquaculture segment employed 402 persons in 2012 corresponding 326 full time equivalent. The employment decreased by 10% and around 74% of the aquaculture employees were men. There are 2.7 FTEs employed per enterprise on average. The average annual wage per FTE was 38,100 Euros and the labour productivity 47,500 Euros in 2012.

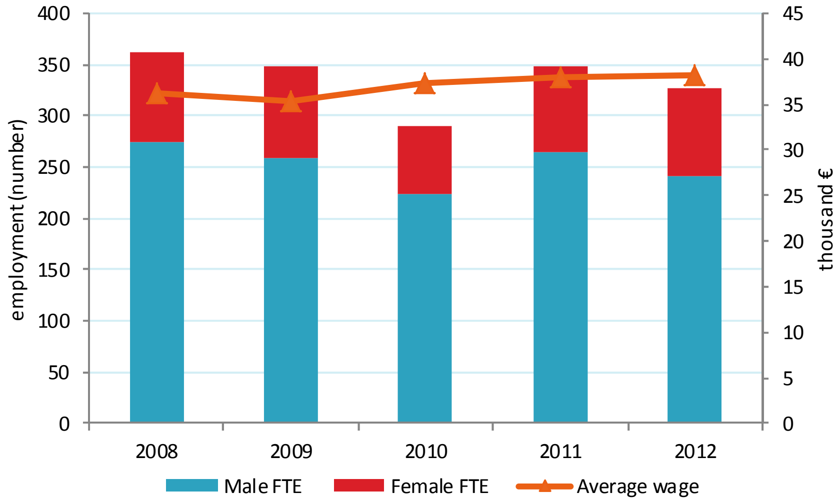


Figure 4.9.1 Employment trends for Finland: 2008-2012.

Source: EU Member States DCF data submission

The number of enterprises and FTEs has decreased from 2008 to 2012, but the average number of FTE per enterprise has increased over the period. The enterprises have not managed to increase labour productivity measured as gross value added per full time employee, although the average wage has been increasing.

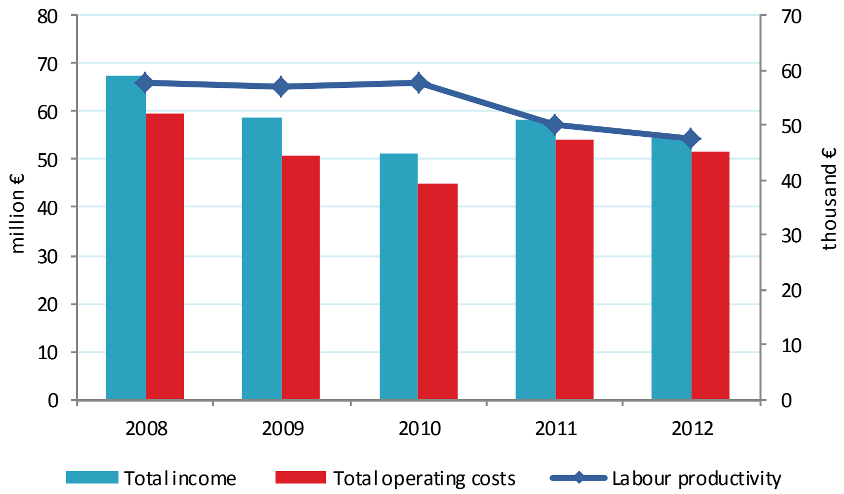


Figure 4.9.2 Income, costs, wages and labour productivity trends for Finland: 2008-2012.

Source: EU Member States DCF data submission

The total income of the Finnish aquaculture sector has decreased from 2008 to 2010, but increased again in 2011. The total income was 55 million Euros in 2012. Total operating costs have developed similarly with a decrease from 2008 to 2010 and an increase in 2011. The operational costs were 52 million Euros in 2012. The labour productivity has been steady for 2008-2010, but it has weakened in 2011 and 2012.

4.9.4 Economic performance

The economic performance of the Finnish aquaculture sector worsened during the period of 2008-2010. In 2011 the situation improved, but again in 2012 the total income fell to 55 million Euros with a turnover of

53 million and other income of 1.7 million Euros. The total income is dominated by the turnover from the sale of fish from the farms, which contributes 97% of total income, leaving only 3% to other sources of income. There are very little direct subsidies for the Finnish aquaculture enterprises. Companies receive investment subsidies, but they are not regarded as direct subsidies in the DCF.

Table 4.9.3 Economic performance of the Finish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	*% of total income*	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	65.8	57.4	50.3	56.7	52.9	*97%*	*-7%*	*-8%*
Other income	1.5	1.1	0.8	1.6	1.7	*3%*	*5%*	*37%*
Subsidies	0.1	0.0	0.1	0.1	0.1	*0%*	*86%*	*92%*
Total income	*67.3*	*58.5*	*51.1*	*58.4*	*54.7*	*100%*	*-6%*	*-7%*
Expenditures (million €)								
Wages and salaries	11.4	11.1	9.7	11.6	10.9	*20%*	*-6%*	*-1%*
Imputed value of unpaid labour	1.7	1.2	1.1	1.7	1.5	*3%*	*-9%*	*7%*
Energy costs	1.8	1.5	1.3	1.6	1.5	*3%*	*-4%*	*-2%*
Repair and maintenance	2.2	1.9	1.7	2.0	1.9	*3%*	*-4%*	*-2%*
Raw material: Feed costs	25.8	21.4	19.0	22.7	21.7	*40%*	*-4%*	*-2%*
Raw material: Livestock costs	6.6	5.5	4.8	5.8	5.5	*10%*	*-4%*	*-2%*
Other operational costs	10.1	8.4	7.5	8.9	8.5	*16%*	*-4%*	*-2%*
Total operating costs	*59.5*	*51.0*	*45.1*	*54.2*	*51.5*	*94%*	*-5%*	*-2%*
Capital Costs (million €)								
Depreciation of capital	2.8	2.7	2.0	3.0	3.1	*6%*	*2%*	*19%*
Financial costs, net	-0.4	0.4	-0.5	-0.1	-0.2	*0%*	*-32%*	*-3%*
Extraordinary costs, net	-0.5	-2.3	-2.4	0.7	-1.6	*3%*	*-320%*	*-47%*
Capital Value (million €)								
Total value of assets	84.4	79.5	74.8	96.5	97.9	*179%*	*1%*	*17%*
Net Investments	1.5	2.5	1.6	9.8	6.4	*12%*	*-35%*	*65%*
Debt	46.1	41.5	36.5	53.5	63.0	*115%*	*18%*	*42%*
Input & Production (thousand tonnes)								
Raw material: Feed	15.3	19.0	13.8	18.1	20.5		*14%*	*24%*
Raw material: Livestock	0.8	0.6	0.6	0.7	0.6		*-3%*	*-4%*
Performance Indicators(million €)								
Gross Value Added	20.8	19.9	16.7	17.5	15.5	*28%*	*-11%*	*-17%*
Operating cash flow	7.8	7.6	6.0	4.2	3.2	*6%*	*-25%*	*-50%*
Earning before interest and tax	5.0	4.9	4.0	1.2	0.1	*0%*	*-95%*	*-99%*
Net profit	5.4	4.5	4.5	1.3	0.2	*0%*	*-83%*	*-94%*
Capital productivity (%)	24.7	25.0	22.4	18.1	15.8			
Return on Investment (%)	5.9	6.2	5.3	1.2	0.1			
Future Expectation Indicator (%)	-1.5	-0.2	-0.5	7.0	3.4			

Source: EU Member States DCF data submission

Total operational costs were 52 million Euros showing a decrease of 5%. The expenditures were dominated by cost of feed (42%), wages and salaries (21%) and other operational costs (17%). The total operational costs make up for 94% of the total income.

The gross value added decreased and the profitability of the sector worsened in 2012. The gross value added was 15.5 million Euros and the net profit was only 0.2 million Euros in 2012. The total value of assets of the Finnish aquaculture sector was 98 million Euros and net investments fell to 6 million Euros. Total debt of aquaculture companies rose to 63 million Euros.

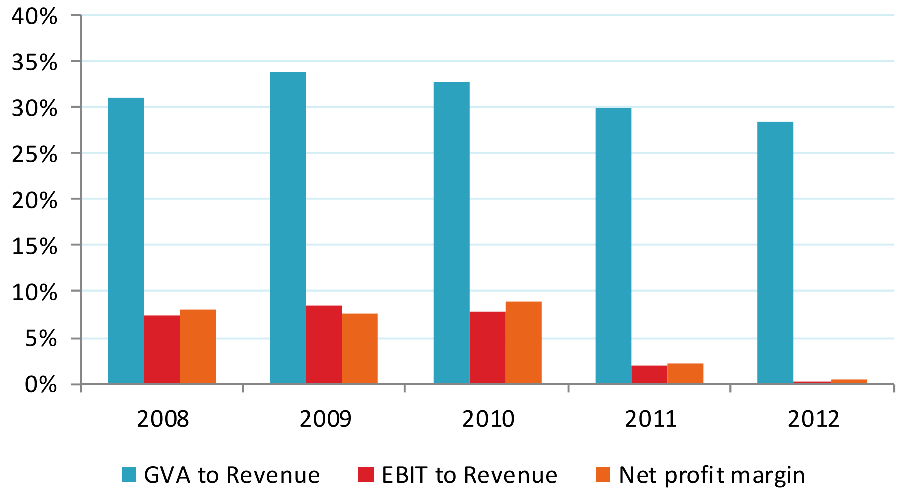


Figure 4.9.3 Economic performance for Finland: 2008-2012

Source: EU Member States DCF data submission

The gross value added decreased and the profitability of the sector worsened in the 2008-2012 period. Year 2012 was particularly weak for the aquaculture sector as the total EBIT of aquaculture companies was only 0.1 million Euros and the net profit 0.2 million Euros.

4.9.5 Main species produced and economic performance by segment

Finnish aquaculture sector has been disaggregated into 4 segments.

- Segment 1: Other freshwater fish combined production of juveniles and food fish;
- Segment 2: Trout marine production in cages;
- Segment 3: Other freshwater fish hatcheries and nurseries (including natural food ponds);
- Segment 4: Other freshwater fish on growing (food fish production inland).

The largest segment in terms of production value is the combined production of juvenile and food fish of other fresh water fish. Salmon, trout and rainbow trout production are included in the other fresh water fish category in the Finnish data collection except for the marine aquaculture. The marine aquaculture production of rainbow trout and European white fish are included in the trout cages segment. Total income of the combined and on growing segment increased in 2012, while the cages and hatcheries and nurseries obtained less income than in 2011. Hatcheries and nurseries and food fish production inland (on growing) made profits, but combined and marine segments were unprofitable.

The main species produced in Finland is rainbow trout, which makes up 88% of the total volume and 70% of the total value of production. The second most important species is European whitefish, which makes up 15% of the total value and 8% of the volume. Seat trout comes next in terms of volume. However, the value of Atlantic salmon exceeds that of the sea trout.

Figure 4.9.4 Main species in terms of weight and value in Finland production: 2012.

Source: EU Member States DCF data submission

The nominal average price of European whitefish for food production has decreased over the past few years and the price was 3.90 Euros/kg in 2012. The food fish price for Rainbow trout was 3.20 Euros/kg with a decrease from 2011. The average prices in the figure 4.9.5 are calculated based on the turnover and production volume rather than real prices and they should consequently not be regarded as market prices. The production of pike-perch is mostly fry production and this is the reason for such high average prices for pike-perch.

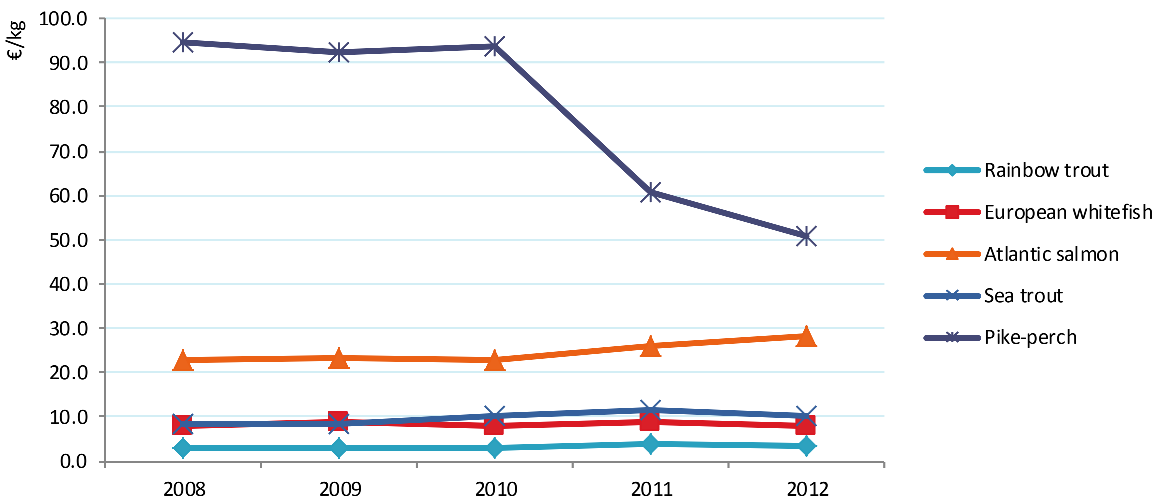


Figure 4.9.5 Average prices for the main species produced in Finland: 2008-2012.

Source: EU Member States DCF data submission

The combined production of juveniles and food fish made up most of the turnover of the Finnish aquaculture sector, but the total sales volume comes equally from the cages at sea. The combined segment employs most persons and there have been relatively more investments in the combined segment than in other segments.

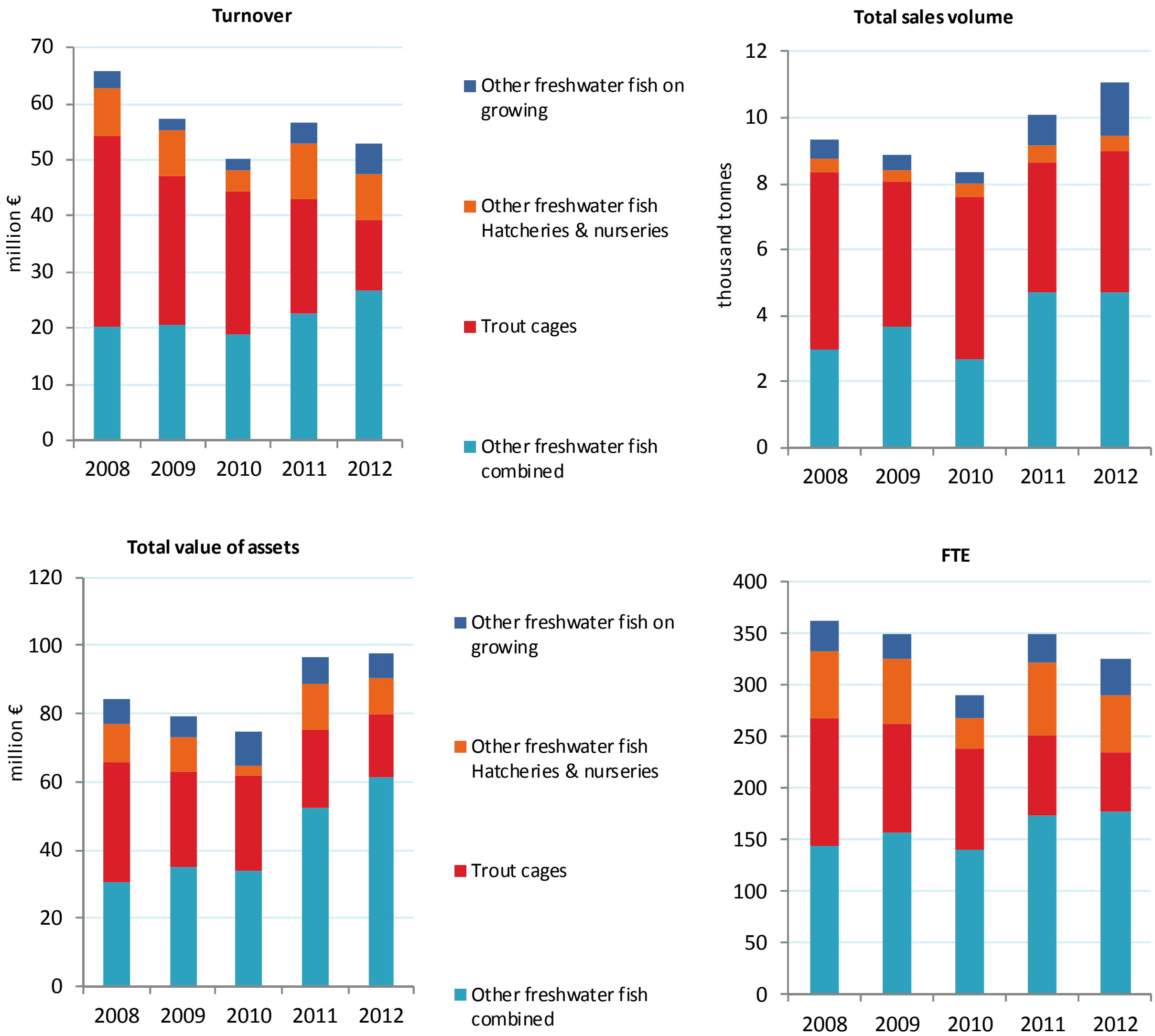


Figure 4.9.6 Structural development Finish aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

Segment 1: Other fresh water fish combined production of juveniles and food fish

The biggest segment in terms of total income was other fresh water fish combined production of juveniles and food fish with 28 million Euros in 2012. The production of combined segment consists mainly of rainbow trout, European whitefish and Atlantic salmon. The gross value added of the segment was around 6 million Euros and the sector made loss of 2.3 million Euros. Income of the segment rose by 17%, but at the same time the net profit fell considerably. The combined segment produced most fish in terms of volume of total production. In 2012 the production was 4.7 thousand tonnes.

Segment 2: Trout marine production in cages

The second biggest segment in terms of total income was marine production of rainbow trout and European white fish in cages with 13 million Euros in 2012. The production consisted mostly of rainbow trout (3.9 thousand tonnes), but also European whitefish was produced. The gross value added of the segment was 2.8 million Euros, which is about half of the GVA in 2011. The income of the segment fell by 37% and the segment made loss of 0.2 million Euros in 2012. The total sales volume was 4.3 thousand tonnes.

Segment 3: Other fresh water fish hatcheries and nurseries (including natural food ponds)

The total income of hatcheries and nurseries of other fresh water fish was 8.4 million Euros in 2012 with a fall of 2 million Euros from the previous year. The production of fry in fish farms consists mainly of rainbow trout fry for food fish farming. Fish farms also produce Baltic salmon, landlocked salmon, brown trout, sea trout, char and brook trout fry. The gross value added of the segment was 4.7 million Euros and the net profit increased to 2.4 million Euros. The total sales volume of hatcheries and nurseries was 0.5 thousand tonnes of fry in 2012.

Table 4.9.4 Economic performance of main Finish aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Other freshwater fish combined								
Total income	20.8	21.6	19.5	23.8	27.9	100%	17%	30%
Gross Value Added	7.8	8.6	7.1	7.1	6.1	22%	-14%	-20%
Operating cash flow	2.5	2.9	1.5	0.4	-1.1	4%	-374%	-163%
Earning before interest and tax	1.6	2.0	0.9	-0.6	-2.7	10%	-318%	-380%
Net profit	2.7	2.1	1.8	-1.2	-2.3	8%	-97%	-270%
Total sales volume (thousand tonı	3.0	3.7	2.7	4.7	4.7		0%	34%
Trout cages								
Total income	34.7	26.3	25.8	20.5	12.9	100%	-37%	-52%
Gross Value Added	9.0	6.9	7.4	5.7	2.8	22%	-51%	-62%
Operating cash flow	4.3	3.2	3.9	2.8	0.7	6%	-73%	-79%
Earning before interest and tax	3.2	2.1	2.7	1.7	0.0	0%	-102%	-102%
Net profit	2.7	1.6	2.5	2.2	-0.2	-2%	-109%	-109%
Total sales volume (thousand tonı	5.4	4.4	4.9	4.0	4.3		8%	-9%
Other freshwater fish Hatcheries & nurseries								
Total income	8.7	8.3	3.7	10.2	8.4	100%	-17%	9%
Gross Value Added	3.4	3.4	1.4	3.8	4.7	56%	23%	56%
Operating cash flow	1.4	1.3	0.3	1.3	3.0	35%	129%	177%
Earning before interest and tax	0.9	0.9	0.1	0.7	2.5	29%	249%	274%
Net profit	0.9	1.1	0.1	0.7	2.4	29%	251%	251%
Total sales volume (thousand tonı	0.4	0.3	0.4	0.5	0.5		7%	28%
Other freshwater fish on growing								
Total income	3.0	2.3	2.2	3.9	5.5	100%	42%	94%
Gross Value Added	0.6	1.0	0.8	0.8	1.9	34%	140%	137%
Operating cash flow	-0.4	0.2	0.3	-0.3	0.6	11%	338%	2194%
Earning before interest and tax	-0.6	-0.1	0.2	-0.6	0.3	6%	157%	220%
Net profit	-0.9	-0.3	0.1	-0.5	0.3	5%	165%	183%
Total sales volume (thousand tonı	0.5	0.5	0.4	0.9	1.6		69%	169%

Source: EU Member States DCF data submission

Segment 4: Other fresh water fish on growing (food fish production inland)

The total income of food fish production inland (on growing) was 5.5 million Euros in 2012. There was an increase of 42% from the previous year. The fish food production inland consisted mainly of rainbow trout, but also European whitefish and other fresh water species were produced. The gross value added of the segment was 1.9 million Euros. The segment made a profit of 0.3 million Euros. The total sales volume was 1.6 thousand tonnes.

In Figure 4.9.7, the economic indicators for the four Finnish segments are presented. From the figures it can be seen that while the total income and total operational costs in the combined segment have grown in the period of 2008-2012, the GVA% and the net profit margin have decreased showing weaker profitability. Furthermore, the income and costs of the marine production in cages have decreased, but the segment has still been able to maintain the profitability except for year 2012. The profitability of hatcheries and nurseries has developed favourably. The inland food fish production segment has been able to expand the production with increased income and costs and improving profitability in 2012.

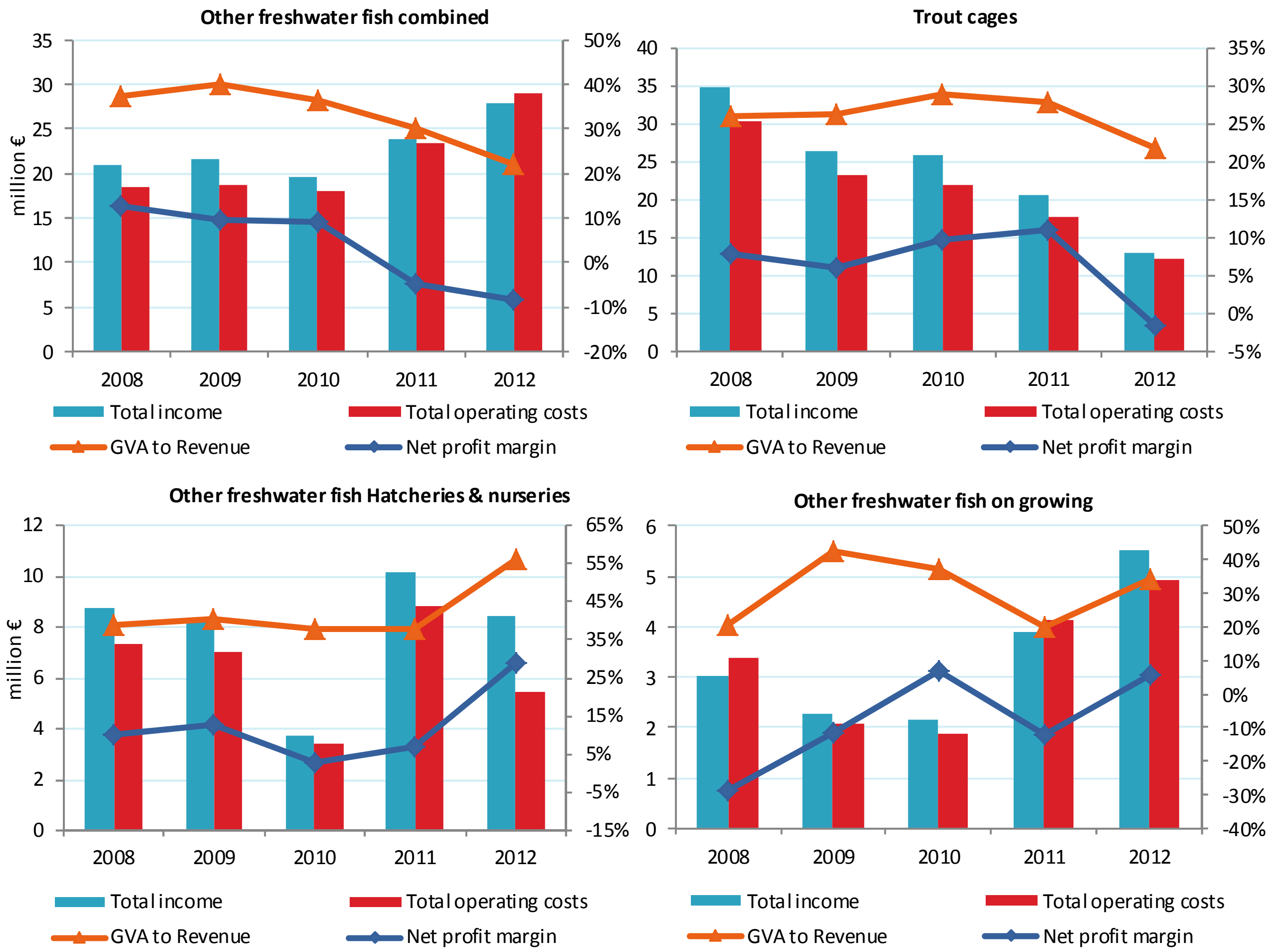


Figure 4.9.7 Economic performance indicators for the main Finish segments: 2008-2012.

Source: EU Member States DCF data submission

The operational cost structures for the four Finnish segments are presented in the Figure 4.9.8. The graphs show that the feed costs is the largest cost item in all segments, about 40% of the total operational costs. Trout cages segment has relatively highest feed costs (43%) and other operational costs (17%) also the livestock cost are comparatively high, 11%.

Hatcheries and nurseries seem more labour intensive than food fish production as the segment has relatively highest costs of wages and salaries (24%). Also the combined segment has relatively high labour costs having 23% of costs coming from wages and salaries. The food fish producers inland (on growing) use more unpaid labour as they have the highest share of costs coming from the imputed value of unpaid labour (15%). And accordingly, the segment has the smallest share of costs from wages and salaries, only 10%.

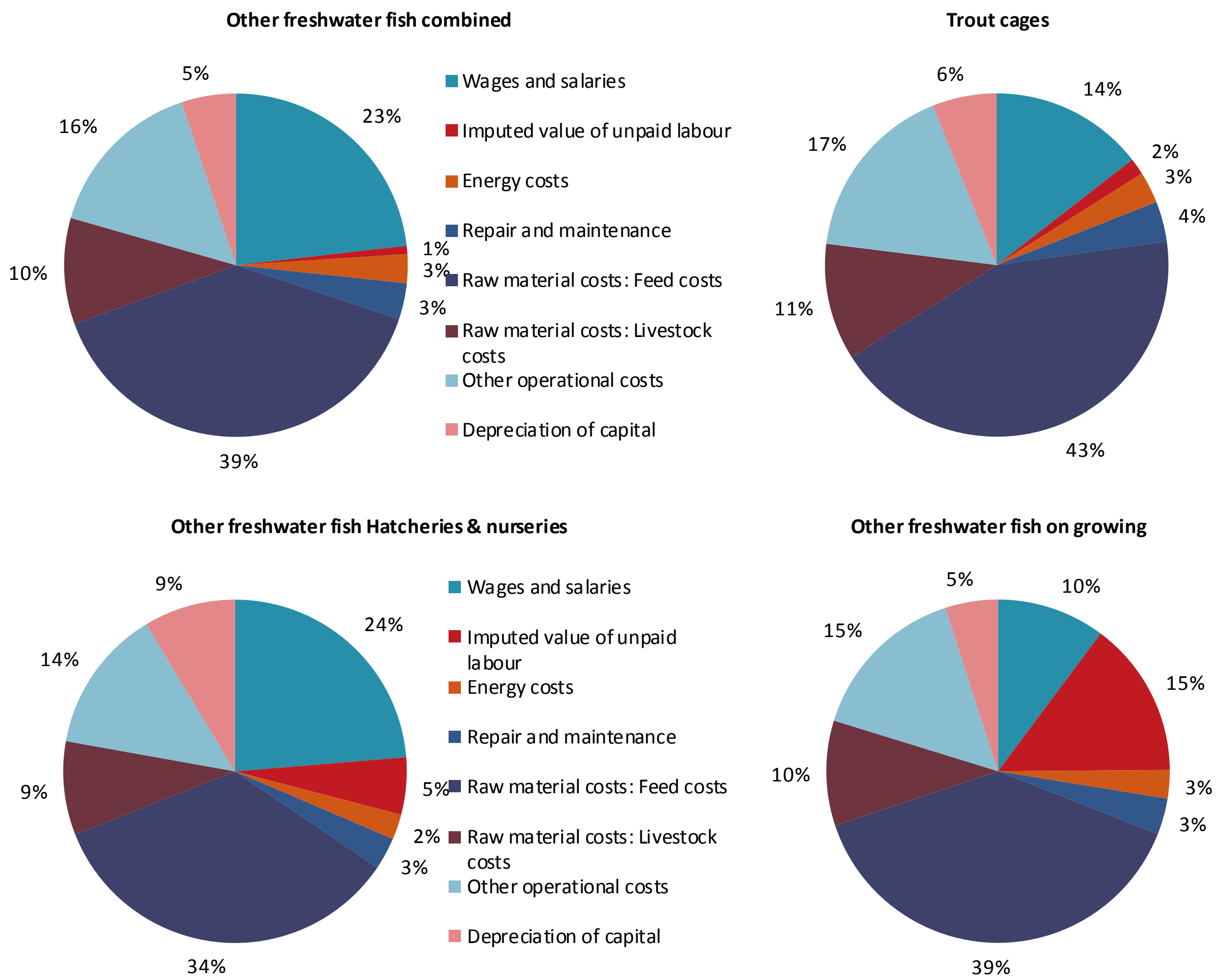


Figure 4.9.8 Cost structure of the main segments in Finland: 2012.

Source: EU Member States DCF data submission

The feed and livestock prices for the four Finnish segments are presented in the Figure 4.9.9. The graphs show that the livestock prices have been steady throughout the period being a little less than 8 Euros per kilogram for combined, cages and on growing segments. The price for hatcheries and nurseries has been around 47 Euros per kilo. However, the feed prices have more fluctuations and the highest prices can be seen in the hatcheries and nurseries segment, being 5 Euros/kg in 2012. For other segments, the feed price was around 1 Euros/kg in 2012.

Figure 4.9.9 Feed and livestock prices for the main Finnish segments: 2008-2012.

Source: EU Member States DCF data submission

4.9.6 Trends and triggers

Current production trends and main drivers

The Finnish aquaculture sector has been strongly affected by the environmental permit policy. Almost all aquaculture producers need to have an environmental permit in order to operate in the aquaculture sector. The main reason for introducing the environmental permit mechanism has been the desire to diminishing the nutrient load in the Baltic Sea. As marine production in cages has been economically very relevant, the environmental permit policy has affected the total production volumes and values of the Finnish aquaculture sector.

The Finnish environmental policy has thus been inhibiting the intensifying of the Finnish aquaculture production and consequently the sector has not been able to benefit from the economies of scale. The tight environmental permit policy has forced some of the Finnish aquaculture producers to move their production to the other side of the Gulf of Bothnia as the Swedish environmental regulation is more advantageous for the aquaculture production.

The Finnish government, in cooperation with the research institutes and the aquaculture industry, have been trying to reach a consensus in combining the interests of the industry with environmental goals. National spatial planning program aims to concentrate the aquaculture production in marine areas into bigger production units and to direct the production in areas where the use of marine areas can be optimally accommodated.

The Finnish environmental control system has enabled lowering the relative nutrient load by 70% in the recent 20 years. This reduction has been possible thanks to feed development, and developing new culturing techniques and selective breeding of fish.

Recirculating aquaculture systems have become more common in Finland in the recent years. With the current production volumes and expenditures of recirculating systems the production will need to be concentrated in the more valuable species.

Market structure

The Finnish aquaculture sector has been increasingly concentrated. The ten biggest companies of the sector made up around 64% of the total revenues in 2012. And the concentration seems to continue as existing companies are buying the environmental permits from the farms and companies phasing out. The international competitiveness of the Finnish aquaculture sector has worsened during the past years as the production volumes have been down due to decreases in the environmental permits issued. The companies have been afraid to invest as there is no guarantee of the future developments.

The competitiveness and performance of the sector is mostly connected to the price developments of fish, mainly rainbow trout and salmon, but also developments of the feed cost play an important role. The recent investments have been limited mostly to recirculating aquaculture systems.

Almost all aquaculture production in Finland is consumed in the domestic market and the demand for domestic aquaculture products is growing further. Only a few special products (fry and roe) are exported. Imports of aquaculture product account for about 40% of the total fish consumption in Finland. Aquaculture imports consist mostly of Norwegian salmon, Swedish rainbow trout, European whitefish and sea trout.

Issues of special interest

Finland has a national spatial planning program of aquaculture which takes into account the different uses of marine areas in order to direct the aquaculture production into areas where it is suitable for both the environment and the aquaculture industry. In this way, the environmental effects can be minimized together with creating possibilities for production growth and improving the profitability of the sector. Spatial planning plans are incorporated in the national aquaculture program of 2015.

An example of innovative method for combining environmental and industry interests in Finland is the net nutrient load system, a pilot project where the aquaculture producers get subsidies for organizing fish removal in order to remove nutrients by fishing economically worthless fish. In return, the fish farmers are given more permits for culturing. This system has enabled more fish being cultured while the net load of nutrients has remained unchanged.

Most recent investments have been made into recirculating aquaculture systems. However, the production capacity potential of recirculating aquaculture systems has not yet been fully fulfilled and there is an on-going process of research and development of new aquaculture techniques for Northern environments as well as continued testing for new species (eg. different applications of recirculating aquaculture systems). Also new industrial symbiosis has been developed, where aquaculture production makes use of other industrial production processes and vice versa.

Outlook for 2013 and 2014

The total food fish production was 13,600 tonnes and 56 million Euros in 2013. There was an increase in both, the value and volume of production, but the value increased significantly (by 11 million euros) thanks to advantageous price evolution of rainbow trout. These figures include all aquaculture fish production for human consumption in Finland, not only the production of the main activity companies. In addition to food fish, aquaculture produced fry totaling 54 million individuals, of different ages, both for stocking and further rearing.

The national program for aquaculture under the EMFF is under preparation. Finland aims to increase the aquaculture production sustainably and thus improve the self-sufficiency of Finland on fish products as well as strengthening the technological expertise of Finland in the aquaculture sector. This growth in aquaculture production should be done in such way that the environmental effects relative to the production are minimized. National spatial planning programs are expected to improve the operating conditions of the industry.

The administration of national environmental control system is being developed and reorganized in order to make the system more predictable to attract more investments in the sector. This could reduce the amount of aquaculture producers moving to abroad.

Recirculating aquaculture systems have become more common in Finland in the recent years. The recirculating systems have a great potential as the nutrient load can be easily managed while it is possible to maintain optimal culturing conditions all year round. However, high production costs as well as risks related to introducing new technologies impose challenges for this technology. Also transferring marine aquaculture production in big production units further to the open sea has potential for increasing the aquaculture production.

As the local food and bio food trends are becoming increasingly popular in Finland, it can also be expected that the demand for domestic fish is growing. There is a lot of knowledge and expertise in Finland on culturing and processing rainbow trout and the demand for this kind on expertise in Finland is growing.

The fish heath situation in Finland can be regarded as good. Healthy fish can also be regarded as a competitive advantage of Finland. Good situation of fish health have been attained by preventive actions; namely by using antibiotics, controlling the fish transfers and by effective fish health observation practices. As the health situation of Finnish cultured fish is good, it is possible to export both the cultured fish and the expertise on fish health.

4.9.7 Data Coverage and Data Quality

Data quality

Economic EU data collection of aquaculture sector in Finland combines information from different data sources. Main sources are a production survey of FGFRI, Structural Business Statistics of Statistic Finland (SF) and account survey conducted by FGFRI. Financial statements were available for all firms in Business Register having aquaculture as the main activity.

Primary sources of financial statements data in Statistics Finland are direct inquiries and business taxation material supplemented by Business Register data. Data is based on corporate balance sheets and profit and loss account data. Statistics Finland checks for the validity of the data. Any missing data was estimated within stratum. Account data was surveyed by FGFRI by stratified survey to detect the detailed cost structure of fish farms. Cost and earnings estimates were done by design-based and model assisted regression and ratio estimation. The cost variables were estimated with ratio estimation from financial statements. A production survey was collected exhaustively from the producers. Any missing information was estimated by stratum.

Differences in DCF data compared with other official data sources

The Finnish Game and Fisheries Institute provide the data on aquaculture for EUROSTAT and the DCF and thus the differences in the figure 4.9.10 are due to different estimation and classification practises of these organisations and different data needs. EUROSTAT data include all aquaculture production in Finland, including also production of companies that are not main activity producers whereas DCF data includes only those companies that have aquaculture as their main business activity. In addition, EUROSTAT data include only food fish production and no juvenile or fry production. Both fish produced for human consumption and fry are included in the DCF data. European white fish production in cages is reported as fresh water production in the EUROSTAT data, but it is reposted as marine production in the DCF data. In figure 4.9.10 the DCF data of production value is based on the turnover of aquaculture companies instead of the sales value of cultured fish and fry. The turnover can include other business activities and is not limited to the pure sales of aquaculture products produced by the company.

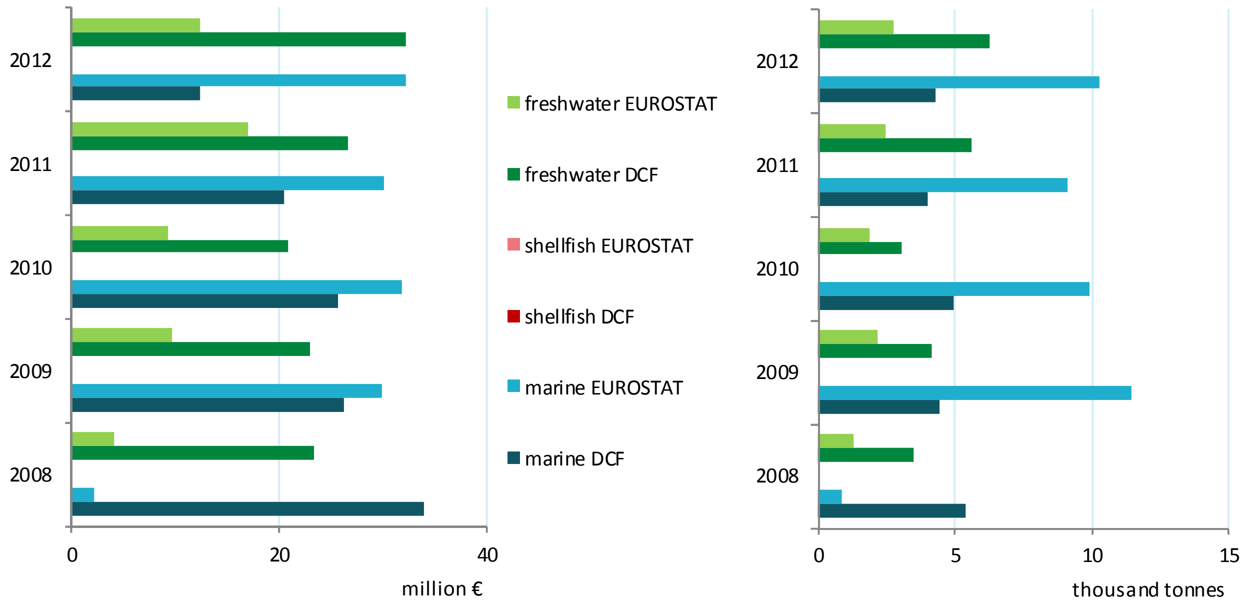


Figure 4.9.10 Comparison of DCF data with EUROSTAT data for Finland: 2008-2012

4.10 FRANCE

4.10.1 Summary

Production volume and value

The total output of the French aquaculture sector in 2012 is 268.7 thousand tonnes and 961.1 million Euros as turnover.

France is the second country for aquaculture production in Europe among other 4 main contributors: United Kingdom (first in value), Spain (first in volume), Greece, Italy. Estimated at 21% of the total in value for Europe, France is mainly contributing to mollusc's production (52% in value), especially in oysters (90%).

Overall industry structure and employment

The French aquaculture sector is largely dominated by bivalve molluscs farming. Shellfish farming is done nearly along all the French coasts. The most productive regions are: Poitou-Charentes, Bretagne, Basse-Normandie for oysters; Poitou-Charentes is more oriented toward sales at the latest stage for human consumption while Bretagne and Normandie are important for rearing at an intermediate stage, leading to important commercial exchange between regions. For mussels, regions come in this descending order: Bretagne, Méditerranée, Poitou-Charentes, Basse-Normandie. Freshwater fish farms are located in nearly all regions with a higher production in Aquitaine and Bretagne. For marine fish, farming is concentrated in some regions: Nord-Pas-de-Calais, Basse-Normandie, Provence-Alpes-Côte d'Azur and Corse.

The total number of aquaculture farms is 3,250 slightly decreasing compared to 2010-11. Table 4.10.2 shows an increase of the number of aquaculture farms compared to before 2010. This result is due to 4 new segments which are added since 2010 in the global statistics (cf. 4.10.7 Data coverage). Firms in these 4 segments are very heterogeneous and we do not have enough perspective to interpret economic indicators. Therefore no analysis will be made on these segments. In addition, accounting data couldn't be assed for seabass & seabream hatcheries. The 8 segments having a full economic data set over the last three years represent 91-93% of the overall turnover.

Main segments

The French aquaculture sector is largely dominated by bivalve molluscs farming. In weight, shellfish farming ranks first with a production of 230.1 thousand tonnes (86% of national total) and 802.4 million Euros for turnover (83%). The second group is the freshwater fish sector with 33.3 thousand tonnes (12%) and 105.9 million Euros (11%).

Pacific cupped oysters (*Crassostrea gigas*) sales nearly represent 48% of the whole aquaculture production in weight and 61% in value. Oysters are mainly produced in intertidal areas by elevated cultivation systems (bags on trestles – segment 8.3). In the Mediterranean, where oyster farming mostly takes place in lagoons, other techniques are used, mainly the culture on rope hung under tables; these farms are included in the oyster raft segment (segment 8.1). Their production reaches 9.3 thousand tonnes and 25.9 million Euros representing respectively 7% and 4% of all the oyster segments.

Two species of mussels are cultivated in France. Blue mussel (*Mytilus edulis*) and Mediterranean mussel (*Mytilus galloprovincialis*) represent 35% in weight, 18% in value of the whole aquaculture production. Mussel farming in the Channel and Atlantic coasts is almost all based on the blue mussel. The predominant cultivation system relies on fixed wooden poles (so-called "bouchot" technique) used in inter-tidal areas (segment 7.3). In the Mediterranean, mussels are cultivated in raft (segment 7.1), in fact on ropes suspended below large tables. The long line technique (segment 7.2) is being developed on open sea areas (Atlantic and Mediterranean). For some producers on the Atlantic coast, this technique is complementary to the "bouchot" technique. The long lines are used for catching spatfall and for a part of growing mussels. After 2 or 3 month, mussels are fixed on the "bouchot" in order to finish their growth. In this case, these companies are included in the mussel bottom segment (segment 7.3).

In freshwater fish farming, the main production results from the farming of rainbow trout for 96% and other salmonids (*brown trout* - *Salmo trutta* - for instance). The segments of trout are still the most important fish production sector in terms of sold volume (33.3 thousand tonnes, 86% of fish farming excluding pond farming) and value (105.9 million Euros, 67% of fish farming). The saltwater fish farming is a small sector in France. The sales volume of sea bass and sea bream is 3.6 thousand tons with a corresponding turnover of 25.5 million Euros, where production volume and value sharing between hatcheries and nurseries (segment 3.1), cages (segment 3.4) and land-based facilities.

It should be also highlighted the production of sturgeon caviar, even there were produced 17.2 tonnes from only 4 companies, it achieved a value of almost 10.4 million Euros (statistical survey 2012, DPMA). The sturgeon's activity also includes some companies that are rearing to maturity females and sell to caviar producers. Caviar production is a new activity and return on investment, due to a long life-cycle, is a limiting factor in the development of the sector.

Current production trends and main drivers

The sales decrease by 10% in weight during the last years is mainly due to production loss in shellfish sector with mortalities of oyster juveniles since 2008. Meanwhile, turnover became higher with an increase in unit price. For the fish sectors, a similar diminution in weight was not compensated for turnover by a price elevation.

Outlook

Production is not expected to increase significantly in the coming years. Mortalities of shellfish juveniles still occur and rearing cycle cover three years ; shellfish farmers may hopefully maintain their production with a stable price. For fish sectors, an increase of production needs to improve the feed aspects in term of efficiency and costs, needs to open new production sites.

4.10.2 Production and sales

The total output of the French aquaculture sector in 2012 is 268.7 thousand tonnes and 961.1 million Euros as turnover. From 2010-11 to 2012, the sales volume decreased by 10% but turnover increased by 8%. The diminution in weight was observed in all sectors while the sales value move upward for shellfish and downward for fish sectors.

Table 4.10.1 Production and sales for France: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2010-11)*
Sales weight (thousand tonnes)	***257.3***	***265.4***	***313.5***	***283.1***	***268.7***	*-5%*	*-10%*
Marine	6.0	4.5	5.5	6.0	5.0	*-16%*	*-13%*
Shellfish	210.3	218.0	267.5	240.7	230.1	*-4%*	*-9%*
Freshwater	40.8	42.7	40.4	36.1	33.3	*-8%*	*-13%*
Hatcheries & nurseries	0.2	0.2	0.1	0.3	0.3	*0%*	*52%*
Sales value (million €)	***810.0***	***760.1***	***881.9***	***898.5***	***961.1***	*7%*	*8%*
Marine	36.1	29.3	39.5	39.7	35.7	*-10%*	*-10%*
Shellfish	607.6	569.8	703.2	719.1	802.4	*12%*	*13%*
Freshwater	150.4	146.0	122.5	119.9	105.9	*-12%*	*-13%*
Hatcheries & nurseries	15.9	15.0	16.8	19.8	17.1	*-14%*	*-7%*

Source: EU Member States DCF data submission

4.10.3 Industry structure and employment

From 2010-11 to 2012, the number of enterprises decreased slightly from 3,300 to 3,250, evolution seen mainly in the fresh fish farming segments. Employment in the French aquaculture sector reach 18,600 persons for 10,600 full time equivalent jobs (FTE) with a slight decrease of 2%.

Table 4.10.2 Structure of the French aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2010-11)
Structure (number)							
Total enterprises	*2,864*	*2,986*	*3,300*	*3,290*	*3,249*	*-1%*	*-1%*
<=5 employees	2,221	2,277	2,495	2,558	2,513	*-2%*	*-1%*
6-10 employees	364	385	440	403	397	*-1%*	*-6%*
>10 employees	279	324	365	329	339	*3%*	*-2%*
Employment (number)							
Total employees	15,961	17,464	19,608	18,522	18,640	*1%*	*-2%*
Male employees	10,250	11,240	12,735	12,199	12,339	*1%*	*-1%*
Female employees	5,711	6,224	6,873	6,323	6,301	*0%*	*-5%*
FTE	9,061	9,536	11,016	10,658	10,581	*-1%*	*-2%*
Male FTE	6,503	6,887	7,964	7,788	7,719	*-1%*	*-2%*
Female FTE	2,558	2,649	3,052	2,871	2,862	*0%*	*-3%*
Indicators							
FTE per enterprise	3.2	3.2	3.3	3.2	3.3	*1%*	*-1%*
Average wage (thousand €)			23.4	24.8	23.7	*-4%*	*-1%*
Labour productivity (thousand €)			44.4	40.4	49.4	*22%*	*17%*

Source: EU Member States DCF data submission

The shellfish sector account for 2,914 companies (90% of the national total), mainly small scale and family structures (66%). They employ around 17,000 jobs representing 9,150 full time equivalent jobs (FTE) as seasonal jobs are quite important. During the latest years, the number of companies was decreasing slightly but this sector had 3,750 enterprises in 2002. In addition, if the tasks in the leaseholds are carried out by the majority of men, the work in the establishment (packaging, orders, billing ...) is rather feminine.

The number of freshwater fish farming companies is 308 in 2012, 45% being small scale or family structures ; the employment account for 1,210 jobs, corresponding to 942 FTE. In spite of being a pioneer in the early eighties, the French sea-water fish farming has remained a small sector with only 27 companies in 2012, including hatcheries of seabass and seabream. The total employees are 525 corresponding to 488 FTE. The national statistical survey doesn't cover the companies and employment of freshwater fish farming in ponds.

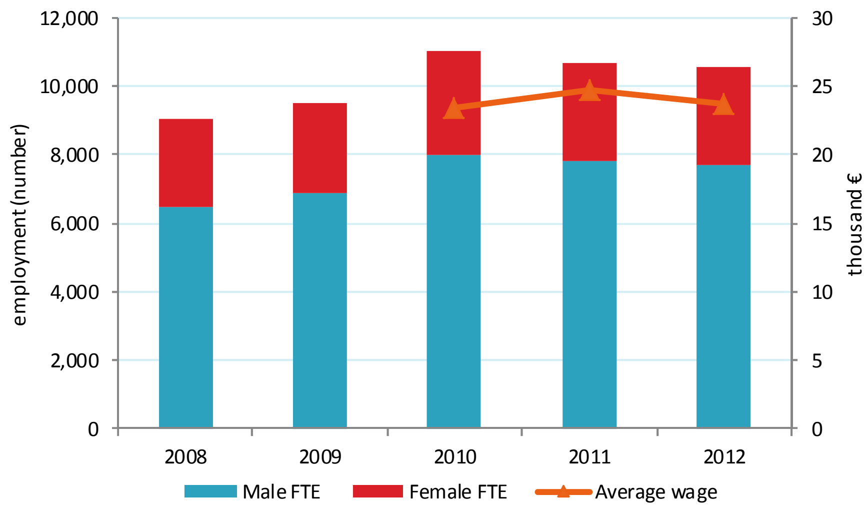


Figure 4.10.1 Employment trends for France: 2008-2012.

Source: EU Member States DCF data submission

Average wage and value of unpaid labour per FTE remain stable in 2012. Labour productivity increased by 17%, reaching 42% for marine fish in cages segment, mainly due to a higher GVA as employment is nearly stable.

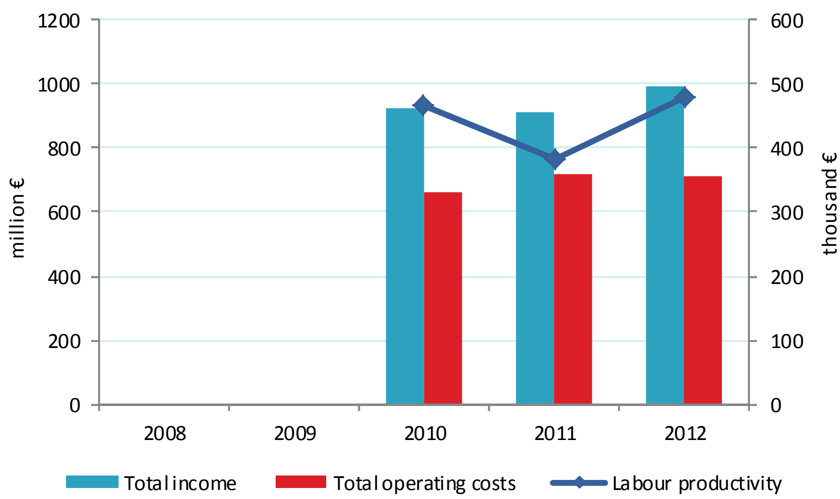


Figure 4.10.2 Income, costs, wages and labour productivity trends for France: 2008-2012.

Source: EU Member States DCF data submission

4.10.4 Economic performance

Economic parameters from 2010 to 2012 do not correspond to all 14 segments, but to the 8 ones where all economic indicators are available for these three years. These 8 segments correspond to 91-93% of the total turnover or the total sales volume. In addition, shellfish farming sector represent 83% of the total turnover in aquaculture, so economic performance is largely influenced by the results of this sector.

Table 4.10.3 Economic performance of the French aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	*% of total income*	Change 2012-11	Development 2012/(2010-11)*
Income (million €)								
Turnover			808.8	816.5	891.4	*92%*	*9%*	*10%*
Other income			50.6	36.7	52.7	*5%*	*43%*	*21%*
Subsidies			45.0	35.1	27.9	*3%*	*-20%*	*-30%*
Total income			*904.5*	*888.4*	*972.0*	*100%*	*9%*	*8%*
Expenditures (million €)								
Wages and salaries			138.1	130.8	129.1	*13%*	*-1%*	*-4%*
Imputed value of unpaid labour			102.2	111.4	101.9	*10%*	*-9%*	*-5%*
Energy costs			22.3	24.7	26.8	*3%*	*8%*	*14%*
Repair and maintenance			25.9	24.7	23.9	*2%*	*-3%*	*-6%*
Raw material: Feed costs			56.5	67.9	61.2	*6%*	*-10%*	*-2%*
Raw material: Livestock costs			203.2	215.6	215.9	*22%*	*0%*	*3%*
Other operational costs			96.8	128.0	131.3	*14%*	*3%*	*17%*
Total operating costs			*645.2*	*703.2*	*690.1*	*71%*	*-2%*	*2%*
Capital Costs (million €)								
Depreciation of capital			85.5	80.9	184.0	*19%*	*128%*	*121%*
Financial costs, net			8.5	31.0	33.1	*3%*	*7%*	*67%*
Extraordinary costs, net			2.2	2.2	2.8	*0%*	*26%*	*27%*
Capital Value (million €)								
Total value of assets			1082.4	1068.7	1083.1	*111%*	*1%*	*1%*
Net Investments			65.8	80.6	64.8	*7%*	*-20%*	*-12%*
Debt			701.8	671.0	687.9	*71%*	*3%*	*0%*
Input & Production (thousand tonnes)								
Raw material: Feed			56.4	61.3	54.1		*-12%*	*-8%*
Raw material: Livestock			81.8	88.5	66.2		*-25%*	*-22%*
Performance Indicators(million €)								
Gross Value Added			454.6	392.3	485.1	*50%*	*24%*	*15%*
Operating cash flow			259.3	185.1	281.9	*29%*	*52%*	*27%*
Earning before interest and tax			173.8	104.2	97.9	*10%*	*-6%*	*-30%*
Net profit			165.3	73.3	64.8	*7%*	*-12%*	*-46%*
Capital productivity (%)			42	37	45			
Return on Investment (%)			16	10	9			
Future Expectation Indicator (%)			-2	0	-11			

Source: EU Member States DCF data submission

For these 8 segments, turnover and total income increased by 8-10% from 2010-11 to 2012, reaching respectively 891.4 and 972.0 million Euros while the total operating costs was relatively stable.

All aquaculture sectors made a positive net profit and had a positive EBIT in 2012 as in 2010 after these parameters became negative in 2011 for freshwater farming sector. However, the overall net profit decreased by 46% in 2012 compared to 2010-11 while EBIT had a similar evolution of 30%.

The ratio of net profit to the total income diminished from 2010 to 2012, reaching 7%. The number of segments having this parameter greater than 15% changed from 5 to 2.

Wages and value of unpaid labour represent 33% of the total operating cost (TOC), 36% in the shellfish sector for which techniques need more manipulation of animals. Livestock costs represent 31% of the TOC: 37% in the shellfish sector, 6% in fish sectors where feed costs represent around 50% of the TOC.

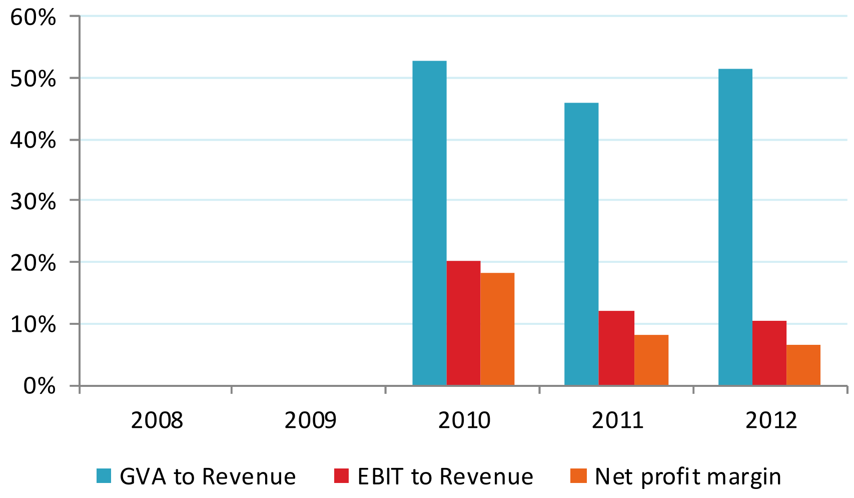


Figure 4.10.3 Economic performance for France: 2008-2012

Source: EU Member States DCF data submission

4.10.5 Main species produced and economic performance by segment

In 2012, the French aquaculture sector reached an overall sale of 268.7 thousand tonnes for a value of 961.1 million Euros, including transaction of juveniles or intermediate aged animals. Main species are pacific cupped oyster, blue and Mediterranean mussel, rainbow trout representing 95% of the national total in weight, 90% in value.

Figure 4.10.4 Main species in terms of weight and value in France production: 2012.

Source: EU Member States DCF data submission

The price is given as a global indicator as volumes and values combine sales of juveniles (except for marine hatcheries & nurseries), young adults sold to other aquaculture farms, adult sold to human consumption.

Price for mussels and rainbow trout are quite stable since 2008. After an increasing price from 2008 to 2010, price for sea bass decreased by 10% in 2011 and 2012.

For pacific cupped oyster, after stability for some years before 2011, the price increased by 20% in 2011 then 24% again in 2012. This is an effect of the decreasing production sales due to mortalities of juveniles since 2008. The price of oysters seems to have reached an upper limit for the consumer market.

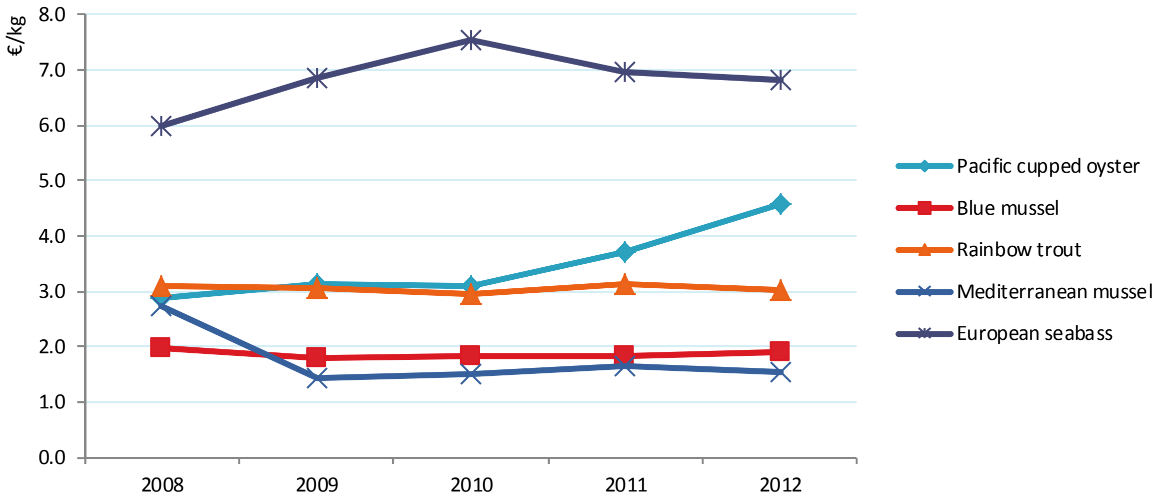


Figure 4.10.5 Average prices for the main species produced in France: 2008-2012.

Source: EU Member States DCF data submission

The most relevant segments in the French aquaculture are Oyster bottom (segment 1), Mussel bottom (segment 2), Trout on growing (segment 3) and Trout combined (segment 4). They represent together around 80% of the total aquaculture in terms of turnover (81%), sales volume (80%), and employment (77%).

Segment 1: Oyster bottom

Companies in this segment are very heterogeneous (i.e. in terms of size, turnover, etc.), and they have different strategies of production. Some of them focus on one stage of production (short cycle) instead of achieving the whole rearing cycle. The spat is supplied either by wild spat (produced by the farmers themselves thanks to collectors of different kinds in the regions located at the South of Loire, or purchased to these farmers by others), or spat produced in hatcheries, or both. In response of mortalities of spat, hatcheries select and produce more resistant diploid or triploid spats. The production of triploids spat is dominant. If the cost of the seed is higher than the wild seed, the growth of these oysters is faster (shorter production cycle) and rotation of stock is higher. It exists also a last phase of oyster production, the refining ("affinage") of oyster. This additional process, which consists in ending the rearing of oysters by a temporary immersion in marshland ponds (“claires”), provides a significant added-value to the final product. Only the oyster farms of Charente Maritime and Vendée practice this process

The segment consists of 1 963 enterprises and around 6 000 FTE. The sales production volume was 118 367 tones with a corresponding turnover of 546 million euro. The production volume accounts for 44% and the value accounts for 57% of the total French production.

Since 2008, the French oyster industry is facing to mortalities of spat (shellfish less than one year) in pacific cupped oysters: between 60 and 90% mortalities in all breeding sites. The research shows that OsHV1 µvar virus plays an important role in explaining mortality and is clearly associated with bacteria of the genus Vibrio splendidus. The respective role of these agents remains to be determined. To cope with these mortalities, several strategies are lead. Companies have increased the number of spat collectors and their purchase of juveniles in the hatcheries. They have also reduced the number of jobs in their companies. Considering it takes 3 years to produce an oyster, the impact of these mortalities on the economic performance will be measured in 2012 and following years. To cope with mortalities of spat, oyster farmers have increased the quantities of natural and hatchery spat in theirs leaseholds. Firms have received subsidies in order to purchase these spat. The consequence is the augmentation of the value of the livestock. In 2012, the enterprises have resumed their investments. Investments in spat and materiel explain the progression of the total value assets (figure 4.10.6). Turnover to total income ratio reach 93% and profitability was rated 9% in 2012 (-1 point/2010).

Segment 2: Mussel bottom

The second most important segment is the mussel bottom and consists of 334 firms and 1200 FTE in 2012. For the second consecutive year, the production of mussel is decreasing. This decline in 2011 was due to unfavourable weather causing a deficit of production and poor quality of mussels. The deficit comes also from the resurgence of predators (sea-star) in some areas of production (Channel and Atlantic coasts). In 2012, the diminution of production, as reported for DCF, was mainly observed in exchange between enterprises while sales for human consumption tended to increase.

In 2012, the sales production volume is 64 380 tons with corresponding turnover of 129 million euro. This cultivation represents 83% of the value of French mussel turnover and 82% of the weight. Due to the slump in sales, the performance measures (Table 4.10.4) indicates decline between 2010 and 2012 in terms of gross value added (-14%), earning before interest and tax (-66%) and net profit (-79%).

Segment 3: Trout on growing

For the trout segments, beside the population of companies having a commercial status that are reported here, France have around 80 enterprises with a non commercial status (association, federal fish farms): generally of small size that produce essentially young fish for the restocking of rivers and don't have a real economic activity. There is a wide range of commercial companies from small businesses that produce less than 10 tonnes of fish per year and some big companies whose annual production exceeds 1,000 tonnes. Small producers focus on local niche markets (sell live fish to stock ponds or river or for sports fishing) whereas medium and large companies are able to offer regularly sufficient quantities to supermarket chains. But they must face pressure from supermarkets, wholesalers and processing industries on prices. The latest years, the low price per kilo of trout and its stagnation, the increase of feed cost limit margins and profitability of the activity. Large scale production has the capacity to support on-going technological development and improved productivity.

The third segment, trout on growing, is 24 761 tonnes bringing about a total turnover of 72 million euro. It represents 74% of the whole trout aquaculture in weight and 68% in value. This segment accounts 208 enterprises for 622 FTE or 66% of the total trout FTE. The economic situation in this segment had developed unfavourably. From Figure 4.10.6, it can be seen that the turnover (-14.6%), sales volume (-14.8%), the total value of assets (-31%)and the total number of FTE (-10%) are decreasing between 2010 and 2012. It was also proportionally the lesser performer in operating cash flow (7% of the income) and net profit (1%). Currently, the equipment and investments are little renewed. The level of depreciation of capital and total asset are the lowest since 2010. With a better income and lesser operating costs in 2012, earning before interest and tax, net profit became positive (figure 4.10.7).

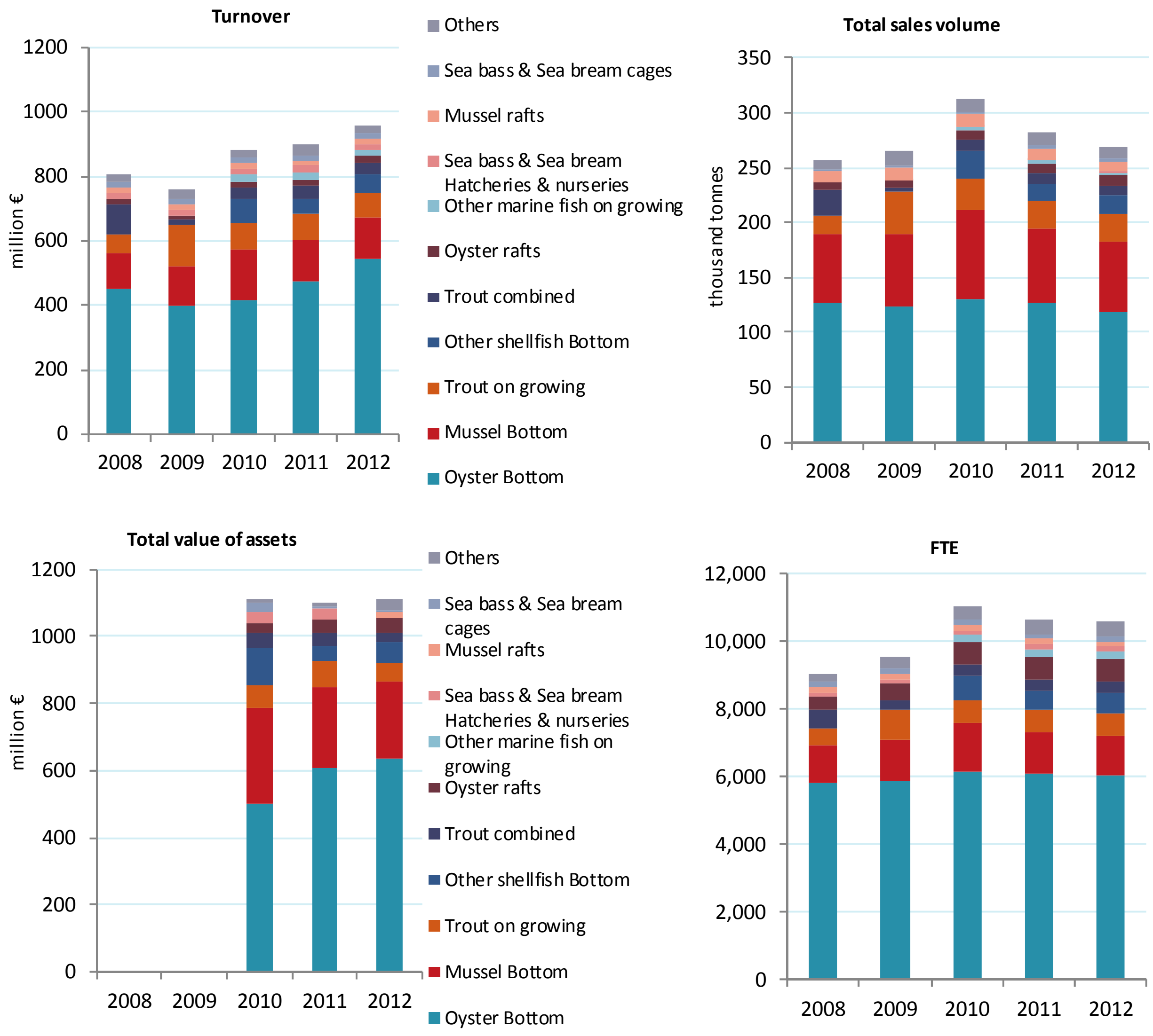


Figure 4.10.6 Structural development of French aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

Segment 4: Trout combined

The trout combined activities complete the global trout production with a turnover of 33.3 million Euros and a sale volume of 8 569 tons in 2012. The last segment is trout combined with 8 569 tonnes in 2012 with a corresponding turnover of 33,3 million euro. The segment consists of 100 firms and 320 FTE. The same decreasing trend as in the trout on growing segment is observed regarding employment (-3%), turnover (-15.8%) and total sales production (-21%). The enterprises in this segment remain profitable but net profit is declining.

Table 4.10.4 Economic performance of main French aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	*% of total income*	Change 2012/11	Development 2012/(2010-11)*
Oyster Bottom								
Total income			*468.0*	*523.8*	*589.6*	*100%*	*13%*	*19%*
Gross Value Added			*203.2*	*227.0*	*289.2*	*49%*	*27%*	*34%*
Operating cash flow			*100.1*	*114.0*	*173.1*	*29%*	*52%*	*62%*
Earning before interest and tax			*58.9*	*70.5*	*68.6*	*12%*	*-3%*	*6%*
Net profit			*53.7*	*53.8*	*51.5*	*9%*	*-4%*	*-4%*
Total sales volume (thousand tonr	*127.3*	*123.9*	*129.5*	*126.9*	*118.4*		*-7%*	*-8%*
Mussel Bottom								
Total income			*176.8*	*137.4*	*135.6*	*100%*	*-1%*	*-14%*
Gross Value Added			*138.2*	*96.1*	*100.7*	*74%*	*5%*	*-14%*
Operating cash flow			*89.8*	*53.2*	*61.4*	*45%*	*15%*	*-14%*
Earning before interest and tax			*65.6*	*31.1*	*16.6*	*12%*	*-47%*	*-66%*
Net profit			*63.1*	*24.3*	*9.1*	*7%*	*-63%*	*-79%*
Total sales volume (thousand tonr	*61.9*	*65.8*	*81.5*	*67.9*	*64.4*		*-5%*	*-14%*
Trout on growing								
Total income			*83.8*	*86.4*	*87.4*	*100%*	*1%*	*3%*
Gross Value Added			*20.5*	*10.2*	*20.4*	*23%*	*100%*	*33%*
Operating cash flow			*7.7*	*-5.8*	*5.7*	*7%*	*199%*	*498%*
Earning before interest and tax			*4.8*	*-10.0*	*2.5*	*3%*	*125%*	*198%*
Net profit			*4.1*	*-12.6*	*1.2*	*1%*	*109%*	*127%*
Total sales volume (thousand tonr	*17.5*	*38.4*	*29.1*	*25.3*	*24.8*		*-2%*	*-9%*
Trout combined								
Total income			*39.1*	*40.3*	*37.7*	*100%*	*-7%*	*-5%*
Gross Value Added			*17.1*	*16.2*	*14.2*	*38%*	*-13%*	*-15%*
Operating cash flow			*5.1*	*6.4*	*6.4*	*17%*	*0%*	*12%*
Earning before interest and tax			*2.3*	*3.8*	*4.7*	*13%*	*25%*	*54%*
Net profit			*2.2*	*3.0*	*1.8*	*5%*	*-41%*	*-32%*
Total sales volume (thousand tonr	*23.3*	*4.3*	*11.3*	*10.9*	*8.6*		*-21%*	*-23%*

Source: EU Member States DCF data submission

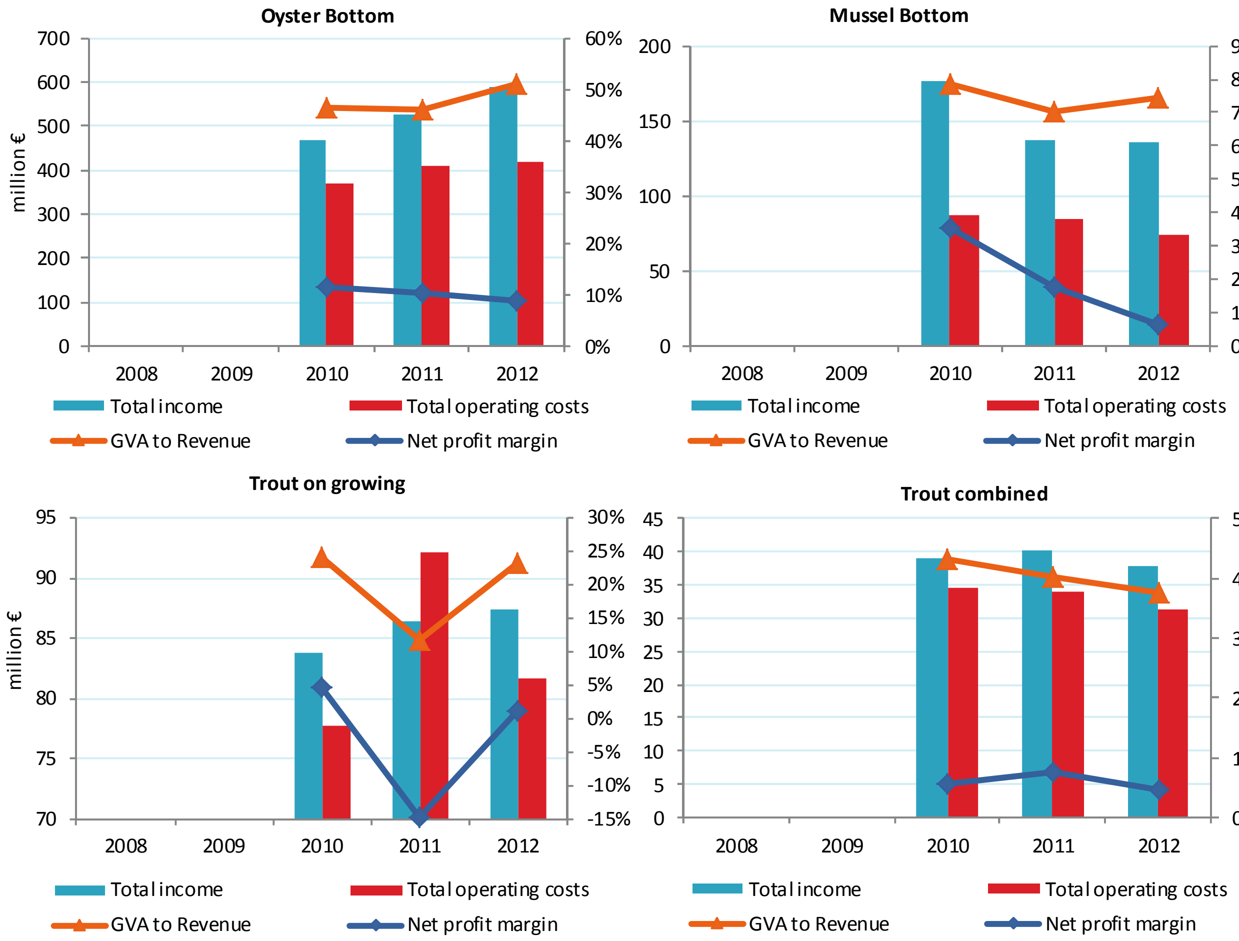


Figure 4.10.7 Economic performance indicators for the main French segments: 2008-2012.

Source: EU Member States DCF data submission

In Figure 4.10.8, the operational cost structures for the four French segments are presented.

Segment 1: Oyster bottom

Livestock is the main cost (33% of the total: operating costs and depreciation of capital) as there are exchange of oysters between regions to improve shellfish growth, to supply adults to farmers specialized in "affinage" process. The important demand of spat and the increase in prices spat (natural and hatchery - figure 4.10.9) cause an increase of 9% of the cost of the livestock between 2010 and 2012. Wages and value of unpaid labour is a high cost (27% of the total costs), depreciation of capital was rated to 10% as in 2010. Despite the mortalities, enterprises seem to be more optimistic and invest again in 2012. The weight of the depreciation of capital increased from 10 to 20% of the total costs. The amounts of the investments were multiplied by 2.4 between 2011 and 2012.

Segment 2: Mussel bottom

The most important operational cost items are wages and salaries and the imputed value of unpaid labour, which are higher than the operating costs. Investments are important for this activity and increased in 2012 by 100%. That is why the depreciation of capital item attains 38% of the total: operating costs and depreciation of capita. In the case of mussel farming, the spat supply is exclusively on wild source, so the livestock costs are very limited (4%).

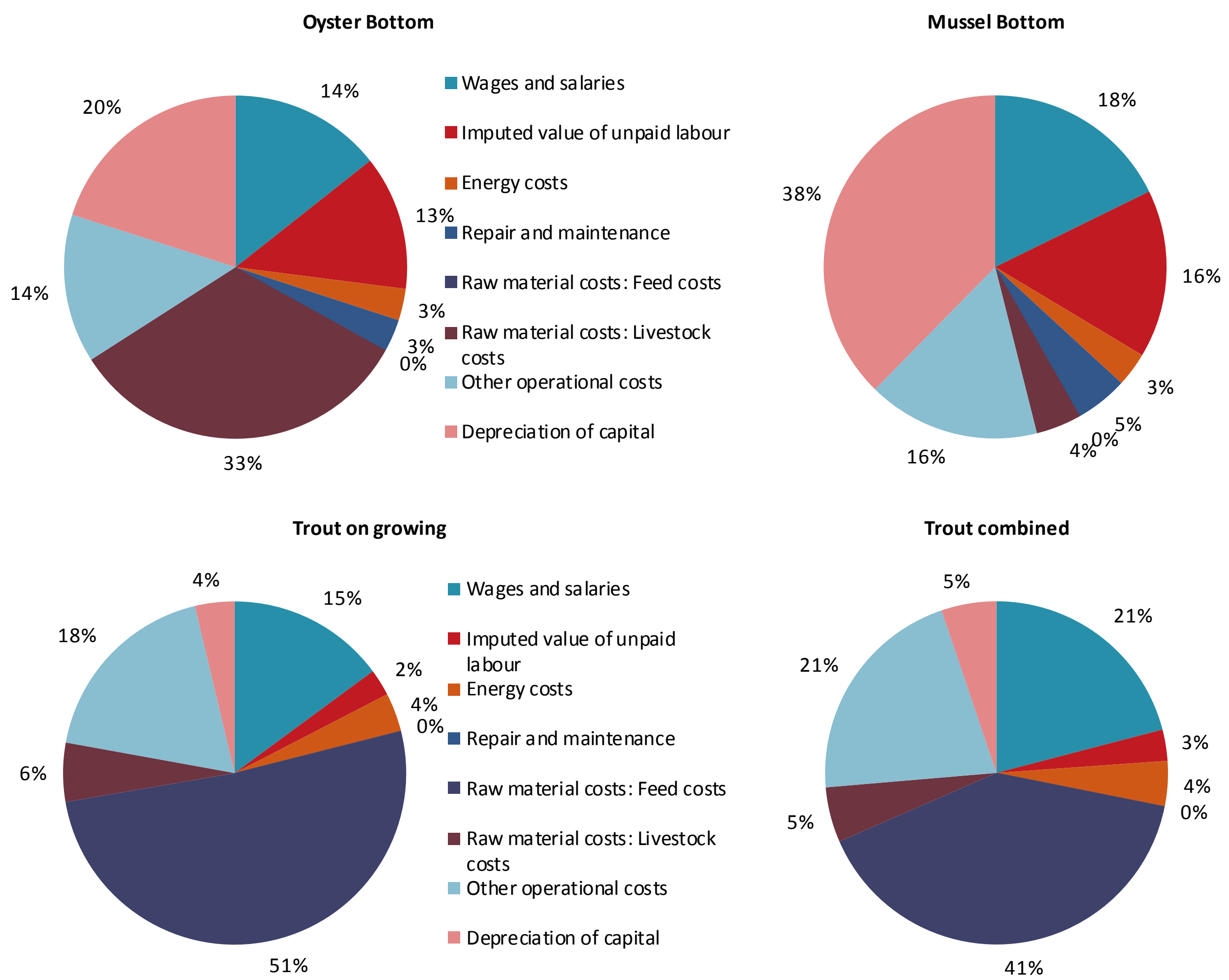


Figure 4.10.8 Cost structure of the main segments in France: 2012.

Source: EU Member States DCF data submission

Segment 3: Trout on growing

The trout on growing segment show the traditional cost composition for freshwater aquaculture industry, where the main cost components are feed which covers 51% of the total operational costs. Anticipating the augmentation of price, firms had purchased and stocked more feed in 2011. Feed volume and feed costs decreased respectively by 9% and 10%.

Segment 4: Trout combined

As these farmers have to feed their juveniles, also the adults that they are rearing up for their own production, feed costs is also high (41% of the total: operational costs and depreciation of capital) while livestock costs are low. The second and third operational cost items are the depreciation of capital and wages and salaries.

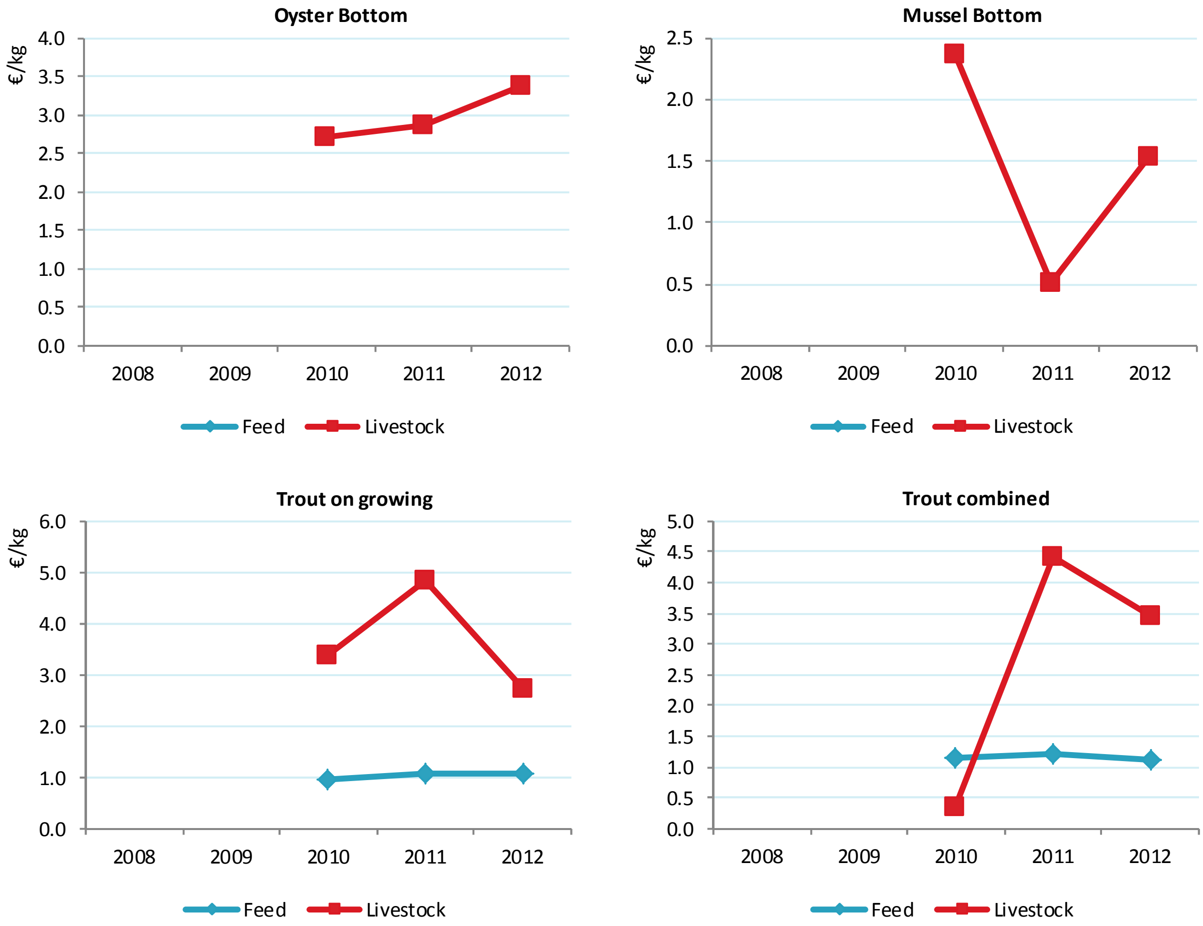


Figure 4.10.9 Feed and livestock prices for the main French segments: 2008-2012.

Source: EU Member States DCF data submission

4.10.6 Trends and triggers

Current production trends and main drivers

In the oyster sector, since 2008, the mortalities of spat has impacted noticeably the production. The main concern of oyster farmers is to maintain profitability. This expected level of requirement leads oyster farmers to keep an adequate level of livestock through the number of spat collectors and their purchase in the hatcheries. The situation is more difficult for professionals with no leasehold, the livestock costs item carry weight. The control of stocks in breeding and in particular for the supply of spat is still a major issue. French State made a commitment in the research for runways of release of crisis. One of these approaches appears to be genetic selection to identify resistant oysters. Research results will not be available before 2015.

Although 2011 and 2012 are characterized by a decrease of the quantities, the mussel production is in regular progress on the whole decade, due to the contributions of the off-shore techniques.

The freshwater production has shown a downward trend of production over the years, the number of firms and employment decreased (365 units to 308 from 2007 to 2012). Total production has declined compared to the production of 1995, due to a non-competitive production cost, of volatile global prices and the difficulties with installing or expansion encountered (conflicts of uses, binding regulations, strong competition from other imported fish, etc.). Developing for a sustainable production is done with the respect of constraints related to the Water Framework Directive (WFD), the Water Act at national level, sanitary regulations.

In all sectors, rising up the production of aquaculture will benefit from increasing the number of farming sites. This will be made easier by simplifying the administrative procedures for aquaculture authorisation, by a better integration of aquaculture activities in the regional development planning.

Market structure

The reduction of oyster quantities leads modifications on market structure. Price of ongrowing and adult oysters continue to increase in 2012 and 2013 between oyster farmers and on the different markets (sell-through, retail-chains, exportation). In 2012, France exported 7 488 tons of oysters and imported 4 478 tons, what released a 30 million euro credit balance. The exchanges of oysters are marginal compared with the production which allows to answer the domestic demand. The challenge to increase the quantities produced oysters limit development prospects of exports.

French mussel production is not adequate to meet the national demand. The imports of mussels (54 458 tons in 2012) mainly, from Chile, Netherlands and Spain exceed widely the exports (2 916 tons) revealing a 70.4 million euro trade deficit. 33% meadows of the imports of mussels concern frozen mussel or in can.

For fifteen years, the marine fish sees its production stagnate or decline, even though more than 80% of fish consumed is imported. A forty companies are involved in marine finfish aquaculture (including hatcheries), on 50 sites along the Atlantic and Mediterranean coasts, but the sector is now very focused on less than a dozen of the companies that realize the three quarters of sales. The freshwater sector is facing to difficulties market and environmental constraints. This results in particular a growing number of requirements related to the evolution of the market demand, economic competitiveness, quality of management of the environment and the social acceptability of production methods. Ensure the necessary development of the French fish also becomes more complex in the context of globalized trade of aquatic products. French products are in competition with foreign domestic productions where natural conditions, social and environmental standards are more advantageous.

Issues of special interest

The oyster mortalities lead to intensify the French research on the development of resistant oysters. This research is conducted by public institutions (including the Ifremer) and by the French private hatcheries.

Since May 2013, “Moules de Bouchot” are a protected name. It’s the first French product to obtain the Traditional Speciality Guaranteed (TSG) designation, because they are produced according to a traditional production method. With the introduction of a TSG, mussel farmers wish to boost their revenues. It will also increase the market value of the products of economic operators, by guaranteeing that they are distinguishable from other similar products.

The quality of the water remains crucial for the development of aquaculture.

Outlook for 2013 and 2014

In the oyster sector, the situation of mortalities of spat is continuing on 2012 and 2014. The supply of spat and the management of the stock remains a crucial issue.

In 2014, a high mortality of mussels have been located in production areas located in the West of France (Pertuis Breton). The mortalities have reached up to 100% on the long line and 50-80% of the “bouchot” cultivation system. A first estimate envisages a loss of 12 000 tons of mussels. The causes of these mortalities are yet to be established. Three domain of research are currently privileged: pathological, environmental and physiological. Nowadays, a suspicious amount of *Vibrio Splendidus* was detected. For professionals impacted, financial difficulties are anticipated (slump in sales) while cleaning of leaseholds (remove the mussels) causes significant costs.

In 2013 and 2014, due to the increase of feed costs and the foreign competition, the low price of trout will not rise. Margins and profitability of fish farmers should not improve.

4.10.7 Data Coverage and Data Quality

Data quality

In 2010, DPMA with LEMNA, an economy laboratory from Nantes University, have set up a working group with 2 subgroups: shellfish farming, fish farming. Each subgroup has clarified how production data should be used to determine the membership of each enterprise to a particular DCF segment as no precise recommendation was found in the DCF regulation, especially on species level for shellfish. To improve the accuracy of sampling, the subgroup defined the stratification to be applied within each segment. The subgroups had also to characterize more precisely the content of each economic indicator.

For shellfish farming, the subgroup involves two enterprise accounts management centres that transmit economic data, on anonymous basis, from a sample of the accounting records of enterprises that they follow. To determine the membership of an enterprise to a segment and stratum, to give full detailed economic data, these centres collect additional data to the standard accounting records.

The planned sample rate is 15% overall (from 11% to 20%) and could be realised for the main segments. Apart from production and employment, economic data couldn't be transmitted for some segments in 2012: mussels and other shellfish on long line. Two segments with full data set were added: mussel and other shellfish on raft with a low sampling rate, leading to high CV’s. Enterprises in these segments are located on Mediterranean coast where the enterprise accounts management centres have just started to collect the additional data needed for our economic collection. In addition, many enterprises are individual units and don’t have accounting records.

For year 2012, the socioeconomic data of 424 enterprises in the shellfish farms segments was collected (274 in 2010) representing 14.5% of the population. The main segments had an appropriate sampling rate, giving a good precision.

The socioeconomic data of 7 enterprises in the marine fish segments was collected, covering the sea bass and sea bream segments. The achieved sampling rate low for the cage segment (25%) representing a limited population of 15 enterprises with a high variation from small farms to very important ones, giving a poor precision. Due to restructuration for one big size enterprise, the very small population (5 units) of the sea bass – sea bream hatcheries & nurseries segments couldn’t be assed properly for 2012.

The socioeconomic data of 47 enterprises in the trout segments was collected for year 2012, representing 15% of the population. As these segments show a high variation from small farms to very important ones, this sampling rate give a medium precision for economic data.

Data availability

The comparison between 2008-2009 and 2010-2012 is not possible due to the addition of 4 new segments which are added since 2010 in the global statistic: "other marine fish on growing" (segment 6.2) is a mix of few but very different fish farms; "other shellfish rafts" (segment 10.1), "other shellfish long line"(segment 10.2), and "other shellfish bottom" (segment 10.3), merge firms which produce jointly oyster and mussel.

Decision to consider shellfish farms in “oysters” or “mussels” segments is based on the turnover ratio of one of these species group to the overall turnover; otherwise the firm is included in “other shellfish”. Since

2010, this minimum ratio was fixed to 60% of the total turnover but segmentation was not updated for years 2008 and 2009 to respect this level.

Economic parameters (turnover, subsidies, other income, total income, wages and salaries, imputed value of unpaid labour, energy costs, raw material costs: livestock costs, raw material costs: feed costs, repair and maintenance, other operational costs, depreciation of capital, financial costs net, extraordinary costs net, total value of assets, net investments, debt, raw material volume: livestock, raw material volume: feed) are not available for all segments, but the main ones. These economic parameters are available for 9 segments corresponding to 93 % of the total turnover in 2010-11, for 10 segments in 2012 as France could add costs data set for 2 segments. For the period 2010 to 2012, 8 segments have a full data set, representing 91-93% of the national turnover. Therefore, even if total data is presented for the whole French aquaculture sector, economic indicators have been calculated only using data for these main indicators where all economic data was available.

Confidentiality

Production data (in weight and value) are assed via an exhaustive survey realised by the statistical service of French fisheries organisation. This survey is registered to the national committee for statistical information and must follow rules for statistical confidentiality: published results aggregated from a minimum of 3 enterprises and one unit doesn't represent more than 85% of the group total.

As part of the DCF data rely on production, segments defined by France try to follow this rule, by example: “Other marine fish” segment is a mix of some enterprises quite different one to another in size and grown species.

But some situation of statistical confidentiality may still occur when data within segment are disaggregated, by example: number of enterprise by employment size.

Differences in DCF data compared with other official data sources

In application of regulation EC 762/2008 of the European Parliament and of the Council, France is reporting every year the production in volume and unit price to Eurostat with a copy to FAO statistics unit. The production concerns mainly the adult animals which are sold for human consumption in general, for river restocking or recreational fishing additionally in the case of fresh water farming. These numbers don't take in account the commercial activity between farmers for livestock exchange at intermediate growth stages, including shellfish spat collected from sea.

Economic data transmitted in the DCF program are reporting in one hand the whole sales (in volume and turnover) from the enterprises: adults products sold for human consumption or river restocking for fresh water fish, animals (adults or juveniles from nurseries or shellfish spat) sold from one farm to another one which will carry on subsequent rearing up. In another hand, economic data include livestock bought (in volume and cost) by enterprises from other farmers.

The ratio livestock costs on sales turnover is 27% in shellfish farming (mainly oyster segments representing 61% of the overall turnover) and 6% in fish farming (mainly trout segments).

This explains the main difference between Eurostat production data and DCF turnover figures.

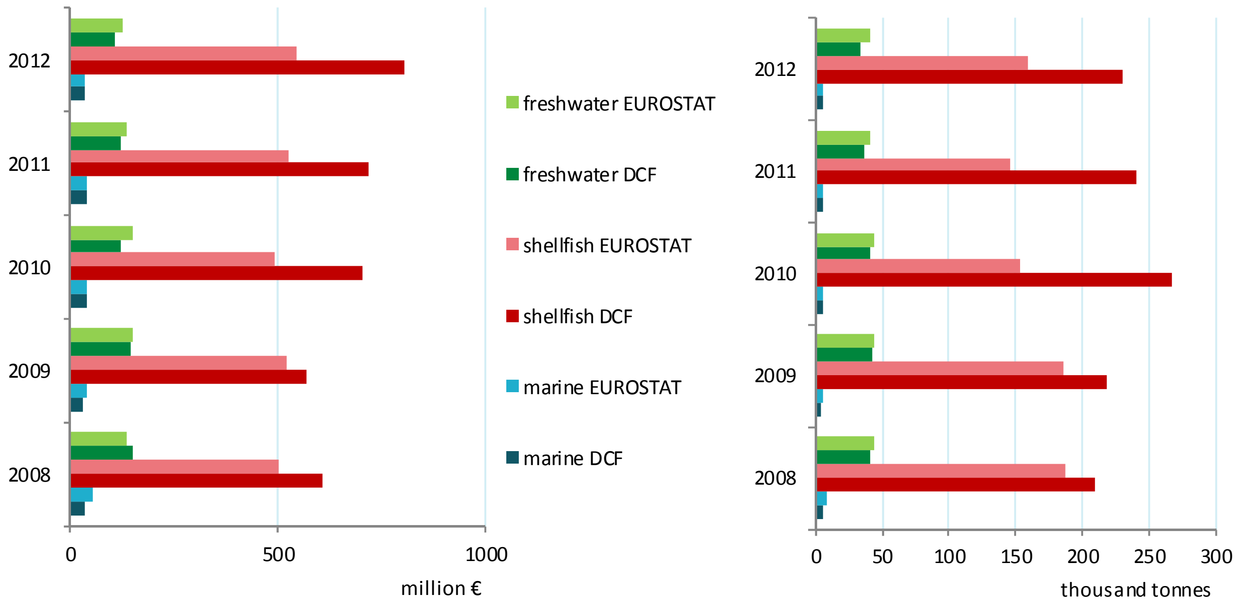


Figure 4.10.10 Comparison of DCF data with EUROSTAT data for France: 2008-2012

4.11 GERMANY

4.11.1 Summary

Production volume and value

In total, the German aquaculture sector produced 26,600 tonnes in 2012, which means a huge decrease compared to 39,200 tonnes in 2011. This is mainly due to an enormous decrease in blue mussel production. Production of Fish from freshwater remains more or less stable at about almost 20,000 tonnes. Production value for the blue mussel segment in 2012 was about a third of 2011 (9.5 million € vs 27.8 million €), production value in the freshwater sector was reported to be 81 million € in 2012 compared to 75 million € in 2011, which could reflect problems in data coverage in 2011 data.

Overall industry structure and employment

The majority of enterprises are quite small, less than 10 % of companies produce more than 5 tonnes a year. This means that profit maximisation is not the main aim for the aquaculture production, but a more or less stable production, often not as the main income source. Many producers also combined aquaculture with gastronomy. Reliant employment figures are not available, as Germany only reports marine aquaculture, but some figures have been included in the EU-Aquaculture report last year.

Current production trends and main drivers (Trends and triggers)

As mentioned, blue mussel production depends on natural conditions. Freshwater aquaculture is more or less stable, also facing the problem of succession. Some new trends are the use of heat from biogas facilities for aquaculture purposes, mainly in order to get higher subsidies for the biogas production. Furthermore, some currently small enterprises try to start innovative production, e.g. for caviar production and marine fish in recirculation systems. Finally, some producers focus on the organic segment, but this stands currently for less than 4% of total production, meaning it is only relevant for local or very specialised markets.

Main segments

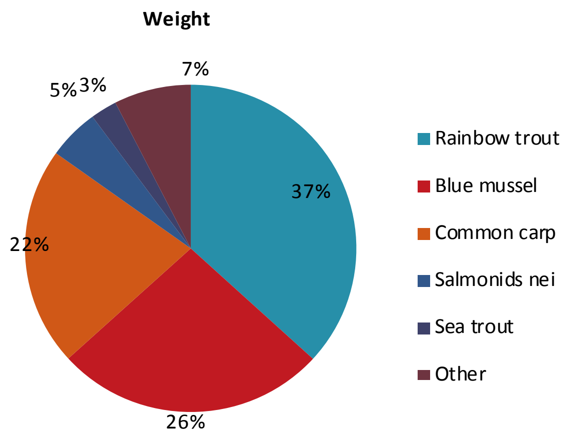
The main segments are blue mussel, trout and carp.

Outlook

As the sector of blue mussel very much depends on environmental conditions, in particular seed, projections for the long run are not possible. The freshwater sector is quite stable and currently there is no reason to project others than stable projection, unless relevant changes in the sector will be taken place, i.e. less rigid regulations and

4.11.2 Production and sales

The numbers volume and sales value of the German production are still under discussion concerning coverage and quality. Starting with 2011, the Federal statistical office collected data under the EU-aquaculture statistics regulation. Compared with an already existing report (Binnenfischereibericht, BFR)) on the volume and sales of the sector, figures differ by about 30%. The Federal Statistical Office (FSO) reported about 39,000 tonnes for 2011 including blue mussels, the report based on a survey at the responsible authorities in the German states reported almost 43,000 tonnes (without blue mussels). As the blue mussel sector figures are based on landing statistics and are official census data, the difference completely belongs to the freshwater segment numbers. Having a blue mussel production of about 19,000 tonnes, freshwater production figures show a range from 20,000 to 43,000 tonnes. The figures before 2011 in this chapter were based on the mentioned report BFR. Starting with 2012 figures, this report took over the data from the FSO. This results in a break in the time series, as production data in this chapter are taken from FSO data for 2011 onwards, but from the BFR for the years before. This change does only affect freshwater data, as the data for the blue mussel segment as the dominant marine aquaculture segment in Germany is based on fisheries landing statistics. As only marine aquaculture is mandatory under DCF-regulation, Germany has only collected economic data for the marine segment.



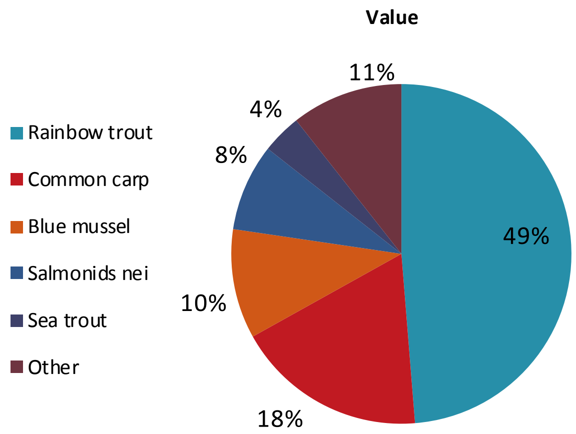


Figure 4.11.1 Main species in terms of weight and value in German production: 2012.

Source: EUROSTAT

The importance in relation to the other aquaculture segments in Germany can be seen in the Figure 4.11.1. Blue mussels stand for one quarter of the volume and almost one fifth of the value of total aquaculture production in Germany. The other important species are trout and carp, while all the rest represents only 15% of volume and 23% of value.

Table 4.11.1 Production and sales for Germany: 2008-2012.

Variable	2008	2009	2010	2011*	2012*	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***44.0***	***40.0***	***40.7***	***36.2***	***25.4***	***-30%***	***-37%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	7.0	3.7	5.0	19.2	6.7	*-65%*	*-23%*
Freshwater	37.0	36.3	35.7	17.0	18.7	*10%*	*-41%*
Production value (million €)	***97.1***	***94.2***	***94.7***	***103.0***	***90.9***	***-12%***	***-7%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	10.4	5.3	4.8	27.8	9.5	*-66%*	*-21%*
Freshwater	86.6	89.0	89.9	75.2	81.4	*8%*	*-4%*
Hatcheries & nurseries (million units)	***0***	***0***	***0***	***0***	***0***	***0%***	***0%***
Eggs	0	0	0	0	0	*0%*	*0%*
Juveniles	0	0	0	0	0	*0%*	*0%*

Source: EUROSTAT& EU Member States DCF data submission for shellfish 2011-2012

Table 4.11.1 shows the timely development of the German aquaculture sector in general. One may notice, that shellfish production, which is mainly blue mussel, varies a lot from year to year due to environmental conditions. For freshwater production data source has been changed in 2011. Data before and after 2011 are not comparable anymore. But one can see that the value of the production is quite stable.

4.11.3 Industry structure and employment

As only data for the marine sector are submitted, only this data can be analysed in more detail. The sector is quite stable, 8 licences exist and it is not likely that this number will change in the near future. As most costs items in this segment are fixed costs and the production volume very much relies on environmental conditions, i.e. seed fall, changes in labour productivity figures do not have a meaning.

Table 4.11.2 Structure of the German blue mussels segment: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*8*	*8*	*8*	*8*	*8*	*0%*	*0%*
<=5 employees	7	7	7	7	7	*0%*	*0%*
6-10 employees	1	1	1	1	1	*0%*	*0%*
>10 employees	0	0	0	0	0		*0%*
Employment (number)							
Total employees	39	38	38	40	39	*-3%*	*1%*
Male employees	39	38	38	40	39	*-3%*	*1%*
Female employees	0	0	0	0	0		*0%*
FTE	39	38	38	40	39	*-3%*	*1%*
Male FTE	39	38	38	40	39	*-3%*	*1%*
Female FTE	0	0	0	0	0		*0%*
Indicators							
FTE per enterprise	4.9	4.8	4.8	5.0	4.9	*-2%*	*1%*
Average wage (thousand €)	57.7	54.2	51.6	71.3	58.7	*-18%*	*0%*
Labour productivity (thousand €)	140.6	44.9	35.3	559.8	131.8	*-76%*	*-32%*

Source: EU Member States DCF data submission

4.11.4 Economic performance

2011 was an extraordinary year in terms of production volume and value. 2012 was still profitable. In order to evaluate the segment one has to look at longer time periods, as the business exists for more than 100 years and strong variation in production volume are normal. Farmers have to deal with this by making provisions for years with less income. Having said this, the economic performance of the segment for the last 5 years shows an overall profitable business which is dominated by physical capital and labour costs.

Table 4.11.3 Economic performance of the German blue mussel segment: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	9.7	5.0	4.1	27.8	9.5	100%	-66%	-19%
Other income	0.0	0.0	0.0	0.0	0.0	0%	0%	0%
Subsidies	0.0	0.0	0.0	0.0	0.0	0%	0%	0%
Total income	*9.7*	*5.0*	*4.1*	*27.8*	*9.5*	*100%*	*-66%*	*-19%*
Expenditures (million €)								
Wages and salaries	2.3	2.1	2.0	2.9	2.3	24%	-20%	0%
Imputed value of unpaid labour	0.0	0.0	0.0	0.0	0.0	0%	0%	0%
Energy costs	0.4	0.3	0.3	0.5	0.4	4%	-11%	15%
Repair and maintenance	0.7	0.6	0.6	0.9	0.7	7%	-18%	2%
Raw material: Feed costs	0.0	0.0	0.0	0.0	0.0	0%	0%	0%
Raw material: Livestock costs	0.0	0.0	0.0	0.0	0.0	0%	0%	0%
Other operational costs	3.2	2.4	1.9	4.1	3.3	34%	-21%	12%
Total operating costs	*6.5*	*5.4*	*4.7*	*8.3*	*6.6*	*70%*	*-20%*	*7%*
Capital Costs (million €)								
Depreciation of capital	2.5	2.5	2.5	2.5	2.5	26%	0%	0%
Financial costs, net	0.4	0.5	0.4	0.3	0.3	3%	-9%	-37%
Extraordinary costs, net	0.0	0.0	0.0	0.0	0.0	0%	0%	0%
Capital Value (million €)								
Total value of assets	30.2	28.5	26.5	25.5	24.0	253%	-6%	-13%
Net Investments	0.5	0.8	0.5	1.5	1.0	11%	-33%	22%
Debt	7.2	7.7	7.0	5.5	5.0	53%	-9%	-27%
Input & Production (thousand tonnes)								
Raw material: Feed	0.0	0.0	0.0	0.0	0.0		0%	0%
Raw material: Livestock	0.0	0.0	0.0	0.0	0.0		0%	-100%
Performance Indicators(million €)								
Gross Value Added	5.5	1.7	1.3	22.4	5.1	54%	-77%	-34%
Operating cash flow	3.2	-0.4	-0.6	19.5	2.8	30%	-85%	-48%
Earning before interest and tax	0.7	-2.9	-3.1	17.0	0.3	4%	-98%	-88%
Net profit	0.3	-3.4	-3.5	16.8	0.1	1%	-99%	-96%
Capital productivity (%)	18.2	6.0	5.1	87.8	21.4			
Return on Investment (%)	2.4	-10.0	-11.8	66.8	1.5			
Future Expectation Indicator (%)	-6.7	-6.0	-7.6	-3.9	-6.3			

Source: EU Member States DCF data submission

The price of blue mussels is quite stable. German mussels get a high price at the mussel auction as the quality is considered to be very well. But this is no natural law and the environmental conditions are the key factor for the development in the next years.

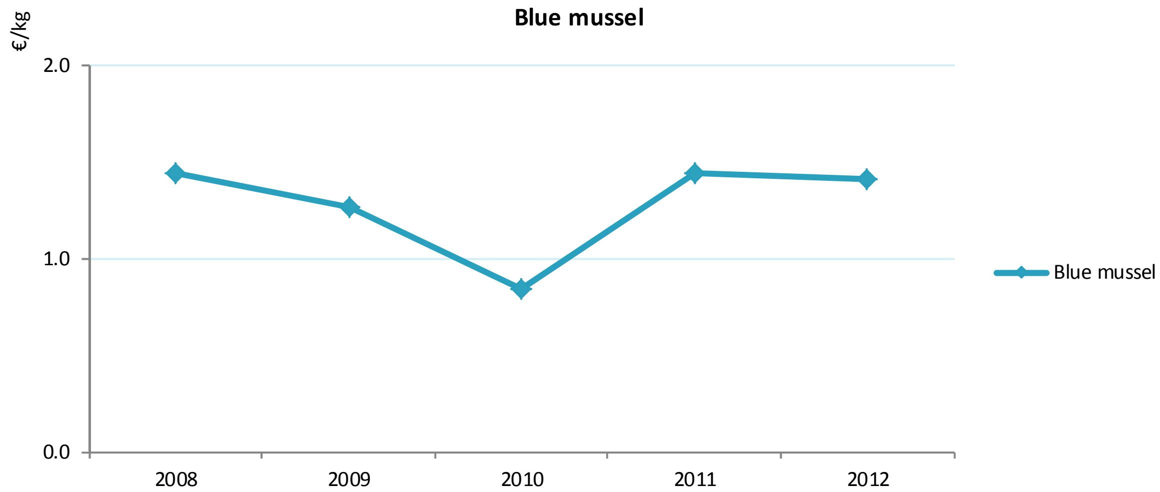


Figure 4.11.2 Average prices for the German blue mussels segment: 2008-2012.

Source: EU Member States DCF data submission

Figure 4.11.7 shows some economic performance indicators and reflects the variations of the natural conditions also in economic terms. Comparisons of one year with the other make no sense as the driver for the development is nature. If there are bad years with less seed mussels turnover 2 years later will be bad as well. On the other hand, a good seed fall is only the condition sine qua non, but it could still happen that storms will cause currents to take away the mussels from the culture areas.

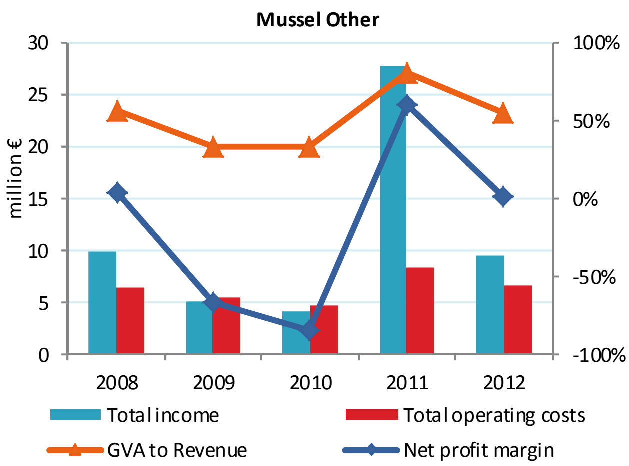


Figure 4.11.3 Economic performance indicators for the German blue mussels segment: 2008-2012.

Source: EU Member States DCF data submission

4.11.5 Trends and triggers

Current production trends and main drivers

As mentioned before, freshwater production is quite stable and declining trends are very likely caused by a change in the data source. Mussel production varies according to environmental influences.

Market structure

German freshwater production is mainly sold locally and regionally or offered at gastronomy belonging to the farmers. Some, in particular from bigger farms, is sold to wholesalers. The blue mussels are almost all sold at the mussel auctions in Yerseke/Netherlands. Another part of the produced fish is sold to recreational fishing facilities or for restocking purposes.

Carps are a very regional and seasonal product, while trouts are sold most time of the year. Mussels have their consumption peak from September to March, but they are reimported from the Netherlands and not marketed under German label.

In 2012 there were about 5350 companies producing fish and about 30 producing mussels and other aquatic organism.

Outlook for 2013 and 2014

Due to a bad seed fall in 2011 and 2012 production volume in 2013 and 2014 is expected to be quite low. Prices may increase and compensate for a part of the income losses. Freshwater production can be expected to be quite stable.

4.11.6 Data Coverage and Data Quality

Data quality

The numbers volume and sales value of the German production are still under discussion concerning coverage and quality. Starting with 2011, the Federal statistical office collected data under the EU-aquaculture statistics regulation. Compared with an already existing report (Binnenfischereibericht, BFR)) on the volume and sales of the sector, figures differ by about 30 %. The Federal Statistical Office (FSO) reported about 39,000 tonnes for 2011 including blue mussels, the report based on a survey at the responsible authorities in the German states reported almost 43,000 tonnes (without blue mussels). As the blue mussel sector figures are based on landing statistics and are official census data, the difference completely belongs to the freshwater segment numbers. Having a blue mussel production of about 19.000 tonnes, freshwater production figures show a range from 20,000 to 43,000 tonnes. The figures before 2011 in this chapter were based on the mentioned report BFR. Starting with 2012 figures, this report took over the data from the FSO. This results in a break in the time series, as production data in this chapter are taken from FSO data for 2011 onwards, but from the BFR for the years before. This change does only affect freshwater data, as the data for the blue mussel segment as the dominant marine aquaculture segment in Germany is based on fisheries landing statistics. As only marine aquaculture is mandatory under DCF-regulation, Germany has only collected economic data for the marine segment.

Data availability

The aquaculture statistics according the EU-Aquaculture statistical regulation are published on the German Federal Statistical Office website approximately 12 months after the end of the reference year. Economic data are collected by the Thünen-Institute of Sea Fisheries and are available about one and a half year after the end of the reference year.

Confidentiality

The economic data from the 8 enterprises dealing with blue mussel are still published as aggregated data, but the problem of confidentiality is becoming more seriously from year to year. As there is only one oyster producer, data for this segment are not published under DCF data submission.

Ridiculous seems the declaration of shellfish data for 2011 and 2012 from Eurostat as confidential whilst the data are freely available on the webpage of the FSO.

Differences in DCF data compared with other official data sources

Production data submitted to Eurostat for the freshwater sector were based on a report on behalf of the federal ministry including the reporting year 2010. Since 2011 they are based on the census conducted by the Federal Statistical Office (FSO) under EU-Aquaculture statistical regulation. The numbers from the two different sources differed a lot and so data from 2011 onwards cannot be compared with former data.

Data for the marine sector are collected under EU-Aquaculture statistical regulation done by the FSO and under the DCF regulation conducted by the Thünen-Institute for Sea Fisheries. As the dominant segment in the marine aquaculture in Germany is the blue mussel sector and concerning economic variables problems of confidentiality arise, these economic data are only published and submitted under DCF regulation for the blue mussel sector. Total production volume and value for shellfish therefore differs a bit between data submitted to Eurostat and those submitted under DCF. For 2011 and 2012 Germany declared shellfish data as confidential, while blue mussel data are submitted under DCF and are not declared confidential und therefore for 2011 and 2012 DCF data were taken.

It cannot be explained why shellfish sales value for 2009 is higher according DCF data than those data that were reported to Eurostat.

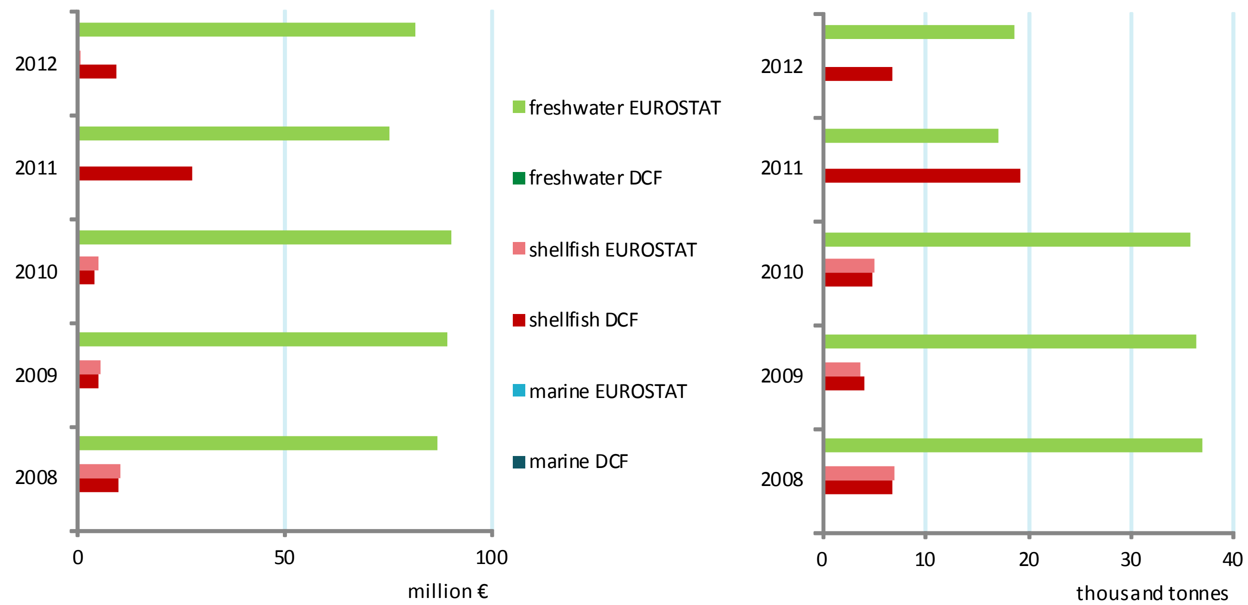


Figure 4.11.4 Comparison of DCF data with EUROSTAT data for Germany: 2008-2012

4.12 GREECE

4.12.1 Summary

Production volume and value

Greek aquaculture production volume decreased by 6% between 2012 and 2011 and reached 114 thousand tonnes in 2012, while in the same period production value increased by 4% to reach 545 million Euros in 2012 indicating a rise of mean sales price.

Overall industry structure and employment

While large vertically integrated enterprises, most of which are listed in the Athens stock exchange market, dominate the Greek marine finfish aquaculture industry, freshwater and shellfish aquaculture are mainly comprised of small family enterprises. Not more than 80 enterprises were operating during 2012 in the marine finfish industry. Total employment in the sector decreased by 8% in 2011 and further 12% in 2012 reflecting mainly the effects of the restructuring and ongoing concentration process of the marine finfish segment.

Main segments

Marine finfish aquaculture production, mainly comprised of seabream and seabass accounts for 81% in terms of volume and 95% in terms of value in Greece, nevertheless shellfish (mostly mussels) and freshwater (mostly rainbow trout) production provide valuable employment, mainly in remote areas.

Current production trends and main drivers (Trends and triggers)

Greek aquaculture production volume is stabilized since 2009 over 110,000 tonnes. The recent Southern European debt crisis that affected demand, credit absence in Greece and rising financial costs are forcing Greek producers to limit production or to sell undersized products in order to gain liquidity. Greek aquaculture production volume is expected to decrease in the near future.

Outlook

While the Greek debt crisis is evolving in 2013 and 2014 and recapitalization of the Greek banks is a major concern for the Greek government, large aquaculture companies had to restructure and refinance their dept thus facing increased financial costs and absence of credit. Greek banks, now indirectly controlling many large aquaculture companies, are expected to play a major role (or even decide in some cases) on the restructuring and further concentration of the Greek marine finfish aquaculture sector during 2014.

4.12.2 Production and sales

Greek aquaculture production volume decreased by 6% between 2012 and 2011 and reached 114 thousand tonnes in 2012, while in the same period production value increased by 4% to reach 545 million Euros in 2012.

Marine finfish aquaculture production volume has stabilized since 2009 at a level over 100,000 tonnes. After the rapid price decline during 2008-2009 for seabream and seabass, sales value increased during 2010 to 429 million Euros for marine finfish aquaculture. In 2011, marine finfish sales value decreased by 2% following the slight decrease (-1%) of production volume. On the contrary, regardless of the decrease of sales volume by 6% during 2012, sales value increased by 4% during 2012 thus indicating a rise of the mean price. Production is mainly comprised of seabream and seabass while relatively small quantities of sharpsnout seabream, red porgy, shi drum, meagre, dentex, mullet and tuna are produced as well. Other species like white seabream, stripped seabream and common pandora are either produced in small quantities or on experimental production stage.

Shellfish production volume reached a peak at 22,500 tonnes during 2009, while during 2010, 2011 and 2012 production declined to 18,000, 18,600 and 17,600 tonnes respectively. Shellfish production value follows the production trend since 2009. Production is mainly comprised of mussels.

Freshwater production volume and value face a downward trend in Greece. Production has halved between 2008 and 2011 to increase again in 2012. Decline of freshwater production during 2011 is mainly attributed to the bankruptcy of one of the larger trout producer firm in Greece. As supply to the market decreased rapidly (40%) in 2011 the price rose, which played a hand in restraining sales value decline to 24%. Nevertheless price rise during 2011 was offset by the increased supply during 2012. Freshwater production is mainly comprised of rainbow trout.

Although marine finfish aquaculture production accounts for 81% in terms of volume and 95% in terms of value in Greece, shellfish and freshwater production provide valuable employment, mainly in remote areas.

Table 4.12.1 Production and sales for Greece: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***115.4***	***126.8***	***123.6***	***121.8***	***114.8***	*-6%*	*-6%*
Marine	89.5	100.5	101.7	100.5	94.3	*-6%*	*-4%*
Shellfish	21.2	22.5	18.0	18.6	17.6	*-5%*	*-12%*
Freshwater	3.9	3.1	3.2	1.9	2.2	*13%*	*-29%*
Hatcheries & nurseries	0.8	0.7	0.8	0.8	0.7	*-9%*	
Sales value (million €)	***456.0***	***498.4***	***534.7***	***523.3***	***545.0***	*4%*	*8%*
Marine	353.6	395.7	429.0	420.9	448.1	*6%*	*12%*
Shellfish	9.0	10.9	8.6	8.6	7.1	*-17%*	*-23%*
Freshwater	13.2	11.5	11.5	8.8	7.4	*-15%*	*-34%*
Hatcheries & nurseries	80.2	80.3	85.6	85.0	82.4	*-3%*	

Source: EU Member States DCF data submission

4.12.3 Industry structure and employment

While large vertically integrated enterprises, most of which are listed in the Athens stock exchange market, dominate the Greek marine finfish industry, freshwater and shellfish aquaculture are mainly comprised of small family enterprises.

The number of enterprises presented in the table below, probably refers to farming sites rather than to legal entities. Not more than 80 enterprises (legal entities) were operating during 2012 in the marine finfish industry. Total employment in the sector decreased by 8% in 2011 and further 12% in 2012 reflecting mainly the effects of the restructuring and ongoing concentration process of the marine finfish segment.

Unfortunately, no data are provided by Greece in order to allow for the estimation and the discussion of employment indicators. Nevertheless, as average wages decreased in Greece during 2012, an average wage decrease is also expected in the aquaculture sector. Lower employment and lower wages are expected to have allowed for increased labour productivity during 2012.

Table 4.12.2 Structure of the Greek aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*1,038*	*1,020*	*1,017*	*1,017*	*1,051*	*3%*	*3%*
<=5 employees	721	705	704	704	738	*5%*	*4%*
6-10 employees	221	219	217	217	217	*0%*	*-1%*
>10 employees	96	96	96	96	96	*0%*	*0%*
Employment (number)							
Total employees	6,073	5,983	6,032	5,559	4,900	*-12%*	*-17%*
Male employees							
Female employees							
FTE							
Male FTE							
Female FTE							
Indicators							
FTE per enterprise							
Average wage (thousand €)							
Labour productivity (thousand €)							

Source: EU Member States DCF data submission

4.12.4 Economic performance

Discussion of the economic performance of aquaculture in Greece is limited by the fact that Greece did not submit most of the economic variables.

EU FIFG funding was extended till the end of 2009 for Greece. Due to the lack of spatial planning for aquaculture, subsidies of the European Fisheries Fund (EFF) were not granted for 2010 and 2011. During 2011, a special framework for aquaculture spatial planning came into force in Greece and the EFF grant approvals started during 2013.

Table 4.12.3 Economic performance of the Greek aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	456.0	498.4	534.7	523.3	545.0	*100%*	*4%*	*8%*
Other income								
Subsidies	4.5	8.0	0.0	0.0				
Total income	*460.5*	*506.4*	*534.7*	*523.3*	*545.0*		*4%*	*8%*
Expenditures (million €)								
Wages and salaries								
Imputed value of unpaid labour								
Energy costs								
Repair and maintenance								
Raw material: Feed costs								
Raw material: Livestock costs								
Other operational costs								
Total operating costs								
Capital Costs (million €)								
Depreciation of capital								
Financial costs, net								
Extraordinary costs, net								
Capital Value (million €)								
Total value of assets								
Net Investments								
Debt								
Input & Production (thousand tonnes)								
Raw material: Feed								
Raw material: Livestock								
Performance Indicators(million €)								
Gross Value Added								
Operating cash flow								
Earning before interest and tax								
Net profit								
Capital productivity (%)								
Return on Investment (%)								
Future Expectation Indicator (%)								

Source: EU Member States DCF data submission

4.12.5 Main species produced and economic performance by segment

Greek finfish aquaculture production is mainly comprised of seabream and seabass while relatively small quantities of sharpsnout seabream, red porgy, shi drum, meagre, dentex, mullet and tuna are produced as well. Other species like white seabream, stripped seabream and common pandora are either produced in small quantities or on experimental production stage. Shellfish production is mainly comprised of mussels and freshwater production is mainly comprised of rainbow trout.

Discussion of the economic performance of aquaculture segments in Greece is limited by the fact that Greece did not submit most of the economic variables.

Figure 4.12.1 Main species in terms of weight and value in Greek production: 2012.

Source: EUROSTAT data, 2014

Nominal first sales price of Mediterranean mussels remained stable during the reporting period. Rainbow trout price increased in 2011, mainly as a result of the supply shortage in Greece.

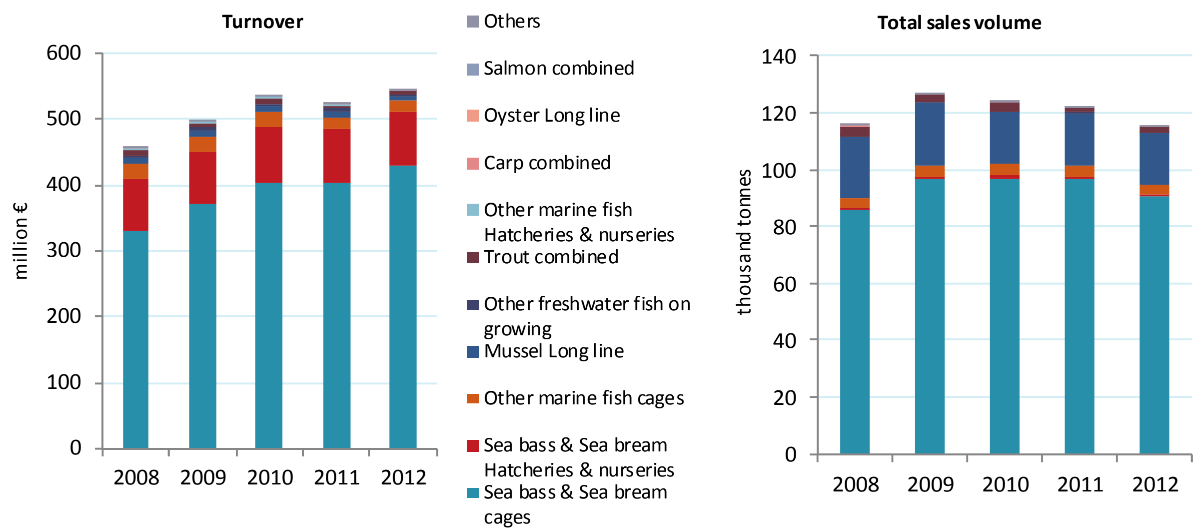


Figure 4.12.2 Structural development of Greek aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

Seabream and seabass nominal first sales price increased in 2010 and remained stable during 2011, after the 2008/2009 price decline. During 2012, seabream price decreased while seabass price increased.

4.12.6 Trends and triggers

Current production trends and main drivers

Greek aquaculture production volume is stabilized since 2009 over 110,000 tonnes. As the vast majority of the production is exported to southern European countries, production volume stabilization is partly attributed to supply side decisions to limit production and the effects of the recent debt crisis in Southern European demand. On top, credit absence and rising financial costs are forcing Greek producers to limit production or to sell undersized products in order to gain liquidity. For the same reasons production volume is expected to decrease in the near future and capital investment is expected to decline.

The rapid decline of wages in Greece during the 2011/2014 period is not expected to significantly affect the economic performance of aquaculture. On the contrary, rising financial costs, rising energy costs and rising fish feed costs are expected to further deteriorate economic performance of Greek aquaculture. The price of seabass and seabream is expected to decline during 2013 due to liquidity shortages of Greek companies, as an effect of credit absence.

Labelling, and especially organic labelling, that provides the opportunity for higher price premiums is applied by a small number of companies in Greece. Nevertheless, the market segment for organic fish is expected to remain niche.

Freshwater and shellfish expansion is mainly restricted by the unavailability of suitable space in Greece.

Marine aquaculture has the potential to grow farther in the Mediterranean due to the availability of suitable space and skilled labour. In the short run, as expansion is mainly limited by demand, processing of aquaculture products, expansion to new markets and marketing are expected to contribute to a slow expansion rate of the sector. On top, rising awareness of consumers on the relatively “low” nutritional value of competing species like pangasius (when compared to seabream, seabass and salmon) is expected to contribute to the slow expansion of the market in the short run.

Substantial funding from EU funds for private innovative pilot projects and spinoff companies rather than traditional capital investment is necessary and is also expected to contribute to the expansion of the sector.

In the long run, in order for marine finfish aquaculture to expand and compete with salmon and pangasius in the global market, research and innovation is crucial. Production cost reduction and production technology needs to be addressed by research. Funding for the research into substitutes of high valued raw material for fish feed, improvement of culture techniques and alleviation of technological constrains mainly for new species will drive the expansion of the sector.

Issues of special interest

The institutional framework for aquaculture development may be considered complete nowadays in Greece. Environmental concerns and spatial planning are addressed in the national low. A new licensing scheme allowing for new farms came into force since 2009 and a new law regarding the administration of aquaculture came into force in August 2014 and it is expected to alleviate barriers to entry for newcomers in the sector.

As of June 2013, the use of land based processed animal protein in the fish feeds is no longer prohibited in the EU. The use of such proteins in aquaculture is expected affect negatively consumer perceptions for aquaculture.

Outlook for 2013 and 2014

The merge of the 2nd and the 4th largest aquaculture companies in Greece announced in 2013 did not came into force. The 4th largest aquaculture company is now facing bankruptcy and has applied in 2014 for judicial protection from its creditors.

While the Greek debt crisis is evolving in 2013 and 2014 and recapitalization of the Greek banks is a major concern for the Greek government, large aquaculture companies had to restructure and refinance their dept thus facing increased financial costs and absence of credit. Greek banks, now indirectly controlling many large aquaculture companies, are expected to play a major role (or even decide in some cases) on the restructuring and concentration of the Greek aquaculture sector during 2014.

The recent Ukrainian conflict and the Russian ban of EU agricultural products, including fish, are raising new concerns on the Greek aquaculture industry as exports to these markets have decreased substantially in 2014. Efforts in order to expand sales at the Asian markets have started during the summer of 2014.

4.12.7 Data Coverage and Data Quality

Data quality

No specific survey for DCF data collection was conducted in Greece for the period of 2008 to 2012, hence the vast majority of the economic variables are not reported.

Official Greek data was often criticised for under-reporting aquaculture production and value for seabream and seabass. A new licensing scheme for Greek finfish aquaculture which came into force in 2009 and the increasing concentration of the sector has significantly improved the quality of production data since 2010.

Differences in DCF data compared with other official data sources

Divergences between Greek DCF and EUROSTAT data should mainly be attributed to the fact that production quantities and value for hatcheries and nurseries reported under DCF are likely to reflect the total production of juveniles rather than sales. Other sources of divergences are unreported data due to confidentiality issues, missing data, methods used for the approximation of missing data, aggregation issues, and revision issues.

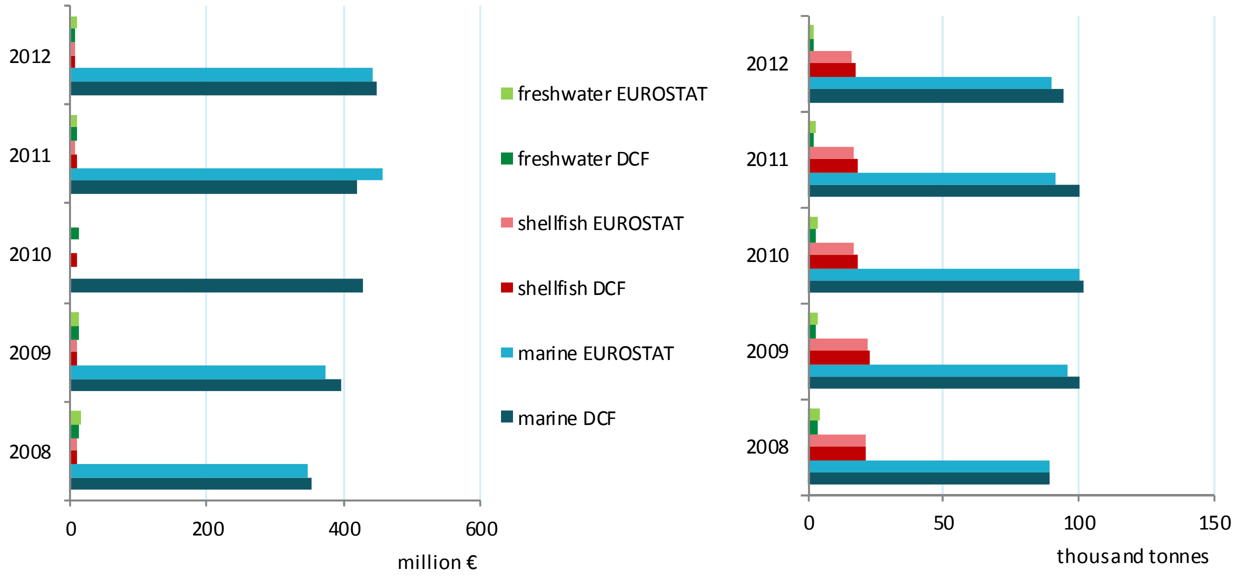


Figure 4.12.3 Comparison of DCF data with EUROSTAT data for Greece: 2008-2012

4.13 HUNGARY

4.13.1 Summary

Hungary is a landlocked country producing only freshwater aquaculture products. The freshwater data collection is not mandatory under the DCF, and landlocked countries are therefore not requested to provide economic data for this report.

Production volume and value

The Hungarian aquaculture sector produced 14.6 thousand tonnes of fish in 2012. This production was valued at about 29.9 million Euros (EUROSTAT, 2014). Hungary produces no marine or shellfish aquaculture (see Table 4.13.1).

A fall in sales weight of 6% was observed from 2011 to 2012 in freshwater aquaculture bringing the total sales down from 15.5 thousand tonnes to 14.6 thousand tonnes.

As a consequence of the fall in production weight, the value of sales decreased by 1% in 2012, but it was still 5% above the average of the production observed in 2008-2011.

Table 4.13.1 Production and sales for Hungary: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***15.0***	***14.2***	***13.6***	***15.5***	***14.6***	***-6%***	***0%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	15.0	14.2	13.6	15.5	14.6	*-6%*	*0%*
Production value (million €)	***30.4***	***26.5***	***27.2***	***30.3***	***29.9***	***-1%***	***5%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	30.4	26.5	27.2	30.3	29.9	*-1%*	*5%*
Hatcheries & nurseries (million units)	***71***	***46***	***0***	***0***	***0***	***0%***	***-100%***
Eggs	1	0	0	0	0	*0%*	*-100%*
Juveniles	70	46	0	0	0	*0%*	*-100%*

Source: EUROSTAT

Main segments

According to available EUROSTAT data common carp was the main species produced by the Hungarian aquaculture sector, representing 70% in terms of weight and 71% in value of total production in 2012 (see Figure 4.13.1). Other important fish species are North African catfish with 13% of the total weight and 14% of the total value, silver carp with 12% of the total weight and 15% of the total value, grass carp with 3% of the total weight and value and Wels catfish with 2% and 3% of the total weight and value, respectively.

Figure 4.13.1 Main species in terms of weight and value in Hungarian production: 2012.

Source: EUROSTAT

Aquaculture prices have increased during the 2008-2012 period. Prices of common carp, silver carp and Wels catfish increased in 2012, while North African catfish and grass carp decreased slightly.

The price of common trout in Hungary was 2.1 €/Kg in 2012. The price of North African catfish was 2.2 €/Kg, silver carp 0.9 €/Kg, grass carp 1.8 €/Kg, and for Wels catfish it was 4.4 €/Kg in 2012.

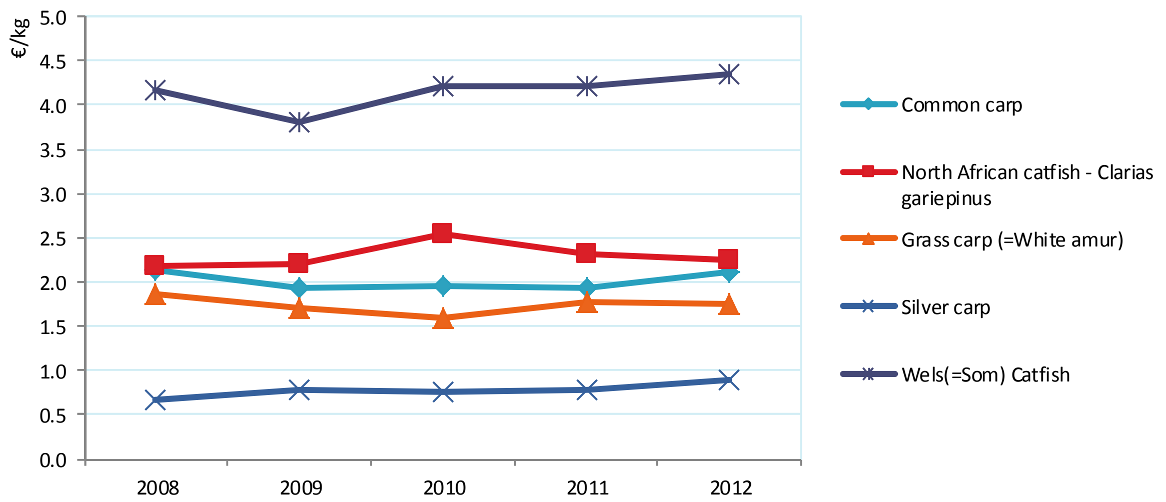


Figure 4.13.2 Average prices for the main species produced in Hungary: 2008-2012.

Source: EUROSTAT

4.13.2 Data Coverage and Data Quality

Hungary is a landlocked country producing only freshwater aquaculture products. The freshwater data collection is not mandatory under the DCF and landlocked countries are therefore not requested to provide economic data for this report.

4.14 IRELAND

4.14.1 Summary

Production volume and value

In total, the Irish aquaculture sector produced 36,197 tonnes of farmed product in 2012, which corresponded to a decrease of 19.2% on 2011. The total value of production showed a slight increase of 1.43% in nominal terms to €130 million euros which translates to a fall of 0.4% allowing for inflation. From 2008 to 2012, the total volume decreased by 19.6%, whereas the total value increased by 27.7%, a real increase as there was virtually no general price inflation in Ireland over the period.

Overall industry structure and employment

In 2012, there were 279 aquaculture enterprises. The Irish aquaculture sector is dominated by small enterprises with fewer than 5 employees. 68.5% of Irish enterprises had less than 5 employees.

Main segments

The production in the Republic of Ireland can be divided into four main segments. The largest segments are the production of on-grown salmon in sea cages, including some 'in house' hatchery units, followed by bag and trestle oysters, rope mussels, bottom mussels and on-growing trout.

Current production trends and main drivers (Trends and triggers)

The occurrence of disease and parasite induced mortalities in juvenile stock, hampering production volumes of the salmon, oyster and clam segments continues, but this is not a problem confined only to Ireland.

The market for organic salmon and Irish oysters continues to be strong. Employment in the salmon sector remains steady despite current production difficulties while the oyster sector continues to grow in production volume, value and employment

Ireland is not self-sufficient in aquaculture produce and supplies of salmon, tilapia, sea bass, sea bream, shrimp, oysters and mussels, almost entirely farmed, are imported. In the case of salmon, the primary production of 12000 or so tonnes is not sufficient to meet the needs of Irish processors. Significant quantities of (wild) cod are also needed to meet domestic demand.

Outlook

Output is not expected to grow in the immediate future. Problems of expansion in the face of limited licenses being available and long delays in dealing with applications as well as changing costs, stock shortages, mortality and growth restriction from disease or parasites continue. The outlook for overall value increase is good, with direct selling of carefully branded shellfish products into new, high end markets occurring in the far-east for oysters, while rope mussel producers are beginning to benefit from a shortage of mussels in existing markets. The future expansion or otherwise of the salmon sector rests on the outcome of the bid to expand offshore, which is under examination at ministerial level.

4.14.2 Production and sales

In total, the Irish aquaculture sector produced 36,197 tonnes of farmed product in 2012, which corresponded to a decrease of 19% on 2011. The fall is almost wholly accounted for by the shellfish sector which showed a 27**%** fall in output by volume. However, the total value of production showed a slight increase of 1.5% in nominal terms to €130 million euros which translates to a fall of 0.4% allowing for inflation and despite the fall in sales by volume in the shellfish sector sales by value remained almost unchanged.

From 2008 to 2012, the total volume of output by fish farms decreased by 19.6%, whereas the total value increased by 27.7%, an increase of the same value in real terms as inflation was virtually zero in Ireland over the period.

Table 4.14.1 Production and sales for Ireland: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***45.0***	***47.4***	***46.7***	***44.8***	***36.2***	*-19%*	*-21%*
Marine	9.2	12.3	15.9	12.5	12.4	*-1%*	*0%*
Shellfish	33.9	33.6	29.4	30.8	22.7	*-26%*	*-29%*
Freshwater	1.8	1.4	1.2	1.3	0.8	*-34%*	*-41%*
Hatcheries & nurseries	0.1	0.1	0.1	0.2	0.2	*9%*	*37%*
Sales value (million €)	***94.3***	***106.6***	***122.5***	***128.5***	***130.3***	*1%*	*15%*
Marine	47.1	65.4	77.6	74.2	75.7	*2%*	*15%*
Shellfish	39.2	34.6	38.6	47.4	47.3	*0%*	*19%*
Freshwater	6.4	4.8	4.4	4.3	2.8	*-36%*	*-45%*
Hatcheries & nurseries	1.5	1.9	2.0	2.6	4.6	*75%*	*128%*

Source: EU Member States DCF data submission

Within the shellfish sector the main decline has been in mussel production. The relative strength of the Euro has aggravated weak market conditions. Although much of the mussels produced is sold to local processors demand is of course largely a derived demand ultimately from the export market. The problems of red tide induced bay closures, quality issues, lack of wild seed and its cost where available, relatively low product unit value and high costs of acquiring and maintaining vessels to regulation standard, continue to contribute to the subsectors decline.

4.14.3 Industry structure and employment

In 2012, there were 279 aquaculture enterprises , a decline of 4% from 2011 and of 8% since 2008. The Irish aquaculture sector is dominated by small enterprises with fewer than 5 employees. 68% of Irish enterprises had less than 5 employees but the structure of the industry is changing. Smaller companies have consolidated and larger companies have contracted in the face of tough market conditions.

Between 2011 and 2012 the effect has been a 16% increase in middle-sized companies employing between 6 and 10 staff and declines of 9% in those with 5 or fewer employees and of 16% in those employing more than 10.

Over the period 2008 to 2012 there has been a 34% increase in middle-sized companies employing between 6 and 10 staff and declines of 18% in those with 5 or fewer employees and of 13% in those employing more than 10. The bulk of these changes have occurred in the last two years.

Table 4.14.2 Structure of the Irish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*304*	*303*	*303*	*292*	*279*	*-4%*	*-7%*
<=5 employees	233	232	230	209	191	*-9%*	*-15%*
6-10 employees	41	41	43	52	62	*19%*	*40%*
>10 employees	30	30	30	31	26	*-16%*	*-14%*
Employment (number)							
Total employees	1,972	1,952	1,715	1,748	1,708	*-2%*	*-7%*
Male employees	1,809	1,807	1,569	1,605	1,571	*-2%*	*-7%*
Female employees	163	145	146	143	137	*-4%*	*-8%*
FTE	1,287	976	952	958	956	*0%*	*-8%*
Male FTE	1,220	908	878	875	887	*1%*	*-9%*
Female FTE	67	68	74	84	69	*-18%*	*-7%*
Indicators							
FTE per enterprise	4.2	3.2	3.1	3.3	3.4	*5%*	*-1%*
Average wage (thousand €)	19.9	28.1	29.8	26.7	42.2	*58%*	*61%*
Labour productivity (thousand €)	21.5	34.0	48.5	55.6	63.4	*14%*	*59%*

Source: EU Member States DCF data submission

The total number of persons employed in the Irish aquaculture sector was 1,708 in 2012, corresponding to 956 FTEs. From 2011 to 2012, the number of employees fell by 2%, continuing the decline witnessed between 2008 and 2011. In 2011, only 7.8% of the employees in the sector were women. The average FTE per enterprise increased 5% from 2011 to 2012. The average wage appears to have increased by 58% from €26.700 to €42,200. While the continuing consolidation of the industry may have resulted in some general increase in wages the figure reported is considered to reflect a difficulty in the estimation process from a low return in 2012 and the true figure is considered to be approximately € 25000.

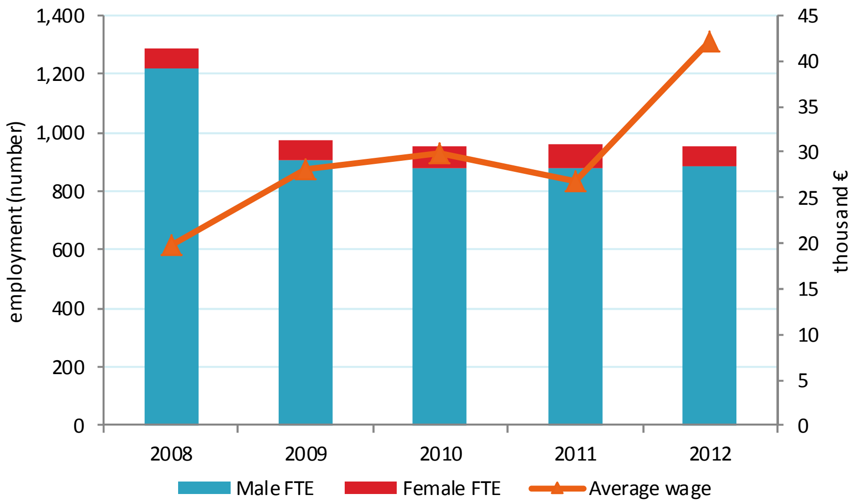


Figure 4.14.1 Employment trends for Ireland: 2008-2012.

Source: EU Member States DCF data submission

The number of enterprises and FTEs has decreased from 2008 to 2012, but the average number of FTEs per enterprise has been rather constant over the period. Despite the question mark over the average wage reported, it is clear that enterprises have managed to increase labour productivity, measured as gross value added per full time employee. From 2011 to 2012 the labour productivity increased by 14% and from 2008 to 2012 the labour productivity trebled.

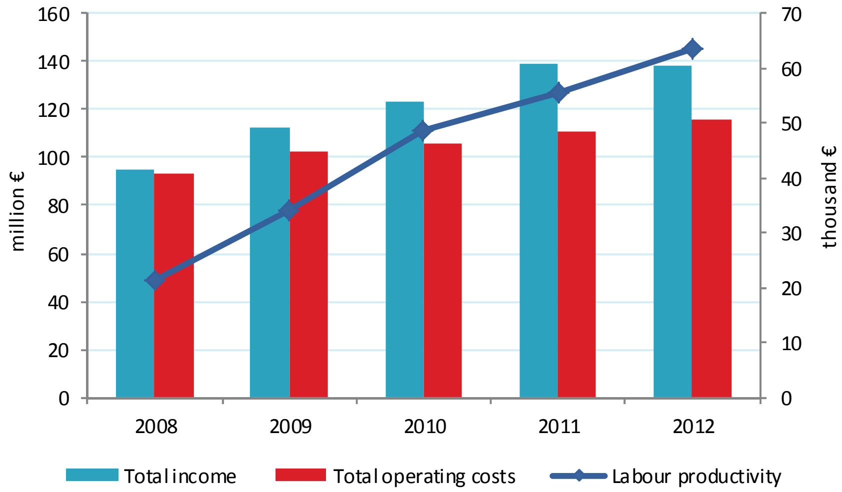


Figure 4.14.2 Income, costs, wages and labour productivity trends for Ireland: 2008-2012.

Source: EU Member States DCF data submission

4.14.4 Economic performance

The impact of the improved profitability has been increasing income with a less than proportionate increase in operating costs.

From 2011 to 2012, total income decreased by 1%, a fall of almost 3% in real terms, while the operational cost increased by 4%. The total income is dominated by the turnover from the sale of salmon from the farms, which contributes 58% of total income, with 27% of income provided by oysters.

Table 4.14.3 Economic performance of the Irish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	94.3	106.6	122.5	128.5	130.3	*95%*	*1%*	*15%*
Other income	0.9	1.6	0.6	10.3	5.7	*4%*	*-45%*	*71%*
Subsidies	0.0	0.1	0.0	0.3	1.9	*1%*	*465%*	*1732%*
Total income	*95.2*	*108.2*	*123.2*	*139.1*	*137.9*	*100%*	*-1%*	*18%*
Expenditures (million €)								
Wages and salaries	23.7	25.1	27.4	23.5	37.9	*27%*	*61%*	*52%*
Imputed value of unpaid labour	1.9	2.3	0.9	2.1	2.4	*2%*	*15%*	*33%*
Energy costs	1.9	1.7	3.3	6.1	10.2	*7%*	*68%*	*213%*
Repair and maintenance	7.9	7.7	5.8	7.3	10.6	*8%*	*45%*	*47%*
Raw material: Feed costs	17.5	28.7	25.5	27.7	22.3	*16%*	*-20%*	*-10%*
Raw material: Livestock costs	12.6	10.9	7.6	5.4	13.7	*10%*	*156%*	*51%*
Other operational costs	27.5	26.0	34.8	39.0	18.6	*14%*	*-52%*	*-41%*
Total operating costs	*93.0*	*102.4*	*105.3*	*111.1*	*115.7*	*84%*	*4%*	*12%*
Capital Costs (million €)								
Depreciation of capital	4.0	4.5	13.3	5.7	8.1	*6%*	*42%*	*17%*
Financial costs, net	1.7	1.4	2.4	0.8	2.1	*2%*	*157%*	*33%*
Extraordinary costs, net	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*	*-100%*
Capital Value (million €)								
Total value of assets	133.1	168.7	170.9	142.6	189.7	*138%*	*33%*	*23%*
Net Investments	6.7	18.5	8.7	3.6	2.3	*2%*	*-36%*	*-75%*
Debt	48.9	65.3	105.6	101.6	125.6	*91%*	*24%*	*56%*
Input & Production (thousand tonnes)								
Raw material: Feed	13.4	16.6	20.5	16.8	16.1		*-4%*	*-4%*
Raw material: Livestock	25.1	25.3	23.9	21.9	15.2		*-31%*	*-37%*
Performance Indicators(million €)								
Gross Value Added	27.7	33.2	46.2	53.3	60.6	*44%*	*14%*	*51%*
Operating cash flow	2.1	5.8	17.8	28.0	22.2	*16%*	*-21%*	*65%*
Earning before interest and tax	-1.9	1.3	4.5	22.3	14.1	*10%*	*-37%*	*115%*
Net profit	-3.6	0.0	2.1	21.5	12.0	*9%*	*-44%*	*141%*
Capital productivity (%)	20.8	19.7	27.0	37.3	32.0			
Return on Investment (%)	-1.4	0.8	2.7	15.7	7.5			
Future Expectation Indicator (%)	2.0	8.3	-2.7	-1.4	-3.0			

Source: EU Member States DCF data submission

The expenditures are dominated by the cost of wages and salaries (27% in 2012), cost of feed (16%) and cost of livestock (10%). Compared to some other countries, labour costs represent a high percentage of turnover compared to feed and livestock costs, indicating the reliance on coastal production and shellfish.

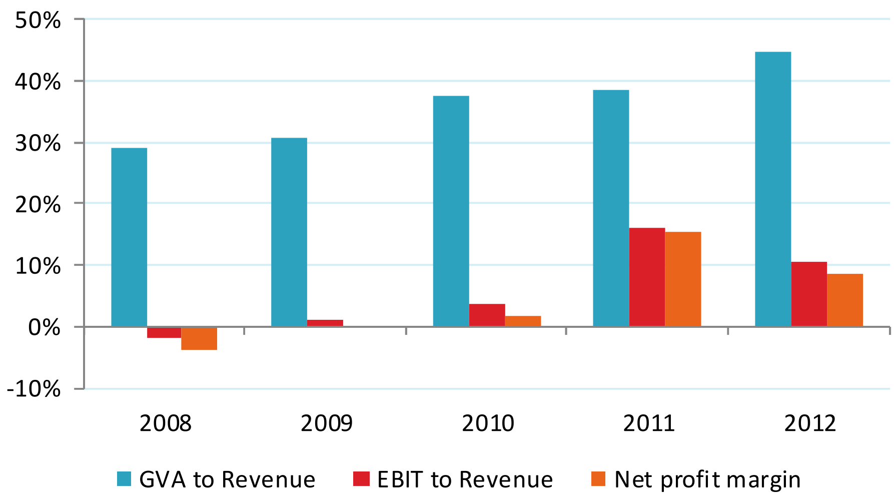


Figure 4.14.3 Economic performance for Ireland: 2008-2012

Source: EU Member States DCF data submission

In spite of the problems of the global economy and the difficult trading conditions created over the period, gross value added for the sector as a whole increased by 120% and both EBIT and net profit were positive in 2012, having been negative in 2008. The total value of assets and debts increased by 33% and 24% respectively, between 2011 and 2012, indicating significant investment.

4.14.5 Main species produced and economic performance by segment

The production in the Republic of Ireland is dominated by four main segments; On-grown Salmon in sea cages, Gigas oyster in bags on trestles, mussel on long-lines and mussels on the sea bed. The largest segment is the production of caged salmon which includes 'in-house' hatchery units. Gigas oysters are, bar a few exceptions, grown in bags on trestles, while mussels are produced either from ropes or from the sea beds. Inland production is mainly from independent smolt hatcheries and trout.

In the Republic of Ireland, aquaculture production is mainly located along the west coast from Donegal to Cork and in some bays in the south-east and north-east of the Republic.

Salmon culture occurs along the western coast, off Donegal, Mayo, Galway and the Cork/Kerry region. Bottom mussel culture, due to a lack of wild seed supply, is now mainly confined to bays of the southeast and southwest, having recently been the dominant shellfish sector of the north coast. Rope mussel and native oyster culture is concentrated mainly in the southwest and to a lesser extent, the northwest. Gigas oyster culture is widespread around the coast but most concentrated in the Bays of County Donegal and County Waterford.

Figure 4.14.4 Main species in terms of weight and value in Ireland production: 2012.

Source: EU Member States DCF data submission

The price of salmon has been increasing over the period from 2008 to 2012. In the shellfish sector, the price of oysters, particularly Pacific cupped oysters has performed well, but the price of blue mussels has been decreasing placing mussel farmers under pressure.

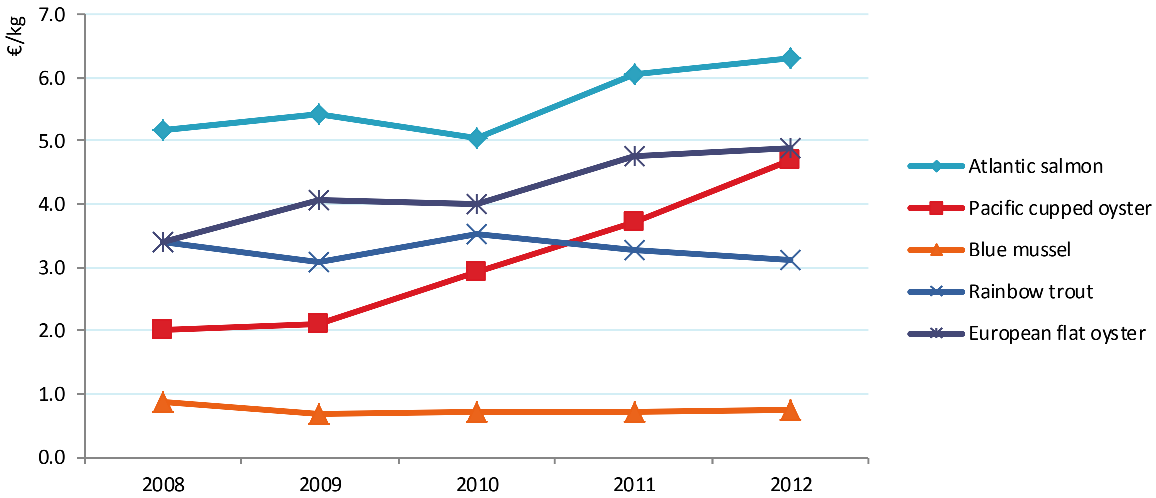


Figure 4.14.5 Average prices for the main species produced in Ireland: 2008-2012.

Source: EU Member States DCF data submission

In the Republic of Ireland, aquaculture production has four principal segments based on the species produced and the technique used.

The most relevant segments in Irish aquaculture are analyzed below.

Segment 1: Salmon

The most important segment is of salmon production in cages. Final production amounted to €75.7m in 2012 with a further €4.6m contributed by hatcheries and nurseries. This provided €24.6m in GVA. The volume of final production was 12,440 tonnes with a corresponding value of €75.7m. This accounts for 58% of total production volume and 34.4% of the total Irish production value in 2012.

Segment 2: Oysters Other

The second most important segment is the cultivation of *gigas* (Pacific cupped) oysters. In 2012, production volume was 7,400 tonnes bringing an income of €38m. The segment produced 20% of the national aquaculture volume and 26.6 % of the value of total Irish production. This is the only one of the four major segments that has been able to increase its revenue from 2008 to 2012 and is the only segment with a positive net profit.

Segment 3: Bottom Mussels

The production of bottom-grown mussels was 6,500 tonnes with a corresponding income of €8.6m in 2012. The mussel segment combined provides 8% of aquaculture sales in the Republic of Ireland from some 41% of production. Income fell by 20% between 2011 and 2012 and the segment is not making a profit. Nevertheless, bottom mussels provided value-added of €5.9m in 2012

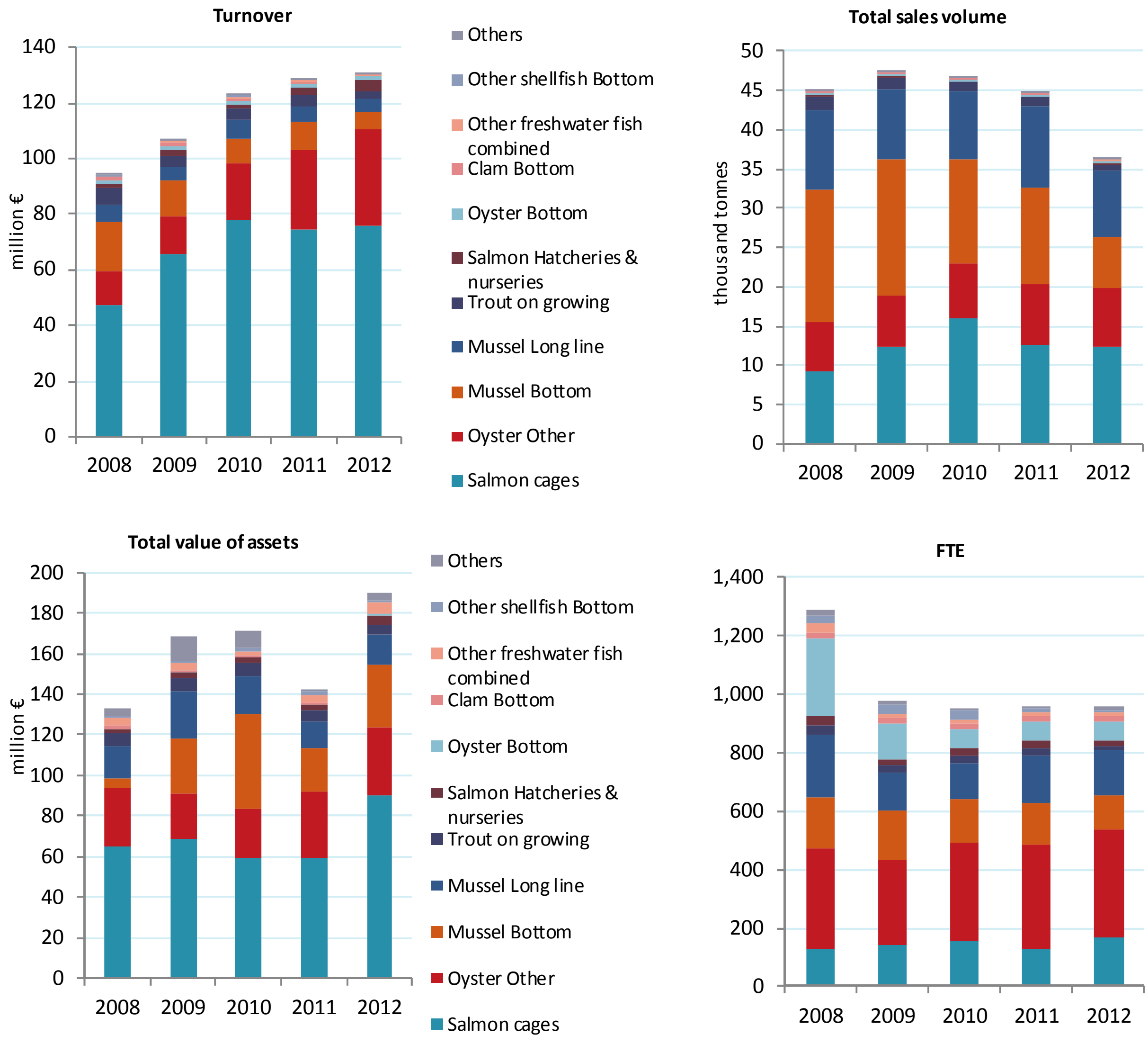


Figure 4.14.6 Structural development of Irish aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

__Segment 4: Rope (Long-Line) Mussels__

Production of mussels on ropes amounted to 8,600 tonnes in 2012 with a corresponding income of €5.0m. This reflects the relatively low unit value of product to costs and the segment made substantial losses relative to its size in 2012.

Table 4.14.4 Economic performance of main Irish aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Salmon cages								
Total income	47.1	65.4	77.6	76.6	76.8	100%	0%	15%
Gross Value Added	12.7	17.0	23.6	24.5	23.1	30%	-6%	19%
Operating cash flow	5.1	3.6	10.2	20.3	1.3	2%	-94%	-87%
Earning before interest and tax			9.3	19.4	-0.6	1%	-103%	-104%
Net profit			9.3	19.4	-0.6	1%	-103%	-104%
Total sales volume (thousand tonnes)	9.2	12.3	15.9	12.5	12.4		-1%	0%
Oyster Other								
Total income	12.5	18.4	20.8	30.0	38.0	100%	26%	86%
Gross Value Added	3.8	5.2	10.9	16.4	26.9	71%	64%	197%
Operating cash flow	-5.5	0.0	5.5	9.8	20.7	55%	112%	740%
Earning before interest and tax	-6.9	-1.4	4.0	8.2	18.9	50%	131%	1828%
Net profit	-7.0	-1.5	3.9	7.8	18.4	48%	135%	2209%
Total sales volume (thousand tonnes)	6.2	6.5	7.1	7.7	7.4		-4%	7%
Mussel Bottom								
Total income	17.3	13.2	9.2	10.7	8.6	100%	-20%	-32%
Gross Value Added	2.5	2.8	5.0	4.1	5.9	69%	44%	65%
Operating cash flow	0.0	0.3	1.4	1.2	2.6	31%	128%	268%
Earning before interest and tax	-1.6	-1.4	-7.8	0.4	0.7	8%	52%	126%
Net profit	-2.7	-2.0	-9.4	0.3	-0.4	-5%	-235%	88%
Total sales volume (thousand tonnes)	17.0	17.5	13.2	12.5	6.5		-48%	-57%
Mussel Long line								
Total income	6.8	5.5	6.6	11.1	5.0	100%	-55%	-33%
Gross Value Added	3.4	3.9	4.7	2.9	1.6	32%	-46%	-58%
Operating cash flow	0.8	1.6	1.6	-3.3	-0.8	-16%	76%	-485%
Earning before interest and tax	0.6	1.2	0.8	-4.5	-1.8	-36%	60%	-273%
Net profit	0.6	1.1	0.4	-4.6	-2.1	-41%	56%	-220%
Total sales volume (thousand tonnes)	10.1	9.0	8.8	10.1	8.6		-16%	-10%

Source: EU Member States DCF data submission

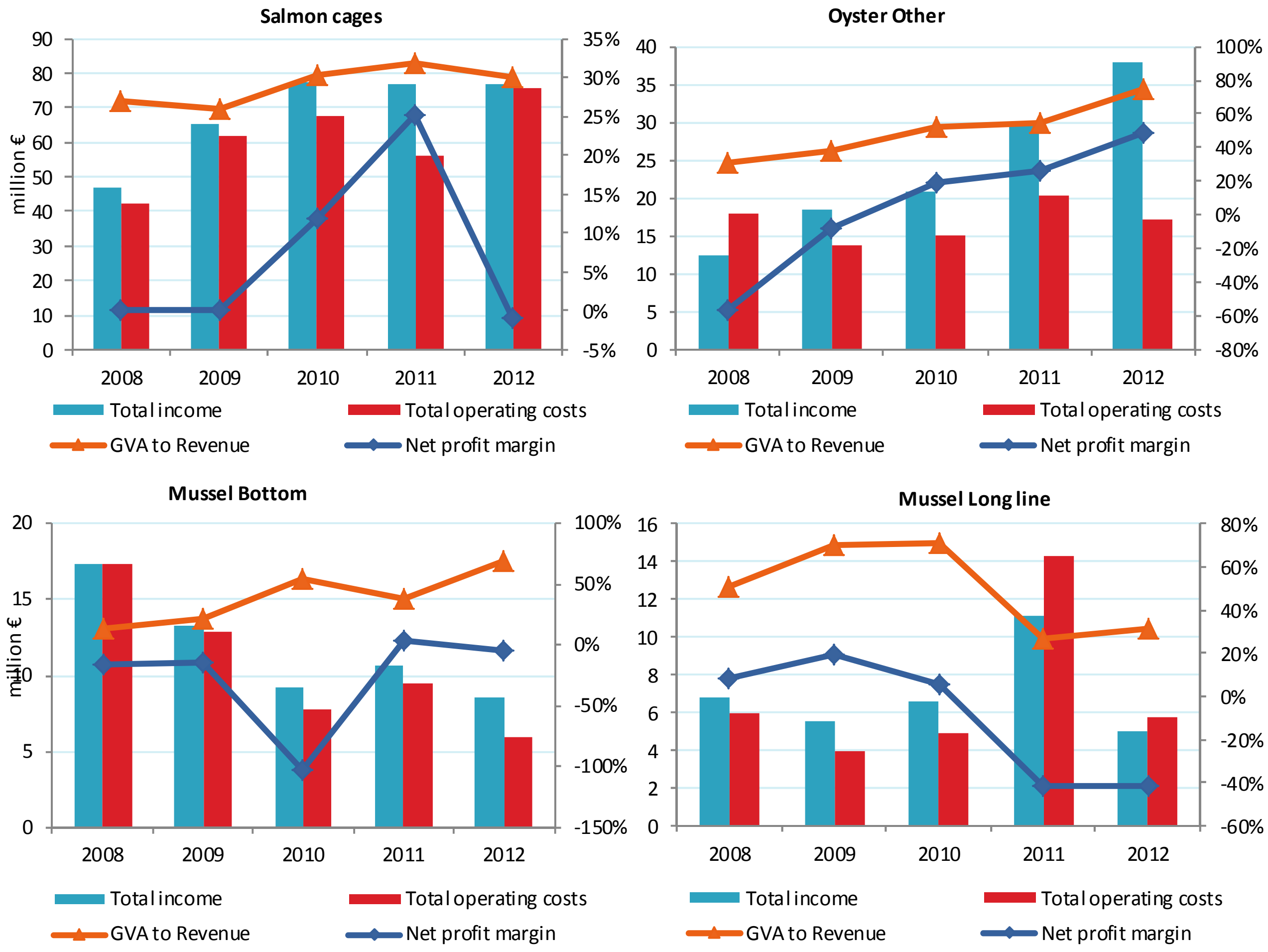


Figure 4.14.7 Economic performance indicators for the main Irish segments: 2008-2012.

Source: EU Member States DCF data submission

Segment 1: Salmon

The salmon segment shows the traditional cost composition for a sea-based finfish aquaculture industry, where the main cost components are wages/salaries and feed in almost equal part and accounting for 55% of the total operational costs.

Segment 2: Oysters Other

In the segment producing *gigas* (pacific cupped) oysters, the cost components wages/salaries and the imputed cost of labour amount to 43% of cost and livestock accounts for 30%. The imputed cost of labour – labour provided by owners who take their return as profit – at 8% shows the artisanal nature of much of the production.

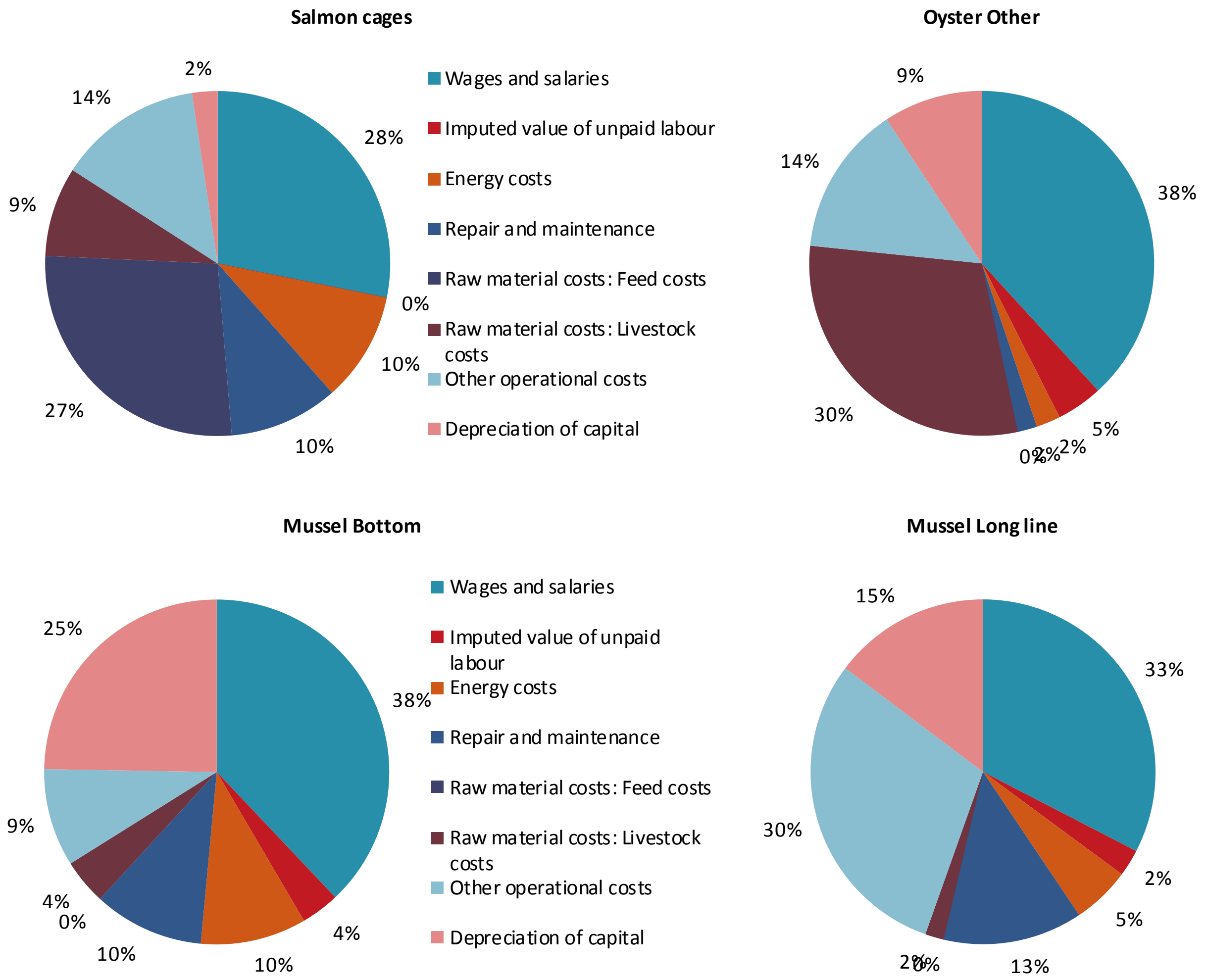


Figure 4.14.8 Cost structure of the main segments in Ireland: 2012.

Source: EU Member States DCF data submission

Segment 3: Bottom Mussels

In the Bottom Mussel segment wages/salaries take 38% of turnover. The high proportion allowed for depreciation, 25%, and the relatively low imputed cost of labour of the owner indicate the extent of use of vessels and other capital equipment. Energy and repair/maintenance costs are equal third in importance.

Segment 4: Rope (Long-Line) Mussels

Labour costs accounted for 35% of turnover in 2012, but the difficulties of the segment are underlined by a level of other operational costs at 30%. The relative size of the figure can be attributed to the continued labour intensity, relatively large number of uncoordinated small companies and lack of growth in product volume or value. Depreciation of capital is the third most important component of costs at 15%.

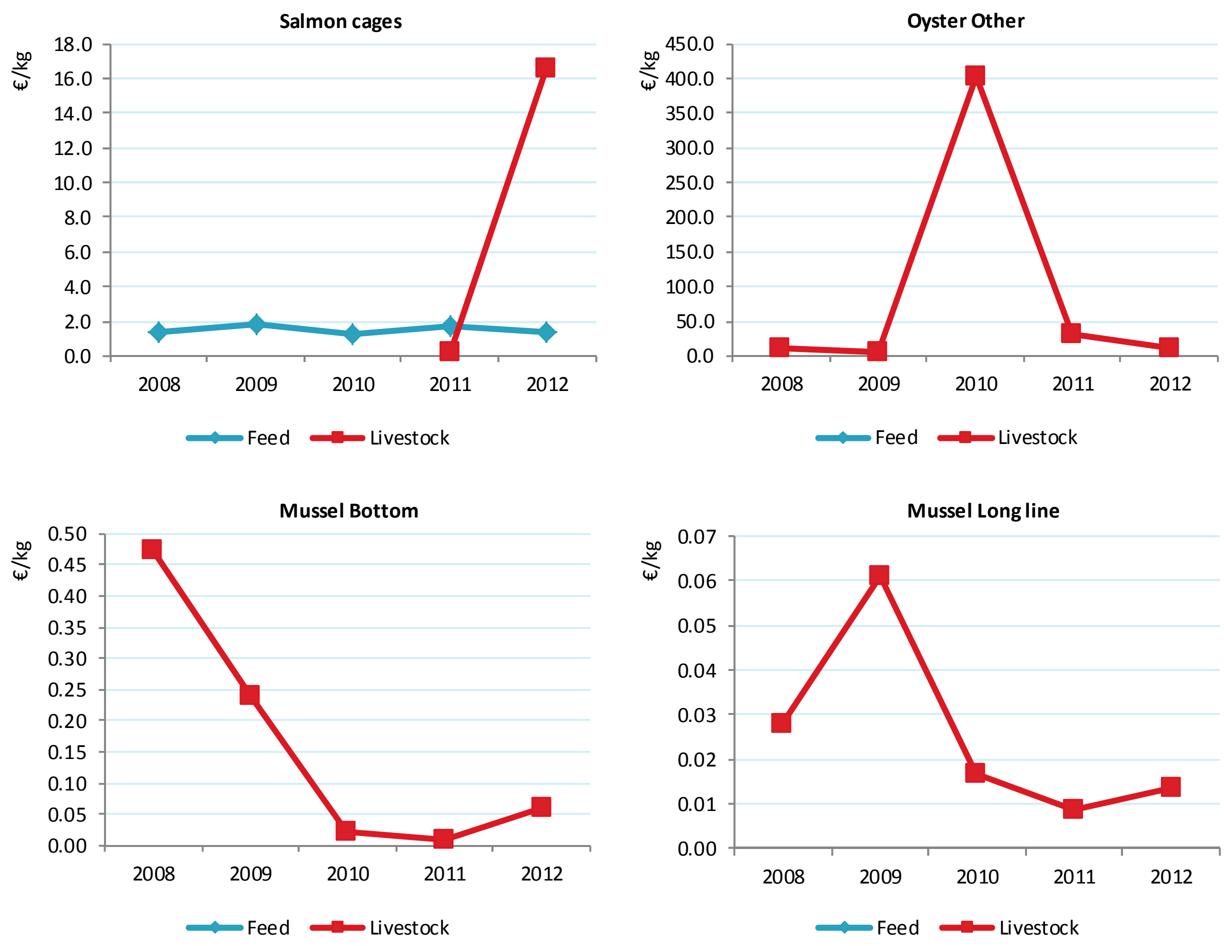


Figure 4.14.9 Feed and livestock prices for the main Irish segments: 2008-2012.

Source: EU Member States DCF data submission

4.14.6 Trends and triggers

Current production trends and main drivers

Aquaculture production volume value and employment continue to decline while production unit value for the R.O.I. continues to increase in 2013. This is due to a number of factors, some environmental, some peculiar to particular subsectors but the overriding principal issues for most subsectors is licencing, disease control and seed supply.

Approximately 80 % of all current aquaculture licenced sites occur within or adjacent to SACs. The application process for new licenced sites and for licence renewals of existing sites has been very slow, taking up to a period of more than 10 years to complete in some cases, within these areas. State investment, in the form of grant aid, is only possible for companies with up to date licences. Many operators, tied up in the bottlenecked application process, do not. The process has been reviewed and there has been a marked improvement in licence decisions throughout 2012 and 2013 though the salmon and oyster sectors in particular suffer from a lack of available production sites .

The occurrence of disease/parasite induced mortalities in juvenile stock, hamper production volumes of the salmon, oyster and clam segments. Seed supply is the single biggest issue affecting bottom mussels and scallops and to a lesser extent gigas oysters. In the case of the latter, seed supply almost exclusively must come from abroad, thereby opening channels for the importation of disease. Product supply disruption from red tide induced Bay closures and a weak Market demand, product quality difficulties related to harvest methods and production costs had curtailed the production volume and value of the rope mussel segment.

A continuing strong market for organic salmon and Irish Oysters will help offset the challenges facing production volume as a whole, in the 2013-2014 period.

Market structure

There has been a gradual reduction in the total number of companies as well as the total number employed in the sector as a whole. The reduction and consolidation as occurred specifically among the '1-5' employee and '10 plus' employee enterprise while medium size ('6-10' employee) enterprises increased over the 5 year period as previously stated. In the case of the Rope mussel, gigas oyster trout and salmon subsectors, there has been a consolidation and reorganisation of businesses and in the ownership and management of production units. In the case of other subsectors such as scallops, clams and bottom mussels, entity population decline has occurred because companies have either wound up or transferred to more economically viable cultures, depending on site suitability and licence conditions

Costs have rose steadily over the 5 year period, principally in energy, feed and other operational costs, such as costs of stock healthcare disease and parasite prevention and control. The latter is a significant cost for the salmon and Oyster subsectors. Energy in the form of fuel costs are an increasing issue in the bottom mussel industry where boats must search harder and longer for increasingly elusive seed mussel beds

Investments

Funding, under the NDP,BIM programs and the EFF, to the amount of € 7,19 million has supported a total investment of €19.68 million in the sector, using several grant schemes, over the 2008 to 2012 period. In 2012 alone, the state and EMFF contributed € 546,456 to a total investment in aquaculture of € 940,858. The uptake on the schemes is limited mainly to businesses outside of Natura 2000 (SAC) areas and whose licences are in date. As mentioned previously, many licence renewal applications in SAC areas, had been bogged down in red tape but the process is improving.

There have been investments in the oyster subsector by French and indigenous companies in the last 5 years. The French investment has taken the form of partnerships with local licence holders or the acquisition of sites licenced in their own name. Investment in the salmon industry has taken the form of investment in moribund sites and the re-launch of production units under new management or revitalised companies. There has also been investment in new technology, in Healthcare, animal welfare, feeding and harvesting technologies and for gathering and growing stock. New technology for harvesting and handling of product has been made in the salmon and rope mussel subsectors.

There are individual companies in all sub sectors who have successfully branded their produce, whether in fresh form or value added products as unique to the Bays they were produced in or to the companies that grow the product. These companies have moved to sell directly into the consumer market and away to simply selling indistinguishable bulk product to a middleman.

Issues of special interest

Salmon

BIM is awaiting the outcome of its application to obtain an offshore salmon production licence for a twin unit producing between them, of up to 15,000 tonnes, to the lee of the Aran Islands, in outer Galway Bay. If successful the licenced site would be tendered out to a company prepared to operate under specific conditions of sustainability, environmental protection and of maximum socio-economic gain. This anticipated maximum production would more than double current national production. Other offshore sites are being studied for their potential as smaller salmon growing units as the move offshore is seen as the best way to develop and increase ‘organic’ production to the current under supplied market.

Seaweeds

The main technical focus in seaweed cultivation has been with the red and brown weeds. The red ones of interest are *Porphyra umbilicalis* and *Palmaria palmata*. The efforts to cultivate these species in tanks show that there are technical challenges still to be overcome. The brown weeds include *Alaria esculenta* and *Saccharina latissima*. The life-cycle of these brown weeds is well understood and manipulation in the marine hatchery is easily carried out. Grow out of these brown weeds at sea is carried out using long lines and a density of 8kgs per linear metre can be achieved at harvest. The main challenge with the red weeds is to achieve tank grow out conditions that mirror the wild environment. Also to achieve successful manipulation of the life-cycle to allow seeding on artificial grow out structures. From a regulatory perspective, we observe that seaweed cultivation is a benign activity and seaweeds carry out a bioremediation function in the sea and as such are useful for mopping up nutrients. For example, seaweed and salmon or mussel farms together can co-exist in a mutually advantageous way. Integrated Multi-Trophic Aquaculture (IMTA) describes the arrangement whereby species are co-cultured for mutual benefit. IMTA allows the by-products, including waste, from one aquatic species to be the input (fertilizer, food) for another. The regulation of seaweed farming needs to take account of the fact that this is essentially a beneficial activity and licensing should not be impeded on environmental grounds. The future of seaweed farming in Ireland looks bright and there is good interest in seaweed farming at locations on the west and south west coasts. New designs for seaweed farming structures at sea in exposed sites are planned and these could revolutionise how seaweed is farmed in Ireland and from a European perspective. On land, our efforts are directed towards developing fail safe systems for life-cycle manipulation of red weeds. This requires careful and well-funded research and development and co-operative work with research agencies in other countries also working in this area.

Oysters

In the oyster sector, recent investment has been made in research, in the development of tetraploid stock and in the set up of Irish shellfish hatcheries to produce, in particular, local disease free oyster seed. The first Irish produced seed is due in 2013

Outlook for 2013 and 2014

Aquaculture unit production value is expected to continue increasing into 2014, though at a slower rate as oyster and salmon unit prices stabilise. It is more difficult to predict if production volume and employment for the R.O.I. over the period to 2014 is likely to grow . Volume increase overall will depend primarily on the tough environmental conditions experienced off the Irish coast; disease and parasites come with warm weather, frequent high winds prevent or curtail salmon feeding. Specifically salmon volume should increase if producers have the opportunity to treat their stocks affected by Gill Amoeba with fresh water, access to which is problematic with so many affected stakeholders. Salmon volume would certainly increase if recently lodged licence applications prove successful. These are still under review in September 2014 and therefore such new sites would not have a significant effect until 2016. Bottom mussel production will probably increase from 2015 as seed beds have been found and are being relaid into licenced ground in 2014. Some temporary growth in unit value is expected in the rope mussel sector due to shortages in the market in 2014. The biggest threat to the growth of the oyster sector is disease. Despite intensive research, no pattern has been observed in the viral induced mortality of oyster seed to suggest a control strategy.

One strategy underway is the development of local disease free stock seed hatcheries to be in production in 2013 or 2014.

4.14.7 Data Coverage and Data Quality

Data quality

Segment data as far as possible is homogenous and representative. Segment amalgamation has occured among the smallest subsectors, due to the tiny populations involved and the need to honour confidentiality. The diversity between these amalgamated subsectors is at the expense of homogeneity within the new segment.

Variables surveyed by census; production and employment data, is based or derived from an 80 % return rate or more by entity number of the total population of aquaculture practitioners for the period 2008 to 2012. In 2012 the census return rate was 88%. As the proportion of entities not returning tend to be small producers, the proportion of national tonnage and turnover required to be estimated is therefore smaller again. The 80 % return rate from producers has been consistent as has the method of estimating the production of non returnees; either using estimates from the local aquaculture officer or the most recent data of the company held and estimating current production using the general percentage trend of the 'indicator companies' of the area. These are the nearest companies in the sector of the non returnee that provide consistently complete and reliable data.

Operating costs variables have been more difficult to get consistent and reliable data for as these can only be obtained from the producers themselves or from their accountant. The majority of companies are small with just one to two full time staff, including the directors and therefore accountant hire is kept to a minimum. Such Companies are only obliged by law to submit abridged accounts to the Company Registration Office, from whose website and others, abridged accounts can be accessed. Despite the legal restrictions, 'Financial' variables such as Turnover, assets, liabilities and depreciation are available online for most companies and can be used to validate the data from survey forms. Currently the percentage return rate for the frame population (commercial entities) of the sample survey(financial variables) for 2012 varies from 23% (income variables) to 11.07% (operating costs variables; 'energy costs' and 'Repair & maintenance' costs). For 2008 the return rate for sample survey ranges from 10-11% while 2009 sample survey variables range from 11 to 15 % of the frame population. The sample survey targeted a minimum of 20% of the frame population for the five year period. Other data sources used are the company registration office, the Central Statistics Office and BIM in house data acquired from regional staff or in the course of BIMs work program.

Data availability

The census survey of production and employment of the previous year, along with the sample survey of financial and operational costs variables begins in early January by post and email. The deadline for the census component is usually the end of February or early March.

Approximately 20 % of the producers respond within three weeks of posting. At this point all the non-respondents are contacted by phone by the coordinator and/or by other available staff. A number of calls may be necessary per producer as many are on site during daylight hours in conditions unfit for mobile phone use. Both parties prefer to have the form completed in a suitable environment, at an appointed time when data can be exchanged without error. Some forms nevertheless are filled over the phone on first contact due to time/availability constraints. Others are filled when travelling staff meet producers directly, by appointment or by other opportunity. Data from returned forms are immediately inputted to an Excel database for processing and creation of summary tables and trends graphs.

After the deadline for returns is passed the call to participate in the survey is renewed and a new and final deadline is set. A point is reached, 3-4 months into the survey when returns per collective effort become prohibitive. The list of outstanding non returns is reduced and late returns are accommodated as far as possible, using only the help of the relevant regional officer or specialist officer where appropriate. At this stage, a provisional summary of employment and production volume/value per cultured species is made. The time taken to achieve the 80% or so, direct response level from producers is a period of 3 to 5 months.

The sample survey of financial costs can take up to a year or more to complete as it relies upon the availability of financial accounts either directly from producers or from websites. The data required by Eurostat, FAO and OECD, corresponding to that of the census survey therefore is available generally by June and the remaining variables required for DCF become available at provisional level at least, early the following year and several months before the data call.

Confidentiality

Apart from the four main segments of Irish Aquaculture, containing the majority of producers previously described, there are a number of other producers engaged in a diverse range of aquaculture practices. This has implications for segmentation structure, data homogeneity and confidentiality. Small numbers of such enterprises were available to make up homogenous segments, back in 2008. A minimum of 4 enterprises per segment was set to protect the data of the individual enterprises involved. Over the five year period, some of the enterprises of these minor segments have either gone out of business, amalgamated or switched to a different culture that compelled their transfer to a different segment. In order to protect the data confidentiality of the remaining enterprises, amalgamation of some minor segments became necessary at the expense of segment homogeneity as stated.

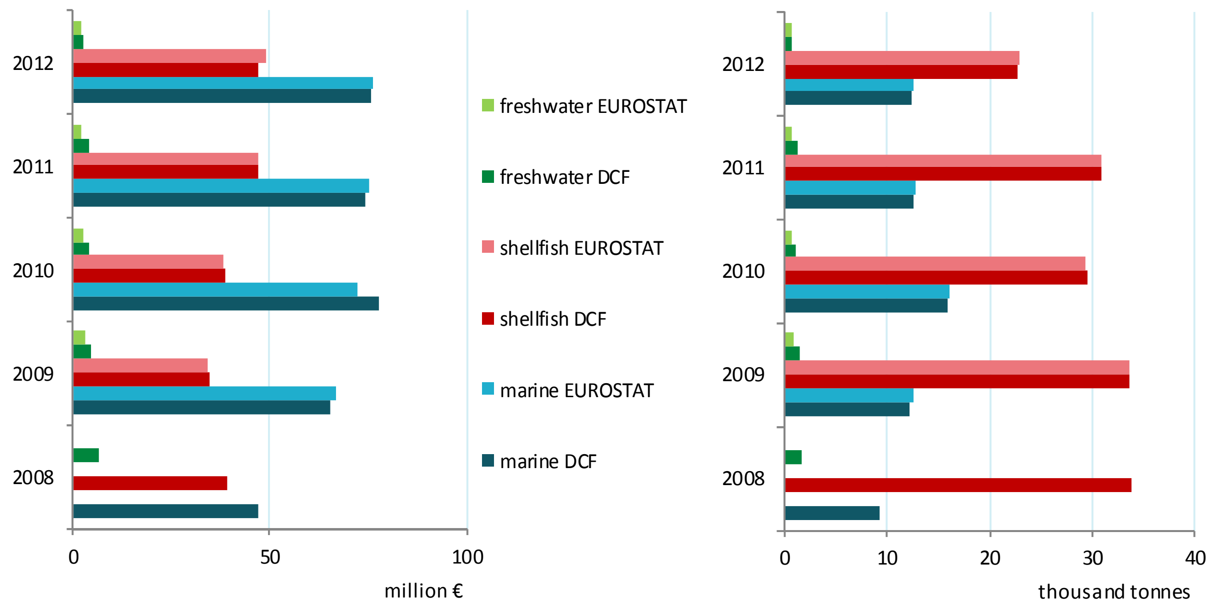


Figure 4.14.10 Comparison of DCF data with EUROSTAT data for Ireland: 2008-2012

Differences in DCF data compared with other official data sources

The production and employment data gathered in the census survey for the DCF is also used to supply Eurostat and FAO data requirements. The data scale and breakdown is therefore similar between all three ways of reporting the shared variables. The latter two bodies however receive this data earlier than the DCF and act as a provisional display of the latter. FAO Data is gathered 10 months ahead and Eurostat data, 7 months ahead of the DCF call. DFC data is from purely commercial entities. Eurostat is concerned simply with total figures, with FAO production data differentiating between production for immediate consumption and farther treatment. This has implications on how the same Irish data is organised between the DCF method of data segmentation and Eurostat/FAO. The overall production tonnage and value reported for the Irish DCF segment 'Oyster other', for example, has to be divided into a production ready for consumption and a tonnage for farther ongrowing for FAO. The Eurostat model is a 'catch all' rather than an economic population (DCF) therefore for Ireland, the Eurostat total production figure may sometimes be greater than that for DCF.

4.15 ITALY

4.15.1 Summary

Production volume and value

In total, the Italian aquaculture sector produced 191,181 tonnes in 2012, which corresponded to a increase of 22% from 2011 to 2012. On the other hand, the total value of the production was 465 million euros in 2012, which correspond to an increase of 10% over the same period. From 2008 to 2012, the total volume decreased by 12%, whereas the total value decreased by 10%.

Overall industry structure and employment

The Italian economic situation, during the last tree years, has taken two opposing effects: many companies have abandoned their activity and, thus, many are currently in liquidation or already closed; others, those with a social structure more solid and far more diversified, have embarked on a phase of transformation that led to a renewal / modernization of facilities, encouraging too much concentration. Variation in the amount of farms that registers from 2008 to 2012 is due to the reorganization of molluscs companies: in the past there were many "individual" farms that currently have joined in consortia, in multiregional enterprises and PO (Producers Organizations). Actually, in 2012, the total population of aquaculture farms was 813, which was distributed on 587 enterprises. The Italian aquaculture sector is dominated by small enterprises with less than 5 employees. 55% of the Italian enterprises had less than 5 employees, 24% of the enterprises had 6-10 employees and the 20% was represented by enterprises had more of 10 employees, in 2012.

Main segments

The production in Italy can be divided into nine main segments. The largest segment, in terms of volume of gross sales production, is mussels produced by long line technology , while the most important segment in terms of turnover is the "trout on growing". This segment is the second in terms of volume of production and it is characterized by fattened juveniles and their sales; in some cases inside of the land based farms are "in-house" hatcheries, where produce small portion trout for auto-consumption in terms of fingerlings/juveniles . The production techniques used are primarily ponds, tanks and raceways. The third segment is represented by clam on bottom. In order the others sectors are represented by cultured sea bream and sea bass in on growing, cages and combined technologies.

Current production trends and main drivers (Trends and triggers)

In a context of continuing economic crisis, the domestic consumption of fresh fish products marked a decrease of 3%, in 2012. With regard to farmed seafood products, it has been registered the decrease of domestic sea bass (1.8%); the consumption of sea bream appeared more stable (0.3%), the consumption of shellfish has been decreased, mainly for clams (-7%) rather than for the mussels (-3.2%). In contrast the data on trout (5.3%) and especially salmon (13.8%).

Outlook

The outlook for the short period should be distinguished according to the three macro-aggregates Italian aquaculture. In the case of aquaculture of marine fish, (both on land and in sea cages), the prevision is represented by an increase in production not exceeding 1% per year. For the segment of freshwater aquaculture, growth is pretty low almost zero, as the sector push much on the diversification of products offered to consumers. The target market supply of freshwater is different: a lot of production is exported to

Central Europe. Finally, the segment of shellfish is expected to have a slight growth between 0.8% and 1% per year, because the producers push for the strength production value.

4.15.2 Production and sales

In 2012, total Italian aquaculture production amounted to 191.2 thousand tonnes in volume, and around 465 million Euros in value. Both volume and value are fluctuating over the period 2008-2012 but considering only the last two reporting periods, the sector shows a increase: 22% and 10%, respectively, in volume and value terms.

Table 4.15.1 Production and sales for Italy: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***222.6***	***217.2***	***270.8***	***157.0***	***191.2***	*22%*	*-12%*
Marine	12.6	14.1	16.2	12.1	11.7	*-4%*	*-15%*
Shellfish	97.9	89.4	173.7	83.7	109.5	*31%*	*-2%*
Freshwater	112.1	113.7	80.9	61.3	70.0	*14%*	*-24%*
Hatcheries & nurseries							
Sales value (million €)	***439.5***	***608.4***	***585.3***	***422.9***	***464.9***	*10%*	*-10%*
Marine	113.2	125.8	138.5	70.6	79.9	*13%*	*-29%*
Shellfish	68.7	149.7	182.9	146.3	135.3	*-8%*	*-1%*
Freshwater	257.6	332.9	264.0	206.0	249.6	*21%*	*-6%*
Hatcheries & nurseries							

Source: EU Member States DCF data submission

The most representative macro-sector is shellfish, in volume but according value performed, the freshwater is the most incident on the total supply. during 2012 the freshwater sector increased both in volume and value performance. The shellfish sector was increase in quantity produced, even in terms of the value this macro-segment has decreased. The lower the value recorded, compared to an increase in volumes, detects a loss of value recognized by the market. In case of shellfish, only in part the abundance affects the price: the many influences affected by intermediaries who sell the product wholesale. The only segment that showed a decrease is the marine one, which has decreased in volume 4%, but has strengthened its market value, increasing by 13% . The average price of marine species is recovering (around 6.8 Euro/kg), although it does not reach the maximum values of 2008 where it was around 8.9 Euro/kg.

It's not information about nursery/hatcheries performance, although the segment is very important. For marine species, Italy is capable of producing the necessary quantities and abundant production that used to export the fry/juveniles in other countries. The trend in recent years is to export fry/fingerlings especially in extra-EU North-African countries. For the freshwater sector, the situation is different: Italy satisfies only in part the demand of fry, so it imports large quantities from other European countries.

In 2012, the Italian trade balance of fish marked registered a reduction in the deficit (-4%). The same was for the negative balance in volume, decreased by 6%. Specifically, total imports were down 6% in volume and around 5% in value compared to 2011. Total exports decreased by 7% in volume and 10% in value, in 2012 . On detail: slight decline in exports (-1.3%) for trout, live, fresh or chilled; 8.3% increase in exported mussels, (the mussels represent the most exported aquaculture product in terms of volumes); 8% reduction in imports of sea bass; increase of 12% of imported sea bream.

4.15.3 Industry structure and employment

The Italian aquaculture sector has been affected over the last decade by a metamorphosis in terms of production structure, size of existing enterprises and number of employees by segment of production. The change was most evident from 2007-2008, since which the Italian economy has started to go through a phase of particular difficulty, involving all sectors of production.

The transformation phase that has hit the industry tends to renovate the structures and modernize them to encourage concentration phenomena, which can contribute to the formation of more solid, more modern, more efficient and more competitive companies.

Italian aquaculture is characterized, at Mediterranean level, by a high level of specialization, high degree of industrialization and large-scale organization. Total legal entities in the aquaculture sector numbered 694 in 2008, the beginning of the analysed period, but has then decreased to 587 in 2011 and in 2012, too (-15%). The Italian aquaculture sector is mainly represented by small size enterprises, dominated by family run businesses with no more than 5 employees (54%).

The trend over the period 2008-2012 continues to be negative, although in the last two years, the data show the same number of fish and shellfish farms. As regards the total employees, the little increase is recorded (2%), but the female employees was decrease about 20%, after previous period in which was registered positive performance.

The shellfish sector is the most important, accounting for 3,774 persons employed, equal to 74% of the total work force. The ‘legal status’ firms in the shellfish segment are 392 and they are mostly co-operative organizations, where every worker is also a member of the organization, and consortiums operate through a government grant aimed at managing the marine environment.

Table 4.15.2 Structure of the Italian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*694*	*696*	*692*	*587*	*587*	*0%*	*-12%*
<=5 employees	366	366	366	315	325	*3%*	*-8%*
6-10 employees	174	175	166	138	140	*1%*	*-14%*
>10 employees	154	155	160	134	122	*-9%*	*-19%*
Employment (number)							
Total employees	4,377	5,885	5,836	5,076	5,164	*2%*	*-2%*
Male employees	4,053	5,459	5,299	4,032	4,325	*7%*	*-8%*
Female employees	304	425	537	1,044	834	*-20%*	*44%*
FTE	3,428	3,612	2,839	2,116	1,937	*-8%*	*-35%*
Male FTE	3,155	3,324	2,676	1,914	1,778	*-7%*	*-36%*
Female FTE	273	288	163	203	160	*-21%*	*-31%*
Indicators							
FTE per enterprise	4.9	5.2	4.1	3.6	3.3	*-8%*	*-26%*
Average wage (thousand €)	34.9	29.6	38.8	31.0	37.0	*20%*	*10%*
Labour productivity (thousand €)	-14.0	57.8	83.1	73.6	106.2	*44%*	*112%*

Source: EU Member States DCF data submission

As far as the fish-cultured species (marine and freshwater), the most representative segments are "trout combined" and "sea bass and sea bream" in tanks and cages. In particular, sea bream and sea bass fish farms are capital intensive, using high value-added technology.

Investment in these segments is heavily directed towards adopting more eco-friendly technologies to help lessen their negative environmental impacts. Health care and safety costs, as well as union agreements, make this segment one of the sectors with the highest labour costs among European countries and other direct competitors in the Mediterranean region.

Total employment amounted, in 2012, to 5,164 persons and to 1,937 FTE. FTE is about 38% of total employment, meaning that the seasonal work is very important. Especially for the shellfish production most of workers are called to work only for limited periods (seasons) while for both freshwater and marine fish farming, full-time and dependent employment is prevailing. Male employment is predominant on the whole: about 84% if considering the number of employees and 92% if considering the FTE. This means that the male full-time jobs are more than the female ones.

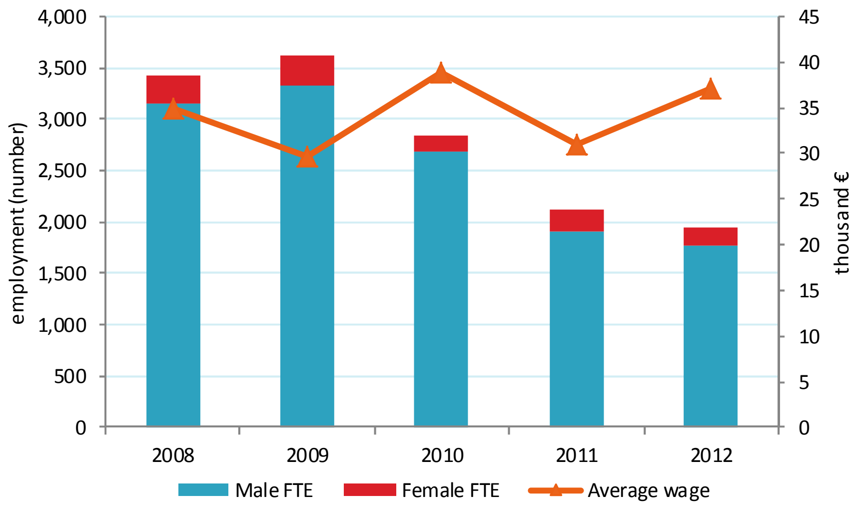


Figure 4.15.1 Employment trends for Italy: 2008-2012.

Source: EU Member States DCF data submission

The average wage is fluctuating over the 2008-2012 period, ranging between the lower value reached in 2009 equal to 29 thousand Euros and the higher value registered in 2010, equal to about 38 thousand Euros. In 2012 the average wage shows a increase (20%).The economic performance shows a good indicator of labor productivity per employee (up 44%).

Surely the Italian aquaculture can achieve higher levels of productivity and to ensure, in the short to medium term (3-5 years), significant increases in employment.

Many strategic choices of the sector will be linked to the strategy which will be implemented the goals of the European Maritime and Fisheries Fund (EMFF).

The Italian aquaculture sector has the capacity and potential of the right to grow both in tons produced and thus increase significantly the employees.

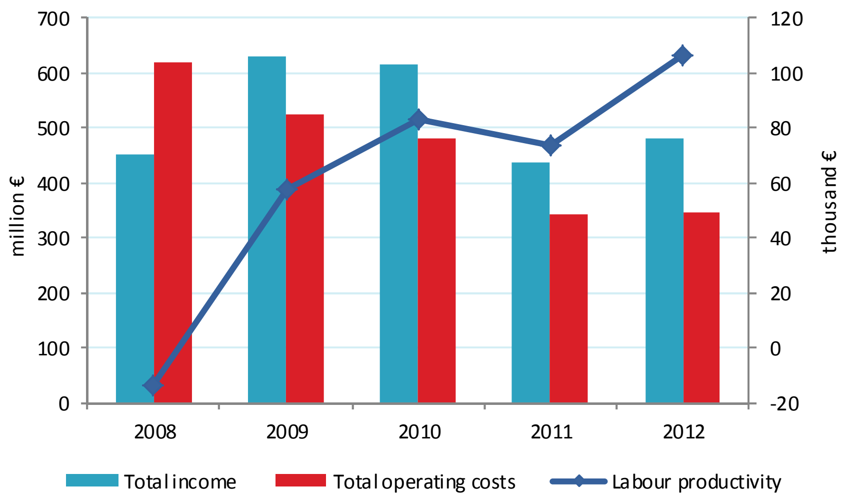


Figure 4.15.2 Income, costs, wages and labour productivity trends for Italy: 2008-2012.

Source: EU Member States DCF data submission

In 2012 the total income of the Italian aquaculture sector was equal to 482 million Euros: 96% of which represented by turnover, 3% by other income and 1% by subsidies.

If looking at the overall period, after an increase in 2009, when the total income of the sector was about 639 million Euros, a declining period has started. In 2012 an increase of 11% is registered if compared to the 2011 level, but on the total observed period the performance is negative (-10%) again.

As far as the cost, operating cost in 2012 amounted to 345 million Euros, representing about 72% of total income. The most important cost item is the raw material, accounting for about 37% of total income (52% of total operating costs). Cost for livestock represented the main part of costs (107 million Euros in 2012).

4.15.4 Economic performance

The expenditures are dominated by cost of livestock(22%) and feed (15%) and cost of wages and salaries (15%), in 2012; but an important percentage is represented by energy costs that registered a high increase in 2012 (more 12% compared to 2011). The expenditures to feed and livestock have been rather constant, whereas the expenditures for livestock is significantly decrease (-26%). Instead, the maintenance and energy costs have been increasing from 2008 to 2012. The total expenditures make up for 71% of the total income.

Table 4.15.3 Economic performance of the Italian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	439.5	608.4	585.3	422.9	464.9	96%	10%	-10%
Other income	10.7	18.3	21.6	10.2	14.5	3%	41%	-5%
Subsidies	2.7	3.0	9.7	2.6	2.7	1%	4%	-39%
Total income	*452.9*	*629.7*	*616.6*	*435.8*	*482.1*	*100%*	*11%*	*-10%*
Expenditures (million €)								
Wages and salaries	108.9	103.5	109.4	64.7	71.4	15%	10%	-26%
Imputed value of unpaid labour	10.6	3.4	0.7	0.8	0.4	0%	-52%	-90%
Energy costs	35.7	77.4	24.0	38.9	51.2	11%	32%	16%
Repair and maintenance	16.4	32.7	8.7	15.4	25.3	5%	65%	38%
Raw material: Feed costs	163.1	166.0	146.4	66.7	72.8	15%	9%	-46%
Raw material: Livestock costs	250.6	102.4	135.1	145.4	107.5	22%	-26%	-32%
Other operational costs	32.3	39.3	56.9	10.9	16.8	3%	54%	-52%
Total operating costs	*617.7*	*524.7*	*481.2*	*342.9*	*345.3*	*72%*	*1%*	*-30%*
Capital Costs (million €)								
Depreciation of capital	19.8	32.0	35.5	19.5	22.0	5%	13%	-18%
Financial costs, net	36.5	13.0	16.7	6.7	6.8	1%	2%	-63%
Extraordinary costs, net	14.4	7.8	7.9	4.0	5.8	1%	47%	-32%
Capital Value (million €)								
Total value of assets	409.9	1409.0	1319.1	700.8	721.7	150%	3%	-25%
Net Investments	39.6	298.0	398.3	239.2	223.8	46%	-6%	-8%
Debt		644.4	757.4	412.7	441.9	92%	7%	-27%
Input & Production (thousand tonnes)								
Raw material: Feed	170.6	130.2	36.2	107.2	79.3		-26%	-29%
Raw material: Livestock	221.3	58.3	3,531.0	28.5	21.3		-25%	-98%
Performance Indicators(million €)								
Gross Value Added	-47.9	208.9	235.8	155.7	205.7	43%	32%	49%
Operating cash flow	-164.8	105.0	135.4	92.9	136.7	28%	47%	225%
Earning before interest and tax	-184.6	73.0	99.9	73.4	114.8	24%	56%	644%
Net profit	-221.2	60.0	83.2	66.8	108.0	22%	62%	3964%
Capital productivity (%)	-11.7	14.8	17.9	22.2	28.5			
Return on Investment (%)	-45.0	5.2	7.6	10.5	15.9			
Future Expectation Indicator (%)	4.8	18.9	27.5	31.4	28.0			

Source: EU Member States DCF data submission

The GVA created by the Italian aquaculture sector has been 205 million Euros in 2012. It represented 43% of total income.

The historical series shows a decrease compared to 2011 of -43%. Even if operating costs show a decrease, the GVA has been affected negatively by the parallel decrease in total income (higher than the decrease of costs).

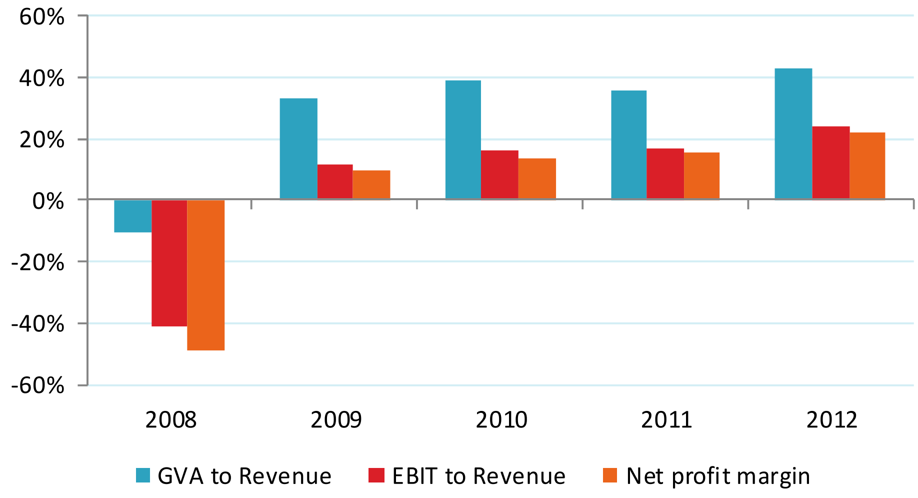


Figure 4.15.3 Economic performance for Italy: 2008-2012

Source: EU Member States DCF data submission

The average GVA during 2008-2012 was around 138 million Euros, and the GVA related to 2012 compared to previous year performance, showed an increase more of 32%. The operating cash flow amounted, in 2012, to about 137 million Euros, increasing around 28% compared to 2011. EBIT is equal to 115 million Euros in 2012, a increase of 24% (compared to 2011). In terms of profit the percentage of EBIT on the operating cash flow increased in 2012, if compared to 2011 (from about 79% to 84%).

4.15.5 Main species produced and economic performance by segment

The main species in volume farmed are for shellfish the Mediterranean mussels and Venus clams, while for the freshwater macro-aggregate the trout was the first cultured fish; finally for the sector of euryhaline species the most farmed species was the sea bass.

On the hand of value, the most important species is the trout and the mussel is one of the last species. The sector of the freshwater is traditionally a driving force for the value product.

Important aspect is that in the segment falls trout rearing of salmon destined exclusively to the production of caviar. Aquaculture Italian is the largest in the world in the production of caviar from farmed sturgeon, exported to more than 90%, but it is also among the world's varieties of farmed species and for the stock of sturgeons in the herd. It should be noted, for fish, a substantial stability of the productions in 2008-2012, with trend growth for the freshwater and decrease for those marine (saltwater), while the shellfish are significant fluctuations over the years, with several production peaks followed by declines, although the last four years 2009-2012 the values are more stable and with a propensity to growth.

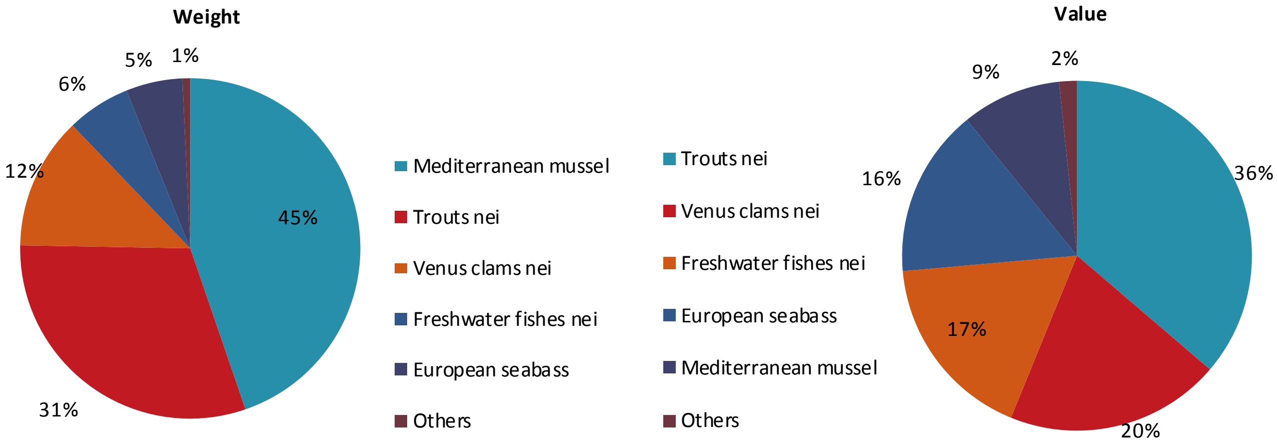


Figure 4.15.4 Main species in terms of weight and value in Italy production: 2012.

Source: EU Member States DCF data submission

The Figure 4.15.5 of the trend in prices, the group of species with the best performance of price is represented by "freshwater fish nei". This group contains the production of sturgeon intended for the production of caviar.

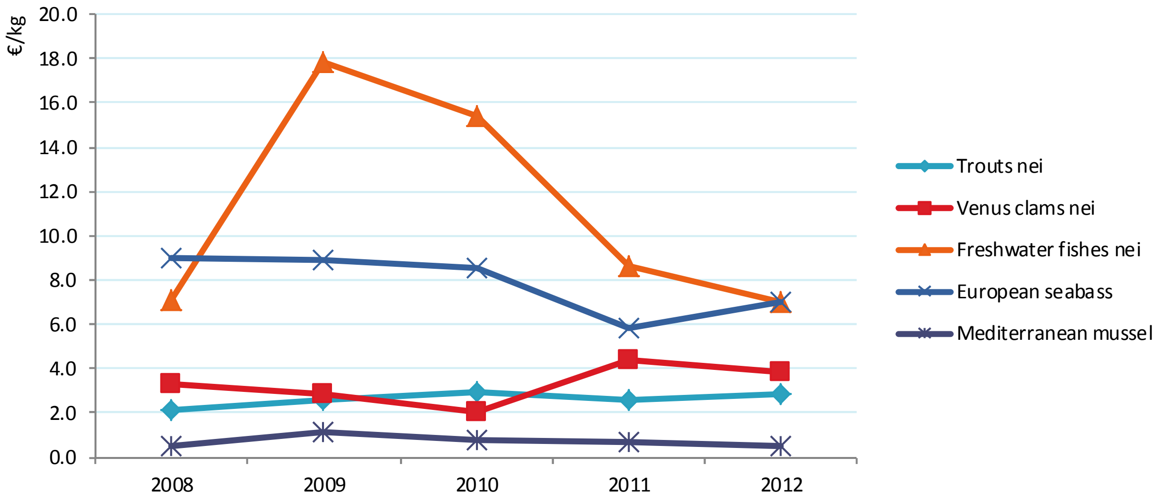


Figure 4.15.5 Average prices for the main species produced in Italy: 2008-2012.

Source: EU Member States DCF data submission

As regards marine species, the most performed was, in 2012, the Mediterranean sea bass, mainly appreciated by consumers. In the Italian market the price of sea bass is strongly influenced by cultured area: the most high price is for sea bass of lagoon (as Orbetello lagoon, where the price maybe around 10 Euros/kg).

The species with lower price is represented by Mediterranean mussel. The average price, on a regional and national level, showed a significant difference in relation to the production area. The companies in Sardinia and Liguria sprouting higher prices, while Apulia producers offered more cheaply mussels. These differences can be attributed to a different quality of product, as well as in social situations and different organizational.

In the 2012 the trout species has registered the higher turnover, 169 million Euros, but in terms of occupied human resources the first representative segment is, in general, shellfish, (mussels and clams)..

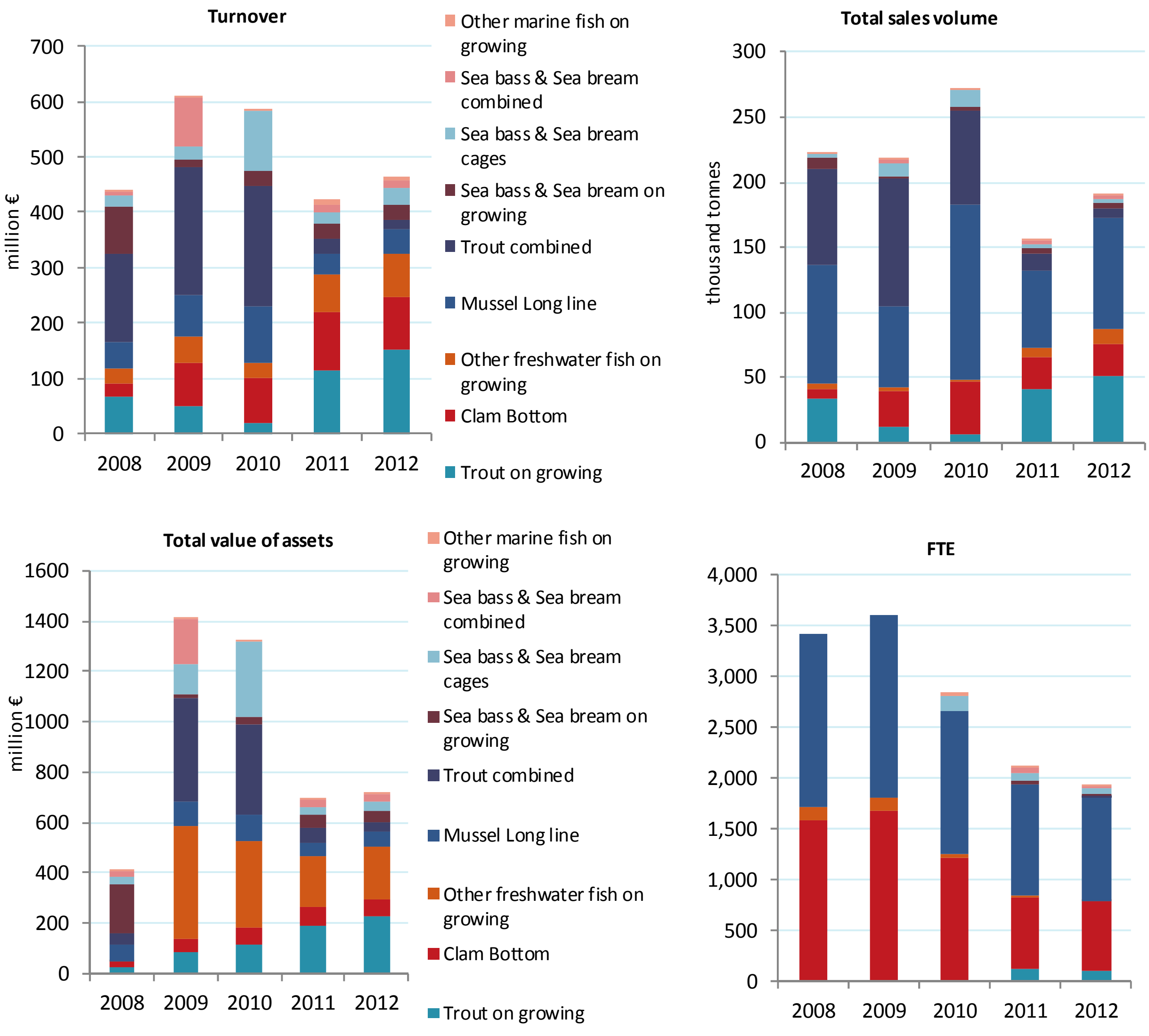


Figure 4.15.6 Structural development of Italian aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

Although the data are collected in Italy for nine different segments, in this chapter four segments have been considered, significant both from the point of view of high input of capital (sea bream & sea bass cages and on growing), from the point of view of number of employees (clams and mussels) and their high degree of specialization (sea bream sea bass cages and on growing technique). Based on the above reasons, the performance of the following product segments is analysed:

- Segment 1: Clam bottom;
- Segment 2: Mussel long line;
- Segment 3: Sea bass & sea bream cages
- Segment 4: Sea bass & sea bream on growing.

The economic performance of the four Italian segments is shown in the next table. There is the need to describe the economic performance of the segments that can be enhanced and strengthened also by future management policies at national and regional level. Another reason, last but not least, is that the four segments can, if they reach a new point of economic and financial stability, ensure the resumption of high quality products and satisfy, in part, the domestic demand for seafood product.

Table 4.15.4 Economic performance of main Italian aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Sea bass & Sea bream cages								
Total income	21.0	27.8	116.0	22.3	31.2	100%	40%	-33%
Gross Value Added	9.2	0.2	23.5	8.8	14.9	48%	69%	43%
Operating cash flow	7.3	-8.5	9.8	6.6	12.8	41%	94%	237%
Earning before interest and tax	6.1	-13.4	-0.4	5.4	11.6	37%	114%	2160%
Net profit	5.7	-14.0	-6.5	5.2	11.2	36%	117%	569%
Total sales volume (thousand tonnes)	1.7	9.9	12.2	2.7	3.8		38%	-43%
Sea bass & Sea bream on growing								
Total income	87.3	11.4	27.0	26.1	29.9	100%	15%	-21%
Gross Value Added	19.9	0.6	10.6	23.8	22.3	74%	-6%	62%
Operating cash flow	3.6	-1.4	5.7	16.4	16.0	53%	-3%	162%
Earning before interest and tax	-1.6	-2.8	5.1	15.1	14.0	47%	-7%	254%
Net profit	-4.3	-2.9	4.9	14.9	13.8	46%	-7%	339%
Total sales volume (thousand tonnes)	9.5	1.5	3.8	5.1	4.2		-17%	-15%
Clam Bottom								
Total income	25.4	79.1	90.5	107.7	98.2	100%	-9%	30%
Gross Value Added	4.0	48.5	80.2	18.2	16.6	17%	-9%	-56%
Operating cash flow	-2.6	38.6	73.4	5.1	3.3	3%	-35%	-89%
Earning before interest and tax	-4.2	37.4	71.4	1.5	1.8	2%	24%	-93%
Net profit	-4.6	36.2	70.5	0.6	1.3	1%	135%	-95%
Total sales volume (thousand tonnes)	7.4	27.1	40.0	24.1	24.0		-1%	-3%
Mussel Long line								
Total income	47.8	77.9	106.1	41.4	44.6	100%	8%	-35%
Gross Value Added	-159.3	26.7	21.5	18.7	21.1	47%	13%	191%
Operating cash flow	-185.5	-3.4	-10.6	9.2	13.4	30%	47%	128%
Earning before interest and tax	-191.8	-7.5	-14.7	6.9	10.3	23%	50%	120%
Net profit	-192.8	-8.1	-15.7	6.4	9.7	22%	51%	118%
Total sales volume (thousand tonnes)	90.5	62.3	133.8	59.6	85.5		44%	-1%

Source: EU Member States DCF data submission

The choice, moreover, is also linked to the level of vertical integration of the segments: in Italy the characteristic of aquaculture fish enterprises is that over 70% of production destined for processing, is done directly within the farms.

As regards the shellfish, it will be analyzed because represent a strong implication with the coastal communities. The mussels and clams sectors are characterized by a complex structure in which still live old traditions and modern capital intensive farming techniques. The process of transformation to modern farming practices (no more local and traditional / artisanal) occurred with the introduction, in the second half of the 80's, a new technique: the long line offshore. The use of new technologies for breeding mussels has allowed to use new spaces. The traditional areas of production, mainly located in coastal areas closely or lagoon (such as the Venetian lagoon, the Gulf of Trieste, the Gulf of Taranto), there are adding many new offshore companies, not longer constrained by environmental and sanitation issues. This has meant that the shellfish industry today represents the main voice production of the Italian aquaculture, although the production is based almost exclusively on mussels (*Mytilus galloprovincialis*) and clams Philippines (*Tapes philippinarum*), limited quantities of clams (*Tapes decussatus*) and oysters (Crassostrea giga and Ostrea edulis). On the hand of market, the fragmentation of supply, added to the lack of producer organizations (PO) sufficiently representative in terms of territory and number, represent a strong weakness for macro-sector of shellfish. Another factor of the inefficiency in the sector is represented to the lack of commercial capacity of the producers: the shellfish farm is responsible almost exclusively of the production aspects, but the marketing and the sales implication are owned almost entirely by intermediaries and wholesalers, so the benefits for the producers are marginal. Finally, the decrease excessive stability of producer prices according to the progressive increase in production costs, also due to the transposition of European directives.

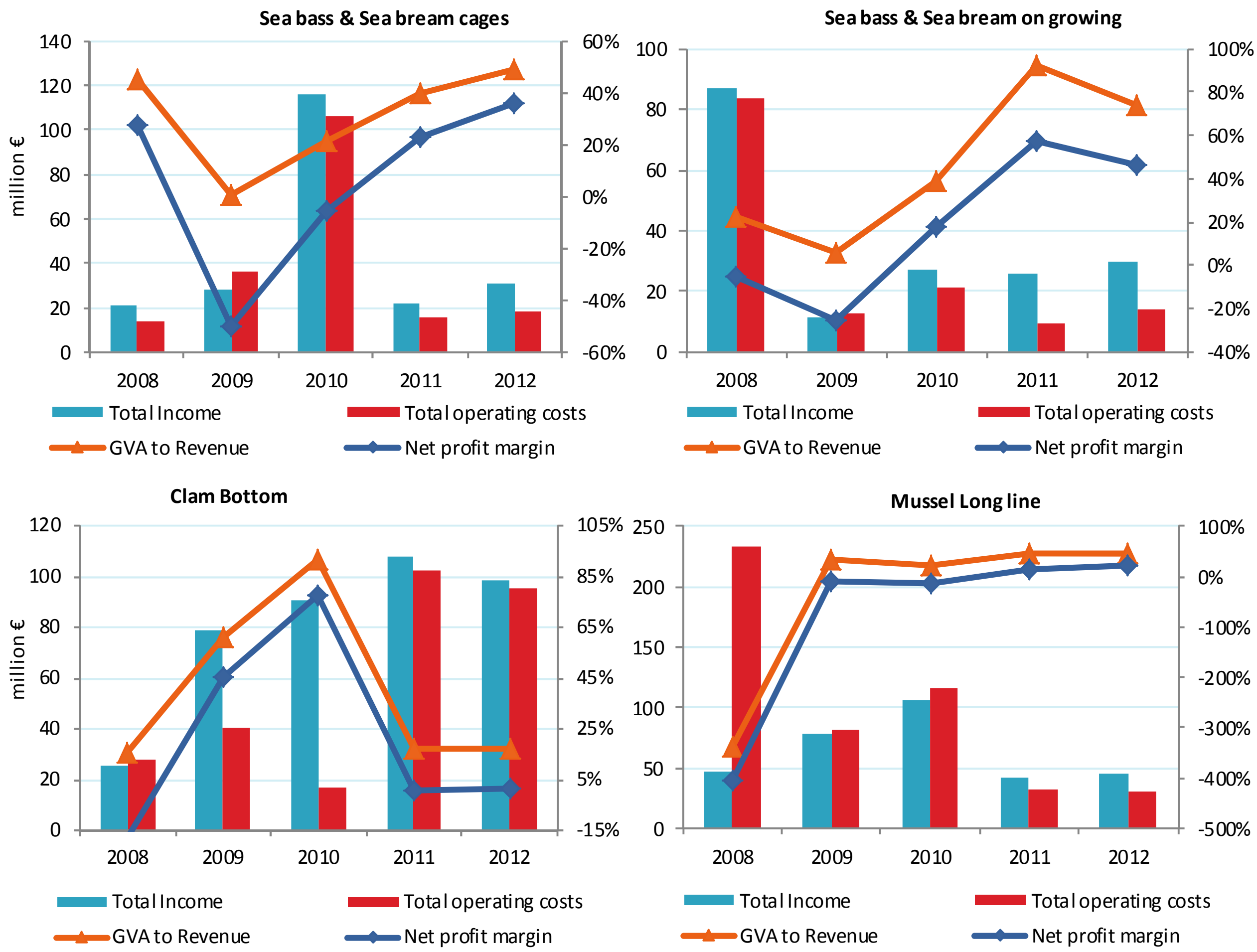


Figure 4.15.7 Economic performance indicators for the main Italian segments: 2008-2012.

Source: EU Member States DCF data submission

Segment 1: Mussel long line

Mussel farming has a high dynamism. The market still has room for expansion, especially for oysters, for which depend almost exclusively from abroad, but also for the mussels, especially if there is a tendency towards presentations more practical for the consumer and that allow greater penetration also in the market interior and northern Italian regions. For the offshore mussel farming systems have achieved high quality standards, giving more stability to the system, limiting the damage caused by the storms, and the related costs, and allowing you to invest in technological improvements. In Italy, mussel is an important production, which puts the country in a leading position in Europe with a production of about 85 thousand tones. Domestic production is not always able to meet the demand, also in relation to the seasonality of the supply that characterizes the national product. Production companies, based on the modest market value of the mussels and the expansion of farming into new areas, must meet the objective of maximizing production efficiency, focusing on the areas in which they deem the conditions most suitable from the point of view of the productivity parameters. The development of the sector is also heavily dependent on the improvement of farming methods, in a perspective of sustainable exploitation of the resource and to reduce costs of production. Compared to the year 2011, the segment shows a increase in the volume. The turnover was increased: given the 44% increase in the volume of production, all economic performances recorded a positive result, ranging from GVA increased of 13% to net profit increased of 51%.The most important cost items are livestock costs and wages and salaries, which are higher than the operating costs. The cost of wages decrease in 2012 of 21% (compared to 2011), while the cost of energy (15%) and livestock(6%) continue to increase.

Segment 2: Clam bottom

With a harvest of 30-40.000 tons per year, Italy is the leading European producer and the second in the world for the production of clams, almost exclusively of the Philippine species, introduced in 1983. The success of the national livestock *T. philippinarum* is mainly due to two factors: the presence of areas and high trophic levels (Adriatic coastal lagoons) and the high volume of juvenile wild. The cultivation of the Philippine clam farming system is low-tech and in almost thirty years has seen few innovations to improve yields. Only the collection phase of the product has undergone significant changes with the evolution of new tools. The Italian production of *T. philippinarum* is concentrated in the stretch of coast between Grado and the southern part of the Po Delta. In Italy the annual needs of Philippine clam seeds is estimated to be at least ten billion units, more than 95% or which are taken in areas that have the calling for the establishment and development of juveniles of this species (nursery areas). The techniques of reproduction of Philippine clam have been consolidated for the past few decades. Since, however, the availability of wild juveniles may be a limiting factor in recent years the belief that the nursery areas is of great strategic importance for the future of the national clam is consolidating. This approach has led, as in the case of Emilia-Romagna, to the geo-referenced mapping and management of the nursery areas of clam according to the objective of protecting and increasing production of juveniles.

The distribution of the operating costs reflects and is consistent with the characteristics of the segment; in fact, the greater cost item is represented by livestock costs.

Assessing the economic and financial performance the collapse of the segment is evident, recording a very low GVA, around 16 million Euros, compared to the total income, around 98 million Euros. The total income decreased 9%, and the most lower performance was recorded by operating cash flow (-35%). The net profit registered high trend around 135% more than previous year 2011.

Analyzing the operational costs, the 48% is paid for livestock, followed by energy costs, related to the vessels that used for daily farmer activities. The costs of livestock are very high but should be compared with the costs of labour, many employees receive lower pay because they give product to breed livestock, much to receive a payment that is to increase the operating cost of the fry. The employed are seasonal so receive salary only for the period in which they work on the clams farm; in the other words, in the some phases some employees are the suppliers of raw materials and then are occupied into clams farms.

Considering, however, the number of employees and their FTE, the huge difference can be explained by the intense seasonality of employment. Against this background it is noted that the cost of the staff represents approximately 14% of operating costs.

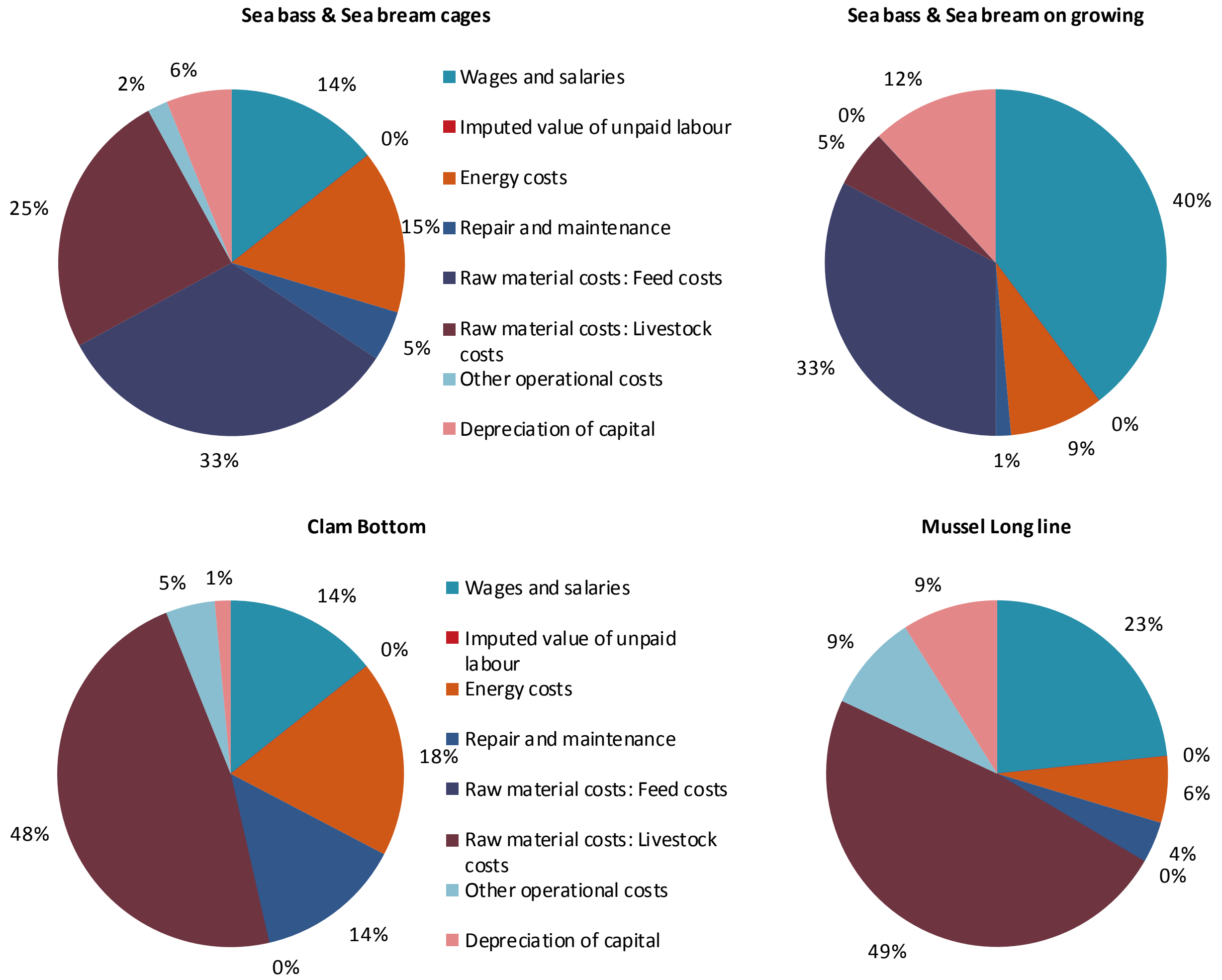


Figure 4.15.8 Cost structure of the main segments in Italy: 2012.

Source: EU Member States DCF data submission

Segment 3: Sea bream and sea bass on growing and Segment 4: Sea bream and sea bass cages

The economic analysis for the segments of sea bass and sea bream will be treated together in the same paragraph. The choice is because the major differences are generated by different technology applied. In general, although the incidence of each operating cost is different in the two segments, in general they are very aligned in relation to the macro-economic performance. The financial crisis has affected numerous sea bass and sea bream farms that were not prepared for the challenges of this period of strong economic and financial instability. These challenges, in fact, require total dedication, high technical capacity and appropriate financial capabilities. In Italy, today, companies that have a size suitable for the challenges are few. These companies manage, however, to ensure: productions of quality, both as regards the fry and the products fattened and the ability to withstand the increasing competition with other Mediterranean productions, especially North African. The two segments of sea bass and sea bream (on growing and in cages), were chosen because in Italy it is a bit much to enhance the production of marine species with high commercial value. Furthermore, these two segments are also those in which there is a high employment level, in terms of FTE: most of people work permanently compared to other segments in which the employed are more seasonal. Finally, they are important because they are the most representative enterprises of capital intensive high-technology and high labour specialization.

For sea bass and sea bream similar considerations can be from the point of view of development strategies and management and investment optimization. However, if we analyze the performance on the side of production costs, there is a big difference in the costs structure between the two segments. In the case of the segment "sea bream and sea bass on growing" the largest item of operating cost is wages and salaries which contributes to more than 45% of operating costs, followed by feeds costs that represented around 37% of operating costs. This is completely reversed in the segment "sea bream and sea bass on cages", where the employment costs are on come back to the normal levels already registered in the past for the segment (about 15%). In the cages' segment there is a strong increase in the value attributed to the cost of feed which is, in 2012, the represented the 35% of operating costs.

A significant anomaly during 2011and less than in 2012 is the cost of livestock: in the case of the segment "sea bream and sea bass on growing" the cost of fry and, in general, for the livestock register a level not previously recorded, equal to 2% in 2011 and less than 6% in 2012 of the total operating costs. In the same segment "on growing" the energy costs already increase: they represented in 2012 the 10% of operating costs. On the other hand for the segment "sea bream and sea bass on cages", the share of the cost item livestock is consistent (around 27%) with the values recorded in the previous statistics surveys, and is consistent with the type of farming and applied technology. The most high costs was, in 2012, the feeds costs, 37% of operating costs.

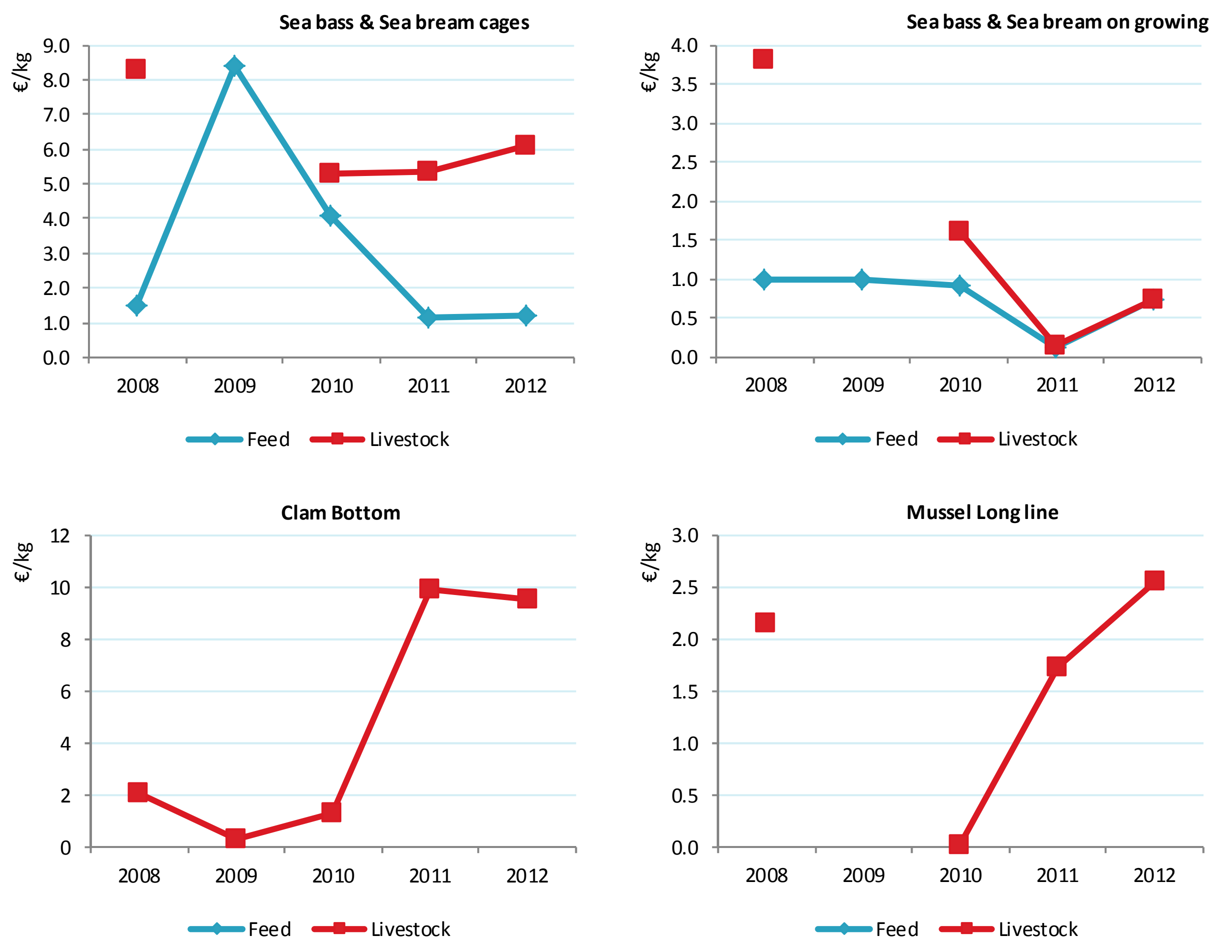


Figure 4.15.9 Feed and livestock prices for the main Italian segments: 2008-2012.

Source: EU Member States DCF data submission

The costs of the fry/livestock and feed are highly variable from one type to another farms. They depend mainly on the cultured species and technology. In the case of marine fish, costs for feeds varied because in off-shore cages, the risk is represented from a greater dispersion of the product, compared to what, for the same biomass bred, is used in the life cycle of inland farms.

Regarding the fry/fingerlings , also in this case their price is linked to the size of "seeding". Normally in a cage on average are reared fry of size greater than those placed on the inland tank, for so their cost is higher.

In the case of mussels and clams, the cost item related to feed is completely absent, because they are not fed artificially. The values related, however, to the seed (livestock) are quite high. In the case of clams these values represent a share of the integration of the income of fishermen employed on plant.

4.15.6 Trends and triggers

Current production trends and main drivers

The domestic production of marine species (fish and shellfish) meets a small part of the domestic needs. This type of growth is enhanced and supported by:

- issuing licenses for new industrial off-shore;
- modernization of existing plants;
- technological innovation of plant and boats;
- strengthening logistics facilities

In addition, as regards to shellfish enterprises, it should considers the regime of strong competition present in the country. This will consider to assess the opportunities for expansion of new facilities for the mussel. For a growth of shellfish macro-aggregate, all activities should be encouraged to diversify production, such as systems and technologies for oyster farming or for other species emerging. The growth requirements for inland fish farms are:

- modernization of existing plants;
- development of nursery / hatcheries;
- introduction of new technologies to increase the competitiveness and environmental sustainability;
- settlements for new species and retraining existing plants;

As already noted, the fund hatcheries is strategic for Italy. With regard to eggs and the fry/juveniles, there is currently a substantial difference between the production of marine and freshwater. In the marine sector, the production is good quality with exports in EU and North Africa relief; while for freshwater macro-sector, mostly trout, must be used import by EU and extra EU countries.

In the methodology of Italian data collection, it loses important information regarding one of the segments of greater excellence of Italian aquaculture: nursery and hatchery segment. Normally these companies are aggregated in the segment "Combined". Although it is not possible to highlight the economic data for reference, in general it is important to describe the performance of the hatchery and nursery sector. As for the eggs and fry there is a difference between the production of salt water and fresh water. In the field of marine production eggs and fry are good and of high quality, with exports in EU and North Africa relief. For the segment of fresh water, mainly trout, there is a lack of resources for which are elevated imports by the

EU and extra EU countries. Based on consultations with the main stakeholders, some of the requirements it is hoped will be met in the future are:

For the sub-segment "salt water" nursery and hatchery is expected in the future modernization of hatcheries / existing hatcheries in order to improve health status, reduce environmental impact, increase the use of renewable energy, adopt and implement the new technologies available.

For the sub-segment "Fresh Water" nursery and hatchery is expected in the future adaptation of incubators / hatcheries existing and creation of new structures, offsetting the current deficit that generates a lot of imports of fry and eggs.

For the sub-segment "Shellfish" nursery and hatchery is expected for the future process of diversification of new species, but also for an increase in the supply of seed in order to reduce dependence on imported mainly from France.

Market structure

In 2012, the per capita consumption of farmed products is stable (-0.2%), while the total number of seafood products has decreased by 5%. The domestic consumption of fish products weaken, decreasing by 3%. The households consumption of aquaculture products regards mussels, sea bream, sea bass, salmon, trout and clams: all these aquaculture products showed different trends in 2012 The domestic purchases of shellfish decreased (-7% for clams and mussels to -3.2%). Decrease in the consumption of sea bass (-1.8%), while it is stable consumption of sea bream (+ 0.3%). Consumer preferences were focused on trout (+ 5.3%) and, above all, to the salmon (13.8%). For the fresh aquaculture product, and even more so for one preserved/canned (mussels, clams, caviar, etc..). The preferred channel of purchase is the modern retail. Consumers prefer the modern distribution retail, because they feel safer in terms of freshness, but also for the security of supply and consistency in appearance and sizes. For mussels, Italy recorded a high degree of self-sufficiency (over 83%), but at the same time a low propensity to export (about 9%). The main target market of the Italian product is France, that has received almost 43% of exports in value (almost 47% in volume). The main competitor of Italy on the French market is represented by the Netherlands, in 2012, holding a market share of 50%, followed by Spain (25%) and Ireland (9%). The second target market of Italian mussels is Spain. The Italian market share is 29% and is second only to the French (57%). For sea bream and sea bass, it recorded a high percentage of import (respectively, 85.1% and 79.1% in 2011). The main foreign countries that export in Italy are Greece, Malta and Turkey for the bream, Greece, Turkey and Croatia for sea bass. Germany was confirmed in 2011, the country's main buyer of Italian sea bream and sea bass. An alternative market for the Italian product, grew at around 10% in the period 2003-2011, is represented by Slovenia. For trout, 20% of the national production (live trout, fresh or chilled) is exported. The trade balance is positive for this product. In the period 2007-2011 an average of trout exports have increased by 14.7%. The main markets for exports of trout are Austria and Germany, but also new markets, such as Romania and Poland. The main market of the Italian product in 2011 was, however, the Austrian. Austria has purchased from Italy over 30% of the trout exported from Italy. On this market, Italy is the leading provider and holds a market share of 47% (in 2012), followed by Denmark. The market in Romania is interesting for the Italian aquaculture product: in 2012 Italy was the first one exporter in Romania, with a market share of 50%. In the domestic market, the product in direct competition with trout is definitely the salmon, that has a strong appeal on Italian consumers.

Issues of special interest

The three macro-aggregates interests to declare specific aspects listed below:

Freshwater aquaculture: the rainbow trout, *Oncorhynchus mykiss*, is a species widespread to European consumers. In particular, organic production, which has a strong market, particularly in Central Europe. Although the price of organic fish is higher, for trout, the consumer price remains a low price that consumers are willing to pay to get seafood products certified as organic. To this, it must be added that the chain of trout is very well integrated and developed: the majority of the supply of trout is not sold fresh, but processed: it is transformed into fillets, smoked, canned, pre-cooked, etc., in this way the supply meets a biggest range of consumers. The weakness for the sector of rainbow trout is the lack of organic fry. To get the organic fry farmers must use fish caught in the wild (wild catch), however, the rainbow trout is not a European native species, so the broodstock are not wild. The lack of fingerlings could be overcome if it were built infrastructure that accommodate wild broodstock to be allocated to reproduction and, thus, obtaining organic fry. Apart from the main weakness represented by the scarcity of wild broodstock, another weakness for the development of organic farming of trout is represented by the operating costs: feed costs in particular, average 30% more than the non-organic feed. In addition, from experimental tests, the use of organic feed showed greater amounts of PCBs in the organic aquaculture fish for human consumption.

Marine aquaculture: The mainly marine species are sea bass and sea bream. For these species it is easier to obtain organic fry, because the wild broodstock can be found by catches. The weakness is due to a poor market for marine organic fish. In addition, the competition with imported fish (from Greece and Turkey) affect on the price, and the organic fish would be even more expensive. Farmers might have an interest, if supported by marketing actions to produce organic fish to sell to the catering (school and corporate canteens, hospitals, etc.).

Shellfish aquaculture: there are some national productions totally organic. The Italian shellfish aquaculture sector requires a series of revisions and changes to the European standards. Among the major weaknesses that determine the low uptake of organic, there is a distance between a shellfish farm and another: in Italy the distance is 150 meters, so, for the characteristics of the spatial distribution of farms, it is almost impossible to adopt and produce according to the criteria of the European Regulation for organic products.

A cross-cutting aspect that worries the entire national aquaculture sector is linked to climate change and the costs of environmental externalities. If the current trend continues in the coming years, the consequences will be able to change the current structure of national production and require resources to upgrade their production processes, structures, livestock, and most importantly, implement research programs are able to give answers to new requirements. Both herds in cages for farmed mussels, strong storms could increase the risk of direct damage to livestock facilities and, at the same time, result in the loss of the product which is the capital of the companies. For farmers of shellfish important aspects are:

- The water acidification could lead to a slowdown in the process of CO_2 fixation in the shells of shellfish, making them more vulnerable to the processes currently in place;

- The general warming of the waters of the Mediterranean could increase the occurrence of diseases, have negative effects on growth and reproductive cycle of temperature-sensitive species, influence the development of phytoplankton, both in terms of quantity and quality, with a direct impact on the shellfish industry;

- The occurrence now frequent, more intense weather events can generate the influx of large amounts of rainwater along the coast, with repercussions on the life cycle of the some species (those are not able to adapt to the variation of the water salinity), make greater microbiological load and increase the incidence of phytoplankton blooms, including microalgae bearers of biotoxins, and macrophytes.

Outlook for 2013 and 2014

The forecast analysis for marine fish farming sector, expects a recovery in production with an average annual growth of 1.1%. As regards "continental" freshwater aquaculture, the forecast analysis registered a consolidation of massive production, mainly represented by trout. The total number of species in freshwater aquaculture will be 20, but only 3 will be produced more than 1,000 (rainbow trout, trout n.i., brown trout). As regards, however, the shellfish, it will be expected to grow by approximately 0.8% per year, then in 2013 about 110 thousand tons. The outlook for shellfish future growth is very low, according to the farmers declarations, their ambition is to consolidate the image of the molluscs in terms of market value and high quality perceived and recognized by market channel. New developments in shellfish sector, in terms of production technology and regulatory measures, will be desirable. From the point of view of farming technologies is likely that will start the production of oyster. Due to difficulties and the crisis of production recorded in France, Italian oyster segment is seen as a new development opportunity. On the hand of a technological investments, in Italy it will be able to raise oysters in deeper areas with systems more environmentally sustainable. Many strategic choices will depend on the guidelines of the National Strategic Plan. The forecast analysis based on SWOT analysis of the Italian aquaculture. In fish farm sector, the main weakness that affects the forecast analysis is the lack of planning for the identification of allocated areas for Aquaculture (AZA) and conflicts of their use. Further weakness that affects the future growth is the lack of diversification of production combined with the lack of technological innovation. If these weaknesses are related to the market's ability to absorb the supply of aquaculture, highlights another weakness due to poor enhancement of logistics facilities on the ground and the almost total absence of producer organizations (PO) as well as the lack of interest in producing specific market studies. In terms of costs of production, a strong weakness is represented by the high incidence of the variable costs added to the difficulty of access to microcredit. In shellfish sector, the mussels sector expects a poor growth mainly due to a serious shortage of laws for the sector. It will be important to adopt a regulatory relative to all aspects such as concessions, to owning a plane, social security and insurance of the employed, etc. It would be a national framework aquaculture law, which does not mortgage the rules a little 'fishing and a little' agriculture. Another aspect that affects the development in the short time is the possibility not to use polypropylene socks (long mesh sleeves), which were scattered at sea begins to be an environmental problem.

4.15.7 Data Coverage and Data Quality

Data quality

The methodology of the system "Probability Sample Survey", was used to draw the sample from the universe of aquaculture companies, for technical and production segment, according to a random selection.

- The segments are 9 according to the following criteria: technology / species
- Data samples in accordance with Appendix X must be expanded;

Structural data in Volume (tones) and Value (Euro) per segment (and here It must necessarily occur with the consistency of the data collected and sent to Eurostat according to Reg.762/2008).

From the analyzes and verifications carried out on the data contained into the report, the consistency between Eurostat data and data DCF is not respected.

Related to estimation, the optimum sample number per stratum is defined according to Bethel's procedure (1989). Then, for each collected variable, to obtain the estimates of the totals per stratum, the Horvitz-Thompson formula is used, derived for the particular case of the simple random sampling without replacement. According to this particular estimator, the variance and the CV are calculated to evaluate the precision level.

As regards the imputation of non-responses, there is a process of localization of errors . The control procedure of the survey can be considered as interactive graphic micro-editing of the univariate type. The term interaction refers to the fact that, in the procedure of localization of errors, there are not only automatic phases but also phases which require human intervention to investigate the situation and to evaluate the effective presence of the error (therefore the human intervention regards the localization phase and not that of imputation). The control is mainly of the univariate type because the variables are controlled individually and only in rare cases are suspected relationships existing among them controlled, using suitable synthesis indexes. During the various phases wide use is made of graphic tools to visibly evaluate situations marked as errors. Finally the word micro-editing is used because the data is gathered in suitable domains of study within which the sampling units can be considered very homogenous. For each of these sets of data, suitable control functions are first calculated, and then, for each of them, certain rules of incompatibility are verified. In the case of activation of conditions of error, that is in the case where the observed value does not belong to the region of acceptance, those control functions are then observed individually for all the sampling units forming the single domain. Thus the sample unit, or units, responsible for the activation of conditions of error is localized for the entire domain of study and then the imputation of the erroneous data follows.

The MS has not provided guidance on the methodology to ensure the quality of the expanded data. Furthermore, there was abnormal number of employed (males and especially females) compared to previous years as well as a very clear correspondence between occupied and conversion into Full Time Equivalent (FTE). Equally important for some items of operating costs there is consistency with the data reported in previous years, the main evidence for the cost of the staff/employee and their affection of other operating costs, but also the costs for energy and maintenance and repairs. Some faults which cause a carelessness data quality concern, moreover, some prices per kilogram reported.

Data availability

Data for the aquaculture sector is published once a year on both an aggregated farm and enterprise level for each segment. The aquaculture statistics are published on Italian Economic Observatory, approximately 18 months after the end of the reference year.

Confidentiality

There is no confidentiality problems because the nine segments include more than 20 companies. For some segments there is a high variability, therefore it was necessary to increase the number of the sample analyzed.

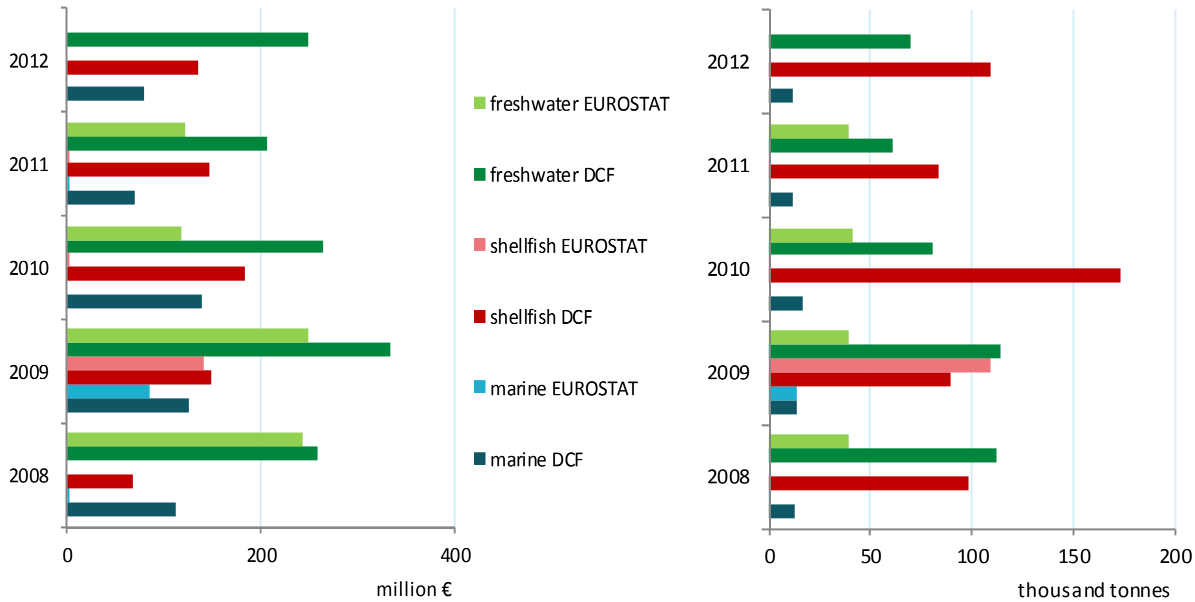


Figure 4.15.10 Comparison of DCF data with EUROSTAT data for Italy: 2008-2012

4.16 LATVIA

4.16.1 Summary

Latvia is a country producing only freshwater aquaculture products. The freshwater data collection is not mandatory under the DCF, and country is therefore not requested to provide economic data for this report.

Latvia is rich of the water resource and has a good location of inland waters and a stable, ecologically pure environment, which facilitates the development of aquaculture. For Latvian countryside aquaculture is important business activity and in the employment provision field. The aquaculture sector plays noticeable role in the Latvian regions development.

The main activities of the Latvian aquaculture enterprises are follows:

- Artificial breeding of young fish for restocking in coastal seawater and inland freshwater;
- Fish cultivation in freshwater open land ponds and land based farms in special tanks and growing up for market sale;
- Short term fish cultivation in freshwater ponds for commercial angling;
- Fish cultivation in household ponds for self-consumption or hobby angling.

The aquaculture enterprises mainly concentrated in the regions of Kurzeme and Vidzeme. A considerable number of agricultural holdings have commenced their business in aquaculture in addition to their business activity.

Total number of ponds registered for aquaculture and its area were 756 ponds and 5507 ha (increased by 9 % from 2010) respectively in 2012. There were 1303 pools with the volume of 17727 m3 (increased by 2 % from 2010) and 25 recirculation systems with the volume of 2786 m3 (increased by 74 % from 2010) used for aquaculture production in 2012.*

The development of producing aquaculture is largely hindered by the high production costs of the breeding and the problems with the sales of finished products. The main item offered at the market – trade size carps during relatively short summer can usually be grown only in the long three-summer cycle with very high production costs.

Production volume and value

During the period from 2004 to 2007 the aquaculture of Latvia developed in a generally positive direction: the production capacity and productivity increased, but starting from 2008 the level of production output has declined as a result of the economic crisis.
The Latvian aquaculture sector produced 575 tonnes in 2012. This production was valued about 1.4 million Euros (EUROSTAT, 2014). Latvia produces no marine aquaculture (see Table 4.16.1).
The main production mass in 2012 was provided by the open land ponds – 88 %, which are suitable under the local conditions mainly for the purpose of cyprinid fish farming, 7 % of the aquaculture production was obtained from the natural flow water basin, whereas 5 % - in the recirculation systems.*

The increase in sales weight of more than 4% was displayed from 2010 to 2012 in freshwater aquaculture bringing the total sales up by 25 tonnes. This is still 9 tonnes below that of 2008.

The value of sales has also increased over the past year and has shown a sharper growth of 11% and bringing the total sales up by 148 € thousand.

Table 4.16.1 Production and sales for Latvia: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***0.6***	***0.5***	***0.5***	***0.5***	***0.6***	***5%***	***5%***
Marine	0.0	0.0	0.0	0.0	0.0		
Shellfish	0.0	0.0	0.0	0.0	0.0		
Freshwater	0.6	0.5	0.5	0.5	0.6	*5%*	*5%*
Production value (million €)	***1.5***	***1.1***	***1.2***	***1.3***	***1.4***	***12%***	***10%***
Marine	0.0	0.0	0.0	0.0	0.0		
Shellfish	0.0	0.0	0.0	0.0	0.0	*-7%*	*-32%*
Freshwater	1.5	1.1	1.2	1.3	1.4	*12%*	*10%*
Hatcheries & nurseries (million units)	***41***	***36***	***52***	***17***	***49***	***188%***	***34%***
Eggs	0	0	2	0	0		
Juveniles	41	36	50	17	49	*188%*	*36%*

Source: EUROSTAT

Overall industry structure and employment

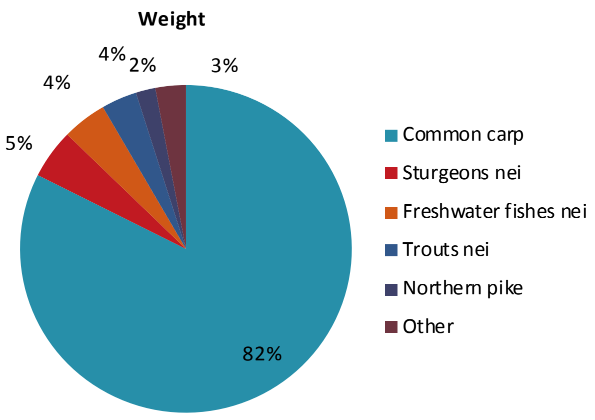
Due to the aquaculture sector in Latvia has a small number of enterprises (56 active enterprises in 2012) can be observed important changes in total value and volume.

During the previous decade the aquaculture production of Latvia reached its peak in 2007 – 729 tonnes in total. In the following years due to the economic crisis the total production of the aquaculture goods experienced significant reduction – by 75% and reached 548 tonnes on average (including 0,2 t of crayfish) or around one million € per year in monetary terms (2008 -2011). It is significant that the most radical decrease was experienced by the commercially most valuable items: trout, catfish and sturgeon breeding and sales - an average by 44% compared to 2007. This is due mainly to the fact that the cultivation of this fish species is based on imported and expensive fish fry, which proved to be a too great economic risk factor under the crisis. The decline of the purchasing power also has a negative effect.*

During the time period from 2010 to 2012 the number of the economically active aquaculture companies increased by 16 companies. Production amount of aquaculture products are not restricted with quota or other restrictions, thus, in comparison to fishing, the initiation of business in this sector is simpler. In 2012 the number of registered aquaculture enterprises was more than 140, however only 56 of them were economically active and farmed market size fish for sale or produced young fish for restocking and on growing. About 86 % of enterprises classified as small enterprises where the number of employment is less than 10. As the number of the aquaculture companies increased, the number of the employees of the aquaculture companies increased as well – by 7 % during the period 2010-2012. The specific weight of the total number of persons employed in aquaculture has increased from 333 in 2010 to 356 in 2012. However, work productivity in aquaculture is comparatively low. The aquaculture mostly employs men and women aged 20-55. The political and economic instability resulted in having relatively little impact on changes of employment level in the aquaculture sector compared to other sectors.

Main segments

Common carp was the main species produced by the Latvian aquaculture sector; representing 82 % in weight and 70 % in value of total production in 2012 (see Figure 4.16.1). Other important fish species are sturgeons with 12 % of the total value and 5 % of the total weight, trout with 7 % and 3 % of the total value and weight respectively (EUROSTAT 2014).



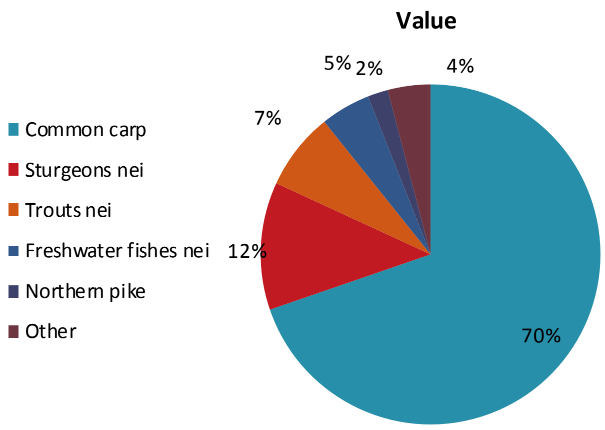


Figure 4.16.1 Main species in terms of weight and value in Latvian production: 2012.

Source: EUROSTAT

The average first-sale price for aquaculture products in Latvia was 4.1 €/Kg during the 2008-2012, and for common carp was 2.0 €/Kg (see Figure 4.16.2). The high share of the common carp (representing 70 % of the first-sale revenues) in the Latvian aquaculture leads average aquaculture prices down, compared to the other species that are more expensive. The average price for trout and sturgeons was 5.0 €/Kg and 6.8 €/Kg respectively between 2008 and 2012.

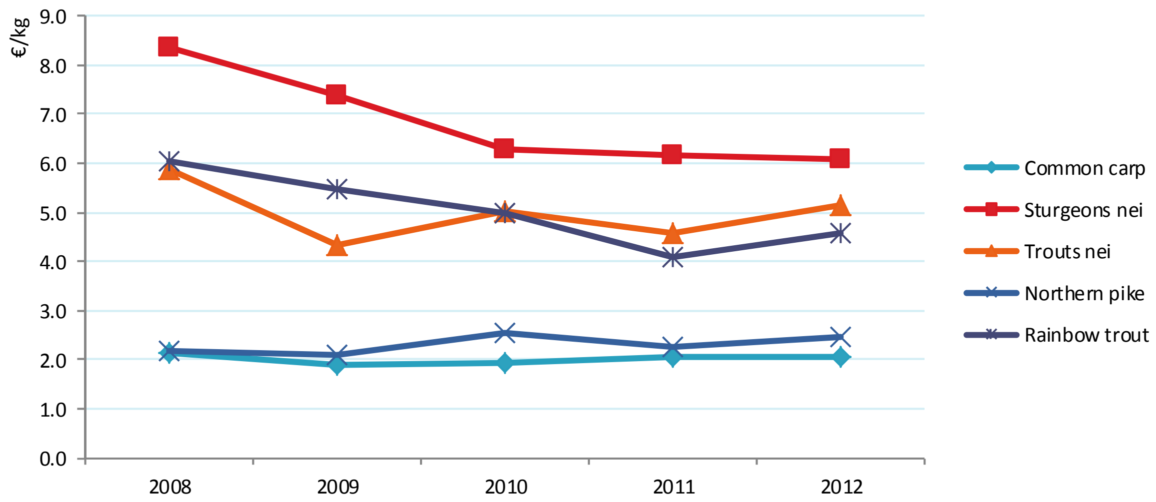


Figure 4.16.2 Average prices for the main species produced in Latvia: 2008-2012.

Source: EUROSTAT

Trend and trigger /Outlook

At the moment in Latvia further industrial processing of fish caught in aquaculture has not developed. The insignificant amount of realised aquaculture production provides evidence that only a part from the companies produces goods for market. The biggest part of the production is sold fresh to the customers.

It is very hard to provide constant and fixed amount and quality of the production supply. There is no aquaculture production trade system, which would comprise and efficiently organize the realisation of products from small private producers.

However Aquaculture, in comparison to other fisheries sectors, has good development opportunities. In accordance with the criteria and support amount included in the Operational Programme for 2007- 2013 and national legislation the planned actions were performed. One of them was facilitation of competitive and technological modern aquaculture enterprises. The implementation of the task was determined by the necessity to modernize the existing technological production process of the existing aquaculture companies, increase the number of aquaculture companies focused on market and extend the range of aquaculture products offered in the market. The following actions were implemented:

1. Modernisation of companies, in order to improve the implementation of work conditions, hygiene requirements, health of aquaculture animals and products, as well as to reduce the impact of the company’s activities to environment.

2. Introduction of new breeding technologies, in order to facilitate the breeding of different fish (crayfish) demanded in the market.

3. Provision of protective measures against the harm done by wild predators to open land ponds.

It is anticipated that investments in the modernisation of aquaculture companies and introduction of new technological solutions will increase the total number of aquaculture companies focused to the market, raise the quality and safety of the produced production, as well as will facilitate the extension of assortment of the produced production. Investments in the protection measures will compensate losses caused by the wild predators, thus the production produced by the company will remain competitive in the market.**

Due to decrease of fish resources in the sea, aquaculture shall be developed as an alternative source of fish resource. Latvia has good location of inland waters (lakes, rivers) and a stable, ecologically pure environment. Amount of aquaculture production is not restricted by quota or other restrictions, thus, in comparison to fishery this sector offers more convenient initiation of business. But in comparison to neighbouring countries, Latvia does not have so good climatic conditions for production of aquaculture products in the open land ponds (too warm conditions for the fish of cold waters and too cold - for the fish of warm waters). In future it may negatively affect the compatibility of the industry in terms of production costs in international level.

There are two main directions for fish farming in Latvia which will be developed:

- fish farming for consumption;
- fish breeding for fish restocking and reproduction in natural streams and lakes (fish recourses reproduction).

The Institute of Food Safety, Animal Health and Environment "BIOR" is responsible for the implementation of the National Fish resources restocking program. In BIOR there are 5 State-owned Fish Hatcheries – Tome, Dole, Karli, Brasla, Pelci designated for breeding of salmon and sea trout smolts, pike, pike- perch, river lamprey larvae and juveniles. The program is established in order to ensure the fish fry compensatory releases to lower the damage to fish resources caused by Hydropower Stations as well as to restore damages and losses facilitated by different human activities in public water bodies. Every year they restock up to 20 million fish larvae, juveniles and smolts in public waters, however, it is not sufficient; therefore the private hatcheries should be involved as well. In 2011 State hatcheries released about 15 million fish larvae, juveniles and smolts.

One of the opportunities for private hatcheries is the specialization in fish resources restocking for public water bodies. Year by year the input of private hatcheries in restocking program is growing and varies from 10-25 %.

In addition to the National Fish resources restocking program and the Latvian Fisheries Fund also supports fish and crayfish restocking in public waters. In Gauja, Venta, Daugava rivers and in the small rivers it is planned to restocked about 5,7 million of fish larvae, juveniles and smolts in 2014. For the fish cultivation in Latvian freshwater open land ponds annually are restocked about 12-26 million of fish larvae, juveniles and smolts.

4.16.2 Data Coverage and Data Quality

Latvia only produces freshwater aquaculture and since freshwater aquaculture is not compulsory under the DCF, it did not submit aquaculture data under the DCF regulation. Therefore EUROSTAT data was used in this analysis.

The Central Statistical Bureau of Latvia (CSB) carries out general reporting on aquaculture sector by collection some basic data as production by species in tonnes and value, total area of fish ponds, volume of rearing tanks and number of employment. CSB gathers official account reports from enterprises (according to the EUROSTAT definition under NACE Code 05.02: “Fish Farming”). According to the small number of aquaculture enterprises and to protect the collected data confidentiality, data are clustered for two segments by number of person employed more than 10 and less than 10 people.

All above information regarding aquaculture sector in Latvia annually is provided to the EUROSTAT in accordance with Regulation (EC) No 762/2008 of the European Parliament and of the Council of 9 July 2008 on the submission by Member States of statistics on aquaculture and repealing Council Regulation (EC) No 788/96.

Other data sources employed are Latvian State Institute of Agrarian Economics http://www.lvaei.lv/upload/Situ%C4%81cijas%20anal%C4%ABze%20akvakultura_2012.pdf (*) and Fishery Department under Ministry of Agriculture (**).

4.17 LITHUANIA

4.17.1 Summary

Production volume and value

Lithuanian aquaculture sector produced 3.6 thousand tonnes of freshwater fish production in 2012. This production was valued about 7.6 million Euros. Compare to 2011, total production volume and value increased 9% and 8% respectively, whereas compare to 2008 it improved by 19% and 15% respectively.

Overall industry structure and employment

Lithuanian aquaculture sector population in 2012 consisted from 39 enterprises and aquaculture farms. From the total population, 19 of enterprises produced around 97% of total national production. All of them are integrated into national producer organisation (PO). In addition to this, separate part of aquaculture units use recirculating aquaculture systems (RAS), rapidly developing segment with constantly increasing production volume. Aquaculture enterprises, producing African catfish in RAS are integrated into other producer organisation which joins alternative to pond aquaculture. In 2012, aquaculture sector employed 368 people from whom 298 were males and 70 females. Total number of employees increased by 7.9% compare to 2011.

Main segments

The common carp was the main species produced by the Lithuanian aquaculture sector, representing the 91% in weight and 86% in value of total production in 2012. Higher valued species as rainbow trout and sturgeons belongs to another important segment, which in 2012 had 5% in total production volume and 9% in total value. Third segment of Lithuanian aquaculture sector consists of RAS exploiting enterprises. The main species in RAS segment in 2012 was African catfish with 13.2 t of annual production and 57.4 thousands Euros as well as species as European eel and rainbow trout.

Current production trends and main drivers (Trends and triggers)

From 2010 increasing trends of Lithuanian aquaculture production, employment and growing variety of species was observed. From structural point of view, positive production growth is expected to all segments. During the years 2007-2013 from EFF, according to different measures, received funds is contributing to increased sector efficiency, competitiveness and development for specific segment as RAS. Share of carp production in total volume and value constantly decreases with the slight proportion. This process is not very important for carp production segment in terms of substituted volume, it is rather benefit to aquaculture companies which diversify its production including another species with better demand and higher value. Around 59% of total production is sold in the internal market for direct consumption. The rest part is delivered to export.

Outlook

Production volume and value in 2013 is expected to increase 18% and 24% respectively. Relatively higher production value is mostly associated with the increased amount of better valued species as rainbow trout and sturgeons. Price for carp is foreseen to stay at the same level or slightly reduced in 2013 and 2014. The supply of cheaper imported aquaculture and other type of fisheries production into market brings a pressure on local producer prices. Despite that rainbow trout prices are expected to improve by 2% in 2013.

Production volume and value

Lithuanian aquaculture sector produced 3.6 thousand tonnes of fish in 2012. This production was valued about 7.6 million Euros (FAO, 2014). Production volume has a tendency to increase from 2008 with the exceptional rise of production in 2009. The main part of production was generated from carp producers, however trout and sturgeon production from channels and basins, which are the part of pond infrastructure, as well as African catfish from recirculating aquaculture systems (RAS) is growing. Compare to 2011, total production volume and value increased 9% and 8% respectively, whereas compare to 2008 it improved by 19% and 15% respectively. There are also several state owned fish breeding and hatching units, producing fish for stocking natural waters. As one of the major policies of Lithuanian fish stocking activities was to increase the average age of released juveniles, therefore the number of fry/eggs was gradually decreasing in 2008-2012. (see Table 4.17.1).

Table 4.17.1 Production and sales for Lithuania: 2008-2012.

Variable	2008	2009	2010	*2011*	2012	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***3.0***	***3.4***	***3.2***	***3.3***	***3.6***	***9%***	***11%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	3.0	3.4	3.2	3.3	3.6	*9%*	*11%*
Production value (million €)	***6.6***	***6.7***	***6.0***	***7.0***	***7.6***	***8%***	***15%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	6.6	6.7	6.0	7.0	7.6	*8%*	*15%*
Hatcheries & nurseries (million units)	***156***	***136***	***91***	***83***	***86***	***4%***	***-26%***
Eggs	0	0	0	9	0	*-100%*	*-100%*
Juveniles	156	136	91	74	86	*16%*	*-25%*

Source: EUROSTAT

Overall industry structure and employment

Lithuanian aquaculture sector population in 2012 consisted from 39 enterprises and aquaculture farms. From the total population, 19 of enterprises produced around 97% of total national production. All of them are integrated into national producer organisation (PO). Members of this PO produce carps in ponds and rainbow trout and sturgeons in basins and channels, using water stream from pond infrastructure as well as mixture of species from carp poly-culture. In general, carp production in Lithuania could be considered as extensive, with more than half of is certified as organic. The rest of population consist of aquaculture farms, which are minor players in this sector and produce negligible quantities, released to local markets. Separate part of aquaculture units use RAS which is rapidly developing segment with constantly increasing production volume. Aquaculture enterprises, producing African catfish in RAS are integrated into producer organisation of alternative aquaculture. In 2012 Lithuanian aquaculture sector structure consisted from 9.0 thousand of ha from which 3.8 thousand ha were for regular production and 5.2 thousand ha were certified for organic production. As was mentioned before, another rapidly growing aquaculture sector use recirculating aquaculture systems and in 2012 it exploited 1.2 thousand m^3. Pond aquaculture area has a staple trend with minor annual fluctuations, whereas RAS volume is constantly increasing, for instance during 2010-2012 period RAS volume increased 3.7 times from 0.56 thousand m^3 to 1.24 thousand m^3. In 2013 is estimated more than 2 thousand m^3 RAS volume.

In 2012, aquaculture sector employed 368 people from whom 298 were males and 70 females. Total number of employees increased by 7.9% compare to 2011. In general, employment in aquaculture sector constantly increasing from 2010 and is expected that in 2013 will reach 450.

Main segments

The common carp was the main species produced by the Lithuanian aquaculture sector, representing the 91% in weight and 86% in value of total production in 2012 (see Figure 4.17.1). Nevertheless the percentage of carp production in the total constantly decreases with the slight proportion. This process is not very important for carp production segment in terms of substituted volume, it is rather benefit to aquaculture companies which diversify its production including another species with better demand and higher value. Higher valued species as rainbow trout and sturgeons could be attributed to another important segment, which in 2012 had 5% in total production volume and 9% in total value. Species as grass carp, bighead carp, tench and northern pike are used for poly-culture in carp production. Therefore it market is more or less stable.

Third segment of Lithuanian aquaculture sector consists of RAS exploiting enterprises. The main species in RAS segment in 2012 was African catfish with 13.2 t of annual production and 57.4 thousand Euros as well as species as European eel and rainbow trout. It is estimated that in 2013 African catfish production will increase to 35 t. Because RAS segment is just started to develop, a considerable part of infrastructure is not fully exploited and in the near future is expected to provide increased volumes of African catfish, rainbow trout and European eel. During 2009 and 2011 RAS segment was orientated to produce pike-perch for consumption and for juveniles, but it was not successful to take part in aquaculture market. Currently no aquaculture unit produce pike-perch, which is getting more demanded in European market. RAS segment is important not in terms of produced volume, which is relatively low, compare to pond production, but it creates fishery employment at family business level in regions where water resources are limited for aquaculture.

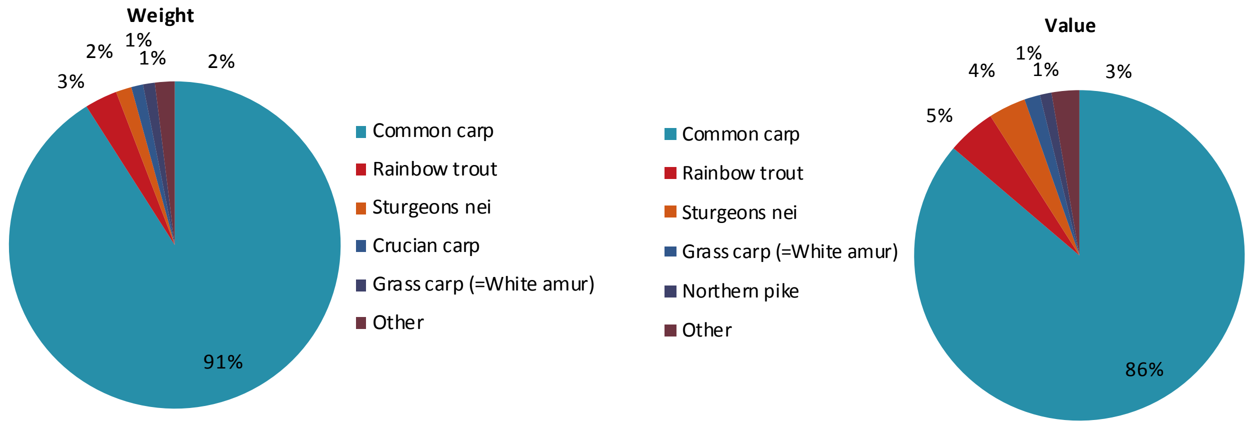


Figure 4.17.1 Main species in terms of weight and value in Lithuanian production: 2012.

Source: EUROSTAT

The average first-sale price for common carp in Lithuania was 2.0 €/Kg in 2012 (see Figure 4.16.2). Around 59% of total production was sold in the internal market for direct consumption, only negligible part of it was delivered for processing industry, mainly for smoking. Compare to salmonid species, carp market is quite limited with the demand of various products. Average price for carp in the internal market is slightly more than 20% bigger compare to export price. The main export market for carp was Poland and Latvia. Companies from northern part of Lithuania exported fresh production to Latvia whereas from southern region to Poland. Carp prices remained relatively stable during long term period and fluctuated around 2€/Kg. In 2013 is estimated 15% increase in common carp sales, mainly in the internal market. The one of the main criteria is increasing of household's income and general fish consumption. Price is foreseen to stay at the same level or slightly reduced. The supply of cheaper imported aquaculture and other type of fisheries production brings a pressure on local producer prices.

In 2012 rainbow trout prices were 3.2 €/Kg and compare to 2011 decreased by 23.3%, but in relation to 2010 data, it remained at the same level. The drop of trout price was partly driven by high supply, when produced quantities increased almost 3 times from 2011 to 2012. Around 80% of production is sold in the internal market. The main export market for rainbow trout in 2012 was Latvia. Average prices of trout for 2013 are forecasted to slightly increase – almost 2%.

From 2009 the average price for sturgeons has a constant decline and in 2012 reached 5.1 €/Kg. With the reduced price sturgeons could easier compete in the market. In 2012 volume of sold production increased by 7%, compare to 2011 and according to stocking data in 2013 it is expected the rise of production more than two times to almost 117 t.

Average prices for African catfish in 2012 was 4.3€/Kg for fresh production. Competition between small aquaculture units, exploiting RAS and quite limited demand for this new species is expected to reduce average price in 2013.

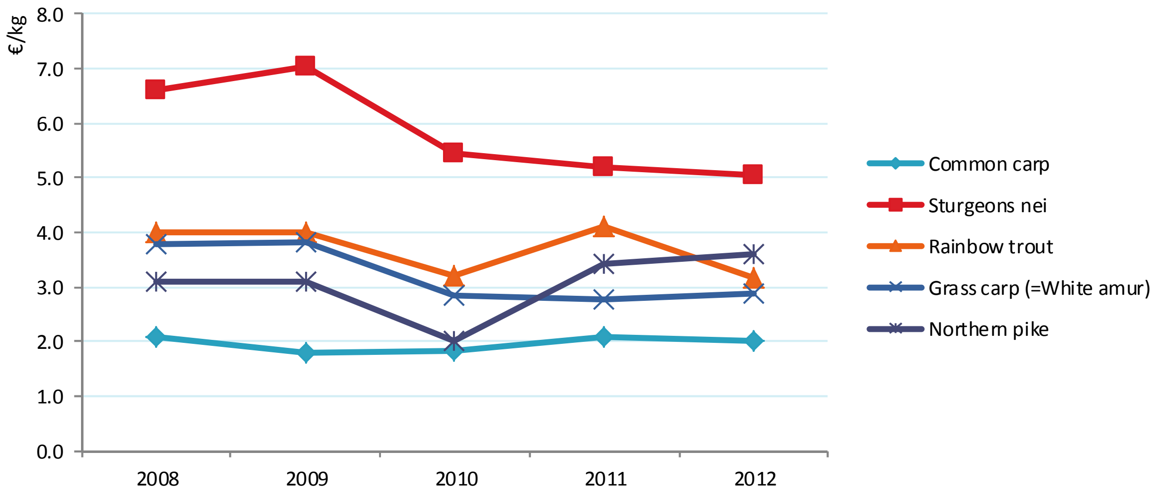


Figure 4.17.2 Average prices for the main species produced in Lithuania: 2008-2012.

Source: EUROSTAT

Trend and trigger /Outlook

From 2010 increasing trends of Lithuanian aquaculture production, employment and growing variety of species was observed. According to preliminary data, remarkable increase of production is foreseen for 2013. From structural point of view, positive production growth is expected to all aquaculture segments. During the years 2007-2013 from EFF, according to measure "Investments to aquaculture" 3.35 million Euros were used for development of RAS systems. This segment is consisted mainly of micro enterprises with an average of 3-4 employees per unit and is important in development of regional employment. RAS producer organization could give a benefit for production realization and stability, Increasing RAS production and income per employee is foreseen for long term period. Currently income per employee is relatively low compare to pond aquaculture segment, because main part of RAS infrastructure is not fully exploited, some of it just started for stocking.

In Lithuania, pond aquaculture is based on extensive type of production, with ensured sustainability of water ecosystems. Regarding water ecosystem sustainability, during 2007-2013 period pond aquaculture units received 6.9 million Euros from EFF. To ensure competiveness in the market during 2007-2013 pond aquaculture enterprises received 15.8 million support from EFF measure "Aquaculture and processing industry modernization and development of marketing". Modernization of pond infrastructure increased efficiency of pond, basin and channels, reduced costs of production. For instance, increased volume and value of carps, rainbow trout, sturgeons and other local species during 2009-2013 was obtained from the almost same pond area. Production volume and value is expected to increase 18% and 24% respectively. Relatively higher production value is mostly associated with the increased amount of better valued species as rainbow trout and sturgeons.

4.17.2 Data Coverage and Data Quality

Lithuania only produces freshwater aquaculture and since freshwater aquaculture is not compulsory under the DCF, it did not submit aquaculture data under the DCF regulation. Therefore FAO and EUROSTAT data was used in this analysis.

4.18 MALTA

4.18.1 Summary

Production volume and value

In total, the Maltese aquaculture sector produced 7,007 tonnes of marine fish in 2012, which corresponded to an increase of 69% from 2011 to 2012 and average overall increase (2008 – 2011) of 24%. On the other hand, the total value of the production was 83.2 million euros in 2012, which corresponds to an increase of 65% when compared to 2011. From 2008 to 2011, the total value increased by 33%. This considerable increase is mostly attributed to the low production obtained in 2011 and to a certain extent in 2010. In the previous years, the production is similar to the 2012 production.

Overall industry structure and employment

In 2012, there were only six operating aquaculture enterprises in Malta, each employing more than ten employees. There is also and an aquaculture research centre that has a marine hatchery for the culture and production of European seabass, Gilt-head seabream, a small production of meagre as well as the hatching and nursing of Greater amberjack and White seabream through research.

Main segments

The aquaculture industry in Malta is marine-based. The greatest portion of production and value is mainly attributed to the capture based aquaculture for Atlantic bluefin tuna (*Thunnus thynnus thynnus*). Following this, other important segments include the culture of European seabass (*Dicentrarchus labrax*) and other marine fish such as the gilt-head seabream (*Sparus aurata*) and meagre (*Argyrosomus regius*). Greater amberjack (*Seriola dumerilii*) and white seabream (*Diplodus sargus*) are also present in relatively low amounts, produced through research.

On a regional scale, Malta attributes for a very low proportion in hatcheries and nurseries, and low volumes of seabass and seabream and other species except for bluefin tuna. Bluefin tuna caging and fattening attributes for a significant share in the Mediterranean.

Current production trends and main drivers (Trends and triggers)

Production levels increased considerably in 2012 when compared to the previous year, stopping the gradual constant decline trend shown throughout the years, and production in 2012 was similar to that in 2008. The same trend was observed in the sales value.

National production is mainly used for export. Atlantic bluefin tuna is exported mainly to Japan, where there is a high demand and fetches high prices, whereas European seabass and gilt-head seabream are exported to Libya and of the European countries mainly Italy. Only a small proportion of the production is retained locally.

Funding for projects and research has contributed to the Maltese aquaculture industry mainly through obtaining funding for research projects concerning diversification of species that may be cultured such as the Amberjack project.

A National Aquaculture Strategy for the Maltese Islands has been put in place and will extend from 2014-2025. It aims to enhance aquaculture growth in a sustainable manner and has made several targets.

Exercises to finally adopt this strategy were carried out and were funded through the European Fisheries Fund (EFF).

Outlook

Production levels may continue to fluctuate. This is mainly attributed to the fact that the main aquaculture activity in Malta is based on the fattening of bluefin tuna captured from the wild. If quota allowance decrease / increase, these will affect production and sales. Moreover, quota may be bought and the maount bought may change from year to year, resulting in fluctuations. The number of companies/enterprises has been stable throughout the years and is expected to remain as such.

4.18.2 Production and sales

The Maltese aquaculture industry is exclusively based on marine fish. In 2012, 7,007 tonnes of marine fish were produced by the Maltese aquaculture sector. A marked increase of 69% was observed from the previous year. This was also reflected in the value, where sales value from aquaculture practices in Malta amounted for over 83 million Euro in 2012 (an increase of ca. 30 million Euro from the previous year). This increase is mainly due to the fact that in 2011, production and consequently sales value was lower than usual. The values obtained for 2012 are more similar to those obtained in earlier years (2008 – 2009).

Table 4.18.1 Production and sales for Malta: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***6.7***	***6.3***	***5.4***	***3.8***	***7.0***	*85%*	*26%*
Marine	6.7	6.3	5.4	4.2	7.0	*69%*	*24%*
Shellfish	0.0	0.0	0.0	0.0	0.0		*0%*
Freshwater	0.0	0.0	0.0	0.0	0.0		*0%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		*0%*
Sales value (million €)	***93.6***	***47.9***	***54.3***	***50.5***	***83.2***	*65%*	*35%*
Marine	93.6	47.9	54.3	53.7	83.2	*55%*	*33%*
Shellfish	0.0	0.0	0.0	0.0	0.0		*0%*
Freshwater	0.0	0.0	0.0	0.0	0.0		*0%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		*0%*

Source: EU Member States DCF data submission

4.18.3 Industry structure and employment

Six aquaculture enterprises operated in 2012, each employing more than 10 employees. This structure was stable over the last three years. The number of employees decreased from the previous year (2011) by 11%, whereas fulltime equivalents decreased by 8%, which led to the FTE per enterprise indicator to also decrease by 8%. Male employees were more prolific, accounting for ca. 93% of total employment. The average wage returned to similar values as in earlier year and recuperated from the declining values obtained in the two previous years.

Table 4.18.2 Structure of the Maltese aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*6*	*6*	*6*	*6*	*6*	*0%*	*0%*
<=5 employees	0	0	0	0	0		*0%*
6-10 employees	1	1	0	0	0		*-100%*
>10 employees	5	5	6	6	6	*0%*	*9%*
Employment (number)							
Total employees	221	173	227	189	167	*-11%*	*-17%*
Male employees	210	167	205	177	155	*-12%*	*-18%*
Female employees	11	6	22	12	12	*4%*	*-5%*
FTE	169	145	161	165	153	*-8%*	*-5%*
Male FTE	160	141	152	158	148	*-6%*	*-3%*
Female FTE	9	4	9	7	4	*-36%*	*-40%*
Indicators							
FTE per enterprise	28.2	24.2	26.8	27.5	25.4	*-8%*	*-5%*
Average wage (thousand €)	24.0	25.2	20.4	18.1	23.1	*28%*	*5%*
Labour productivity (thousand €)	150.6	-149.9	91.7	73.7	-9.5	*-113%*	*-123%*

Source: EU Member States DCF data submission

The total number of persons employed in the Maltese aquaculture sector was 167, corresponding to 153 FTEs. The graph below shows an overall stable trend, with slight fluctuations in the number of employees, for both males and females. Average wage shows some fluctuations which mirror image the number of employees, i.e. for the years in which the number of employees was greater, the average wage was low, while when the number of employees decreased, the average wage was higher.

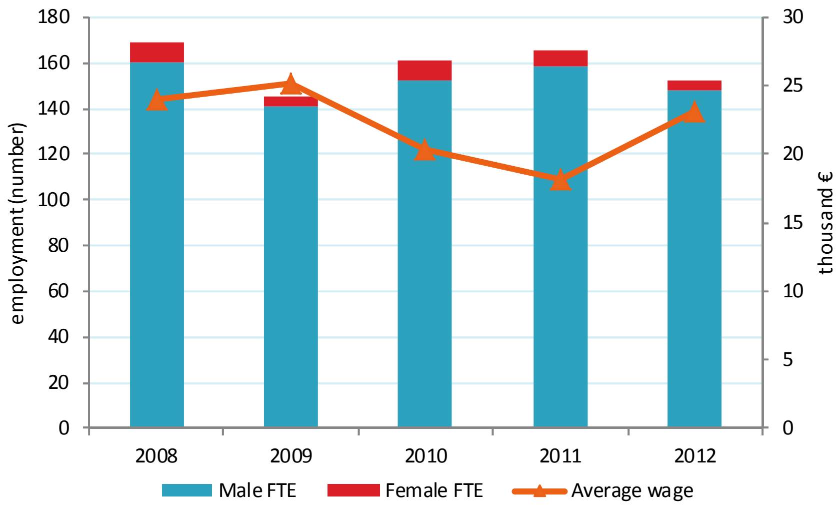


Figure 4.18.1 Employment trends for Malta: 2008-2012.

Source: EU Member States DCF data submission

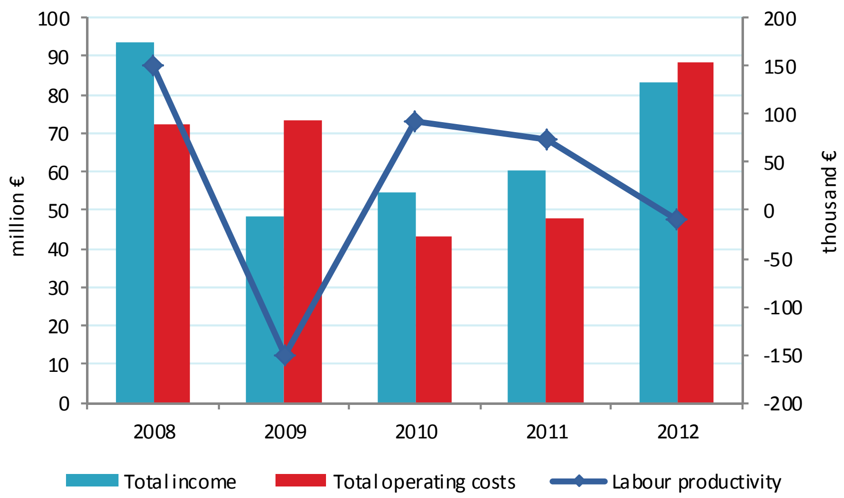


Figure 4.18.2 Income, costs, wages and labour productivity trends for Malta: 2008-2012.

Source: EU Member States DCF data submission

In 2012, total income increased by 46% when compared to 2011 whereas total operating costs increased by 85%. The greatest proportion of costs was due to the raw material required; feed (27.4%) and livestock (40.7%). Other operational costs, wages and salaries, energy costs and repair and maintenance followed in decreasing order. Significant variations in expenditure, capital costs and capital value were observed when compared to previous years. These variables always vary significantly from year to year (see trends in previous years) probably due to the fact that the population is very small (only 6 enterprises in total) and thus any change in any of the enterprises would result in a significant variation.

4.18.4 Economic performance

From 2011 to 2012, total income increased by 46%, while the operational cost increased by 85%. These staggering changes are mainly due to the low values obtained in 2011, but the values for 2012 are more comparable with the earlier years. The total income is exclusively from the turnover from the sale of fish from the farms.

Table 4.18.3 Economic performance of the Maltese aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	93.6	47.9	54.3	50.5	83.2	*100%*	*65%*	*35%*
Other income	0.0	0.2	0.2	6.4	0.0	*0%*	*-100%*	*-100%*
Subsidies	0.1	0.1	0.0	0.0	0.0	*0%*	*0%*	*-100%*
Total income	*93.7*	*48.2*	*54.5*	*56.9*	*83.2*	*100%*	*46%*	*31%*
Expenditures (million €)								
Wages and salaries	4.1	3.7	3.3	3.0	3.4	*4%*	*15%*	*-1%*
Imputed value of unpaid labour	0.0	0.0	0.0	0.0	0.1	*0%*	*4653%*	*18913%*
Energy costs	2.8	1.5	0.9	1.3	3.2	*4%*	*143%*	*93%*
Repair and maintenance	4.5	4.1	0.9	3.1	2.5	*3%*	*-18%*	*-20%*
Raw material: Feed costs	17.5	22.4	13.0	17.3	27.4	*33%*	*58%*	*56%*
Raw material: Livestock costs	25.3	26.2	13.7	12.8	40.7	*49%*	*219%*	*109%*
Other operational costs	18.0	15.7	11.2	10.3	10.9	*13%*	*6%*	*-21%*
Total operating costs	*72.2*	*73.5*	*43.0*	*47.7*	*88.1*	*106%*	*85%*	*49%*
Capital Costs (million €)								
Depreciation of capital	8.8	11.1	6.3	1.9	1.5	*2%*	*-23%*	*-79%*
Financial costs, net	1.1	7.2	1.1	0.5	-1.4	*2%*	*-415%*	*-158%*
Extraordinary costs, net	3.3	5.3	0.2	0.3	0.0	*0%*	*-100%*	*-100%*
Capital Value (million €)								
Total value of assets	18.7	17.5	13.7	10.7	9.5	*11%*	*-12%*	*-38%*
Net Investments	4.1	0.9	1.5	0.4	1.1	*1%*	*149%*	*-39%*
Debt	5.3	37.3	29.3	35.7	33.3	*40%*	*-7%*	*24%*
Input & Production (thousand tonnes)								
Raw material: Feed	24.8	36.6	18.0	11.1	7.9		*-29%*	*-65%*
Raw material: Livestock			1.2	0.8	2.7		*240%*	*174%*
Performance Indicators(million €)								
Gross Value Added	25.4	-21.7	14.8	12.2	-1.4	*2%*	*-112%*	*-119%*
Operating cash flow	21.5	-25.3	11.5	9.2	-5.0	*6%*	*-154%*	*-218%*
Earning before interest and tax	12.7	-36.4	5.1	7.3	-6.4	*8%*	*-188%*	*-129%*
Net profit	11.6	-43.6	4.0	6.8	-5.0	*6%*	*-173%*	*6%*
Capital productivity (%)	135.9	-124.0	107.7	113.3	-15.2			
Return on Investment (%)	67.7	-207.6	37.5	67.8	-67.9			
Future Expectation Indicator (%)	-25.0	-58.2	-35.6	-13.7	-4.4			

Source: EU Member States DCF data submission

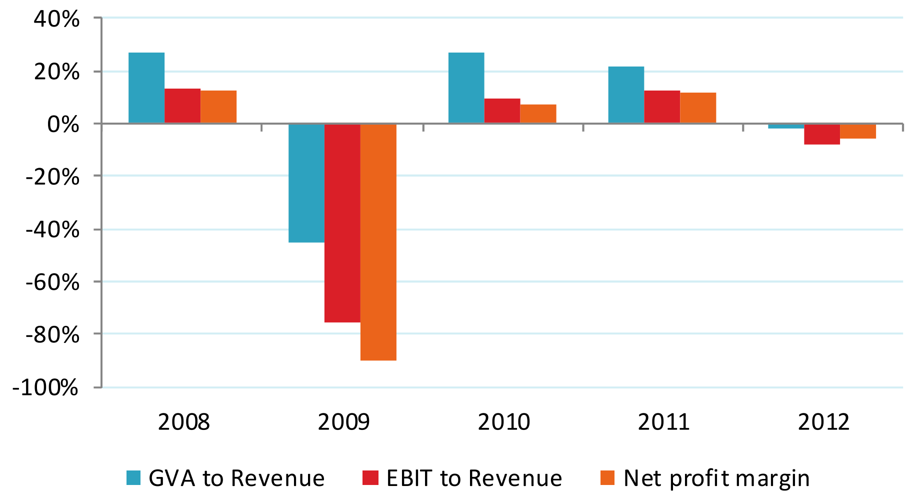


Figure 4.18.3 Economic performance for Malta: 2008-2012

Source: EU Member States DCF data submission

The contribution to the national economy, measured with the GVA indicator, was negative as was the net profit. The future expectation improved, although still negative.

4.18.5 Main species produced and economic performance by segment

The largest segment in the Maltese aquaculture sector is the 'other marine fish cages', which mainly consists of the aquaculture of Atlantic Bluefin tuna captured from the wild and fattened in the off-shore cages. A very minimal amount of other marine fish species are also included.

The second most important segment is the marine production of sea bass and seabream in cages.

Figure 4.18.4 Main species in terms of weight and value in Malta production: 2012.

Source: EU Member States DCF data submission

The top aquaculture species in Malta by first-sale weight were: Atlantic bluefin tuna (50%) followed by Gilt-head seabream (37%). The other species (European seabass and other marine fish) contributed for around 13% in total weight. In terms of value, bluefin tuna sales dominated the market, attributing for 83% in value when compared with other species. This is mainly attributed to the fact that bluefin tuna fetches very high prices especially in the Japanese market, which is the main market for this species in Malta. The second most important species by value is Gilt-head seabream, mostly attributed to the fact that it is grown in large amounts in Malta. The other species contribute to only approximately 4% of total value.

The lowest average price per kilogram remained that for the Gilthead seabream and remained relatively constant in the last three years. The price for European seabass fluctuates through the years. Data on average price for Greater amberjack in 2012 was not obtained and thus cannot be compared. Atlantic Bluefin tuna fetches the highest prices. In 2012, the average price was significantly lower than in 2011 but higher than previous years.

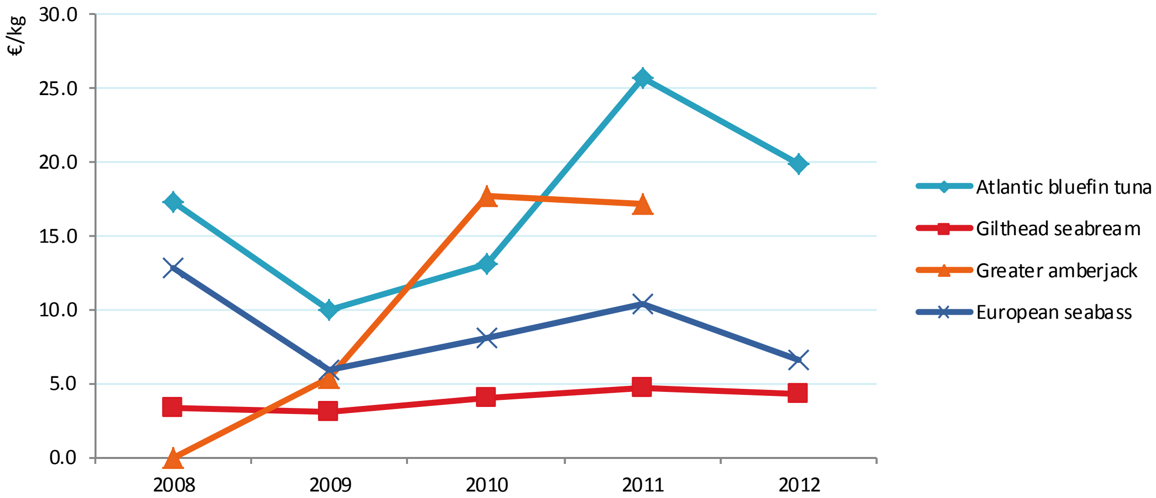


Figure 4.18.5 Average prices for the main species produced in Malta: 2008-2012.

Source: EU Member States DCF data submission

In Malta, the aquaculture sector is divided into two main segments, these being:

- Sea bass and sea bream cages
- Other marine fish cages

However, due to the limited number of companies (six in total) and due to the fact that in one of the segments, only one aquaculture enterprise is present for most of the years, due to confidentiality reasons, segmented analysis is not possible.

4.18.6 Trends and triggers

Current production trends and main drivers

Production levels increased considerably in 2012, especially when compared to the previous year. This is mainly due to unusual low production levels obtained in 2011 when compared to other years, mainly attributed to significantly low production of Atlantic Bluefin tuna for aquaculture, the reason being mostly attributed to quota allocation in 2011. From 2008 to 2012, a trend showing a slight decline in Atlantic bluefin tuna production is observed (with the exception of the year 2011, where a sharp decline was observed) over the years. This is mainly attributed to the fact that the main aquaculture activity in Malta is based on the fattening of bluefin tuna captured from the wild. The decreasing quota allowance and the higher prices paid for those bluefin tuna captured from the wild have led to a situation where less bluefin tuna are being brought to the fish farm cages resulting in decreased production. It is expected that this trend will continue into the near future, especially if quotas remain the same or are reduced further.

Turnover value increased for 2012 since the production of Bluefin tuna also increased considerably from the previous year. The price per kilo fluctuates mainly depending on the production. Low production (as in year 2011) results in higher process per kilo due to increased demand and vice versa.

The number of companies/enterprises has been stable throughout the years and is expected to remain as such. National production is mainly used for export. Atlantic bluefin tuna is exported mainly to Japan, whereas European seabass and gilt-head seabream are exported to Libya and of the European countries mainly Italy. Only a small proportion of the production is retained locally.

Market structure

The Maltese aquaculture sector consists of a very low number of enterprises, six in total. They are mostly focused on the production of Atlantic Bluefin tuna. The production of European seabass and Gilthead seabream is of secondary importance. Other marine fish are of minor importance.

Issues of special interest

In Malta, a few farms are experimenting on the production of new species and using new technologies. Such species include Meagre (*Argyrosomus regius*), and white seabream (*Diplodus sargus*), produced in relatively small amounts.

Funding for projects and research has contributed to the Maltese aquaculture industry mainly through obtaining funding for research projects concerning diversification of species that may be cultured such as the Amberjack project. The Maltese Aquaculture Research Centre also obtained funding through participation in the SELFDOTT Project, and the TRANSDOTT project that followed, both EU funded projectsunder the 7th Framework Programme for the domestication of bluefin tuna (http://www.fao.org/fishery/countrysector/naso_malta/en).

A National Aquaculture Strategy for Malta has been developed and it laid out a long term path towards clarity for growth and investment in aquaculture. It aims to enhance aquaculture development in the country in a sustainable way and should stretch from 2014 – 2025.

Outlook for 2013 and 2014

Observing trends obtained, production levels are expected to decrease slightly, if no radical changes in quota allocations for Bluefin tuna are made. Increased energy costs and other costs will affect the profitability of the industry.

4.18.7 Data Coverage and Data Quality

Data quality

Data for this report was obtained from DCF data.

Aquaculture data for 2012 was collected as a census. All six farms present in the Maltese Islands were surveyed and full coverage of data was obtained for most variables. For a few of the variables, mostly related to employment and costs, data was not obtained from all farms and coverage was not always satisfactory. Malta dealt with unit non-responses by raising estimates from the data collected to the total population.

The total population of farms is provided by The Maltese Department of Fisheries and Aquaculture. The data is collected at farm level, and can be aggregated to the enterprise level. The data is collected at farm level to get the most homogeneous segments in terms of species and technique.

Data is collected through a questionnaire survey and is on a voluntary basis obtained from the companys' accountants. The technique of census was applied. Direct interviews and postal questionnaires were used to gather the data needed.

The number of aquaculture farms was derived from a count of the number of enterprises registered to the population concerned in the business register corrected for errors. Dormant units were excluded. It included all units active during at least a part of the reference period.

Quality checking of the data was carried out by economic officers responsible for the collection of aquaculture data.

Data availability

Data for the aquaculture sector is available from the Department of Fisheries & Aquaculture of the Ministry for Sustainable Development, the Environment and Climate Change.

Confidentiality

The only two segments that are surveyed in Malta are the 'Seabream and seabass cages' and the 'Other marine fish cages' segments. All enterprises fall under these two segments. Since there a very small number of active aquaculture enterprises in Malta, six in total, when these are divided further into segments, the numbers are very low and cannot be rpesented separately due to confidentiality reasons. To avoid problems with confidentiality, segments should in general include more than 10 enterprises.

Differences in DCF data compared with other official data sources

Some fluctuations in data for value and weight are present between data reported by Eurostat and data collected through the DCF, although it has improved in the most recent years. Reasons may be mostly attributed to the fact that the segmentations used are different, as are raising procedures and calculations for estimations. Since calculations, data collection procedures, assumptions and raising procedures are not homogenous, different final values are reported. Data for the DCF is collected through survey questionnaires and reliability of data is questionable in this matter.

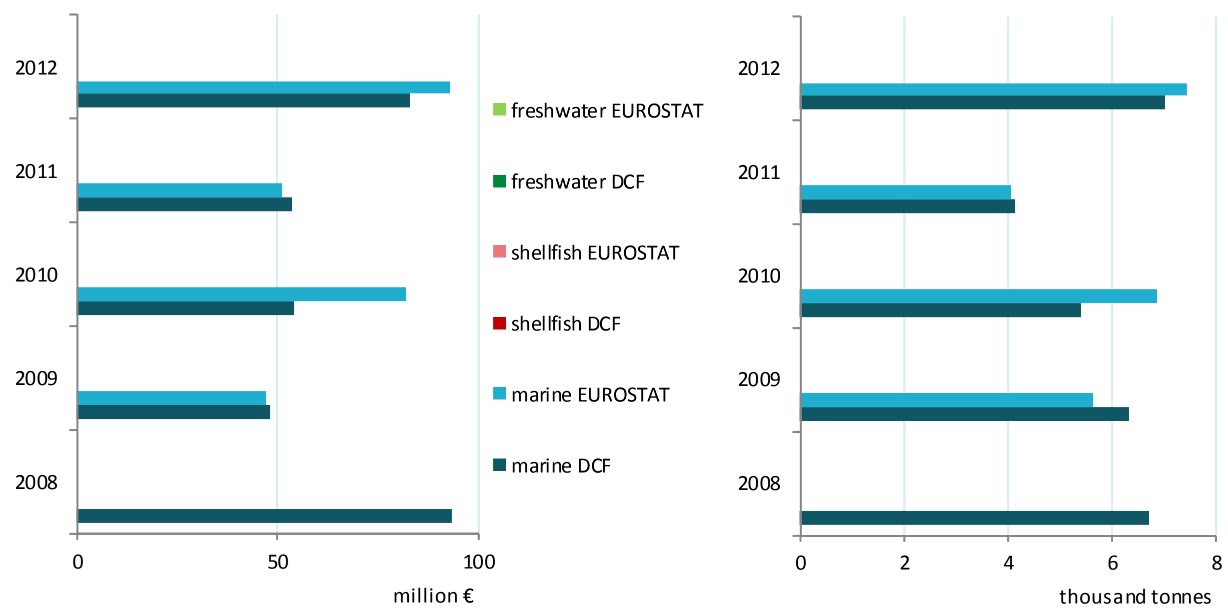


Figure 4.18.6 Comparison of DCF data with EUROSTAT data for Malta: 2008-2012

4.19 NETHERLANDS

4.19.1 Summary

Production volume and value

The Dutch aquaculture sector produced a total of 43.5 thousand tonnes in 2011, which corresponded to a decrease of 39% from 2010 to 2011. The total value of the production was 64.4 million euros in 2011, which corresponds to a decrease of 29% over the same period. Compared to the average for the years 2008-2011, the total volume decreased by 20%, whereas the total value decreased by 25%.

Overall industry structure and employment

In 2011, the total population of aquaculture farms was 115, distributed over mussel production (58 companies), oyster production (19 companies) and freshwater aquaculture (38 companies). The Dutch aquaculture sector is dominated by small enterprises with less than 5 employees.

Main segments

The production in the Netherlands can be divided into three main segments. The largest segment is the production of blue mussels on bottom cultures. The second most important segment is the production of oysters. Third is land-based production of freshwater fish, mostly eel and catfish.

Current production trends and main drivers (Trends and triggers)

2011 showed a steep decline in mussel production, caused by lack of supply of mussel spat. Due to ecological considerations, bottom trawling for mussel spat was restricted in spring 2011. This recurrent issue is a problem to the sector. To ensure supply of mussel spat, the sector now works with mussel spat collection using long-lines in both the Wadden Sea and North Sea. Oyster production is relatively stable over the last years.

The production size of freshwater aquaculture has decreased over the years, as has the number of active companies. In 2011, total sales value remained fairly constant. Wholesale prices increased slightly and some producers are experimenting with different business models, omitting wholesale and delivering directly to consumers and restaurants.

Outlook

Based on the currently available data, is it expected that the mussel sector will show better performance in the coming years as supply of mussel spat is better than in 2011. The oyster sector will likely face little changes. Freshwater aquaculture shows a tendency towards low volume/high value production. It is to see if all producers, in particular catfish producers, can make this transition.

4.19.2 Production and sales

Dutch aquaculture is dominated by the shellfish sector, largest in sales weight and in sales value. Within this sector, blue mussels are the most important species. The freshwater sector is much smaller in weight and value.

Table 4.19.1 Production and sales for the Netherlands: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2011/10	Development 2011/(2008-10)
Sales weight (thousand tonnes)	***37.0***	***54.5***	***71.9***	***43.5***		*-39%*	*-20%*
Marine							
Shellfish	37.0	46.0	59.7	34.5		*-42%*	*-28%*
Freshwater		8.5	12.2	9.1		*-26%*	*-12%*
Hatcheries & nurseries							
Sales value (million €)	***90.2***	***77.8***	***90.3***	***64.4***		*-29%*	*-25%*
Marine							
Shellfish	72.2	62.3	74.5	48.8		*-35%*	*-30%*
Freshwater	18.0	15.5	15.8	15.7		*-1%*	*-5%*
Hatcheries & nurseries							

Source: EU Member States DCF data submission

In 2011, both total sales weight and sales value decreased considerably. Total sales weight decreased by 39% from 71.9 thousand tonnes to 43.5 thousand tonnes. Total sales value decreased by 29%, from 90.3 million to 64.4 million. The overall decrease is largely the results of decreasing mussel production.

Culture of shellfish is by far the largest activity. We differentiate between mussels and oysters. The production of mussels has decreased between 2010 and 2011 by 44%, and total sales value decreased by 39%. The mussels sector is far larger than the oysters sector (43 million compared to 5.7 million total sales volume in 2011). Oyster aquaculture remained fairly stable between 2010 and 2011. Production of shellfish takes place in the coastal areas with a concentration in the South-Western province Zeeland and the Wadden Sea.

Freshwater aquaculture is the second main segment albeit significantly smaller. Total sales value of this sector remained fairly stable in 2011 (-1%) even though sales weight has gone down considerably (-29%). Activities are dispersed throughout the country, with some concentration around traditional fishing communities. Freshwater aquaculture is dominated by production of European eel and North African catfish. Catfish has low value but is produced in relatively high volumes. Eel production in tons is small but due to higher prices, total value is comparable to that of catfish.

4.19.3 Industry structure and employment

Structure and employment trends are discussed, differentiating between the shellfish and freshwater fish sectors.

Table 4.19.2 Structure of the Dutch aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2011/10	Development 2011/(2008-10)
Structure (number)							
Total enterprises	*131*	*127*	*120*	*115*		*-4%*	*-9%*
<=5 employees	128	124	117	112		*-4%*	*-9%*
6-10 employees	3	3	3	3		*0%*	*0%*
>10 employees	0	0	0	0			
Employment (number)							
Total employees	196	513	492	467		*-5%*	*17%*
Male employees	196	513	492	467		*-5%*	*17%*
Female employees	0	0	0	0			*0%*
FTE		363	349	332		*-5%*	*-7%*
Male FTE		363	349	332		*-5%*	*-7%*
Female FTE		0	0	0			*0%*
Indicators							
FTE per enterprise		2.9	2.9	2.9		*-1%*	*0%*
Average wage (thousand €)	44.7	25.3	18.9	33.1		*75%*	*12%*
Labour productivity (thousand €)	294.3	140.6	197.8	92.1		*-53%*	*-56%*

Source: EU Member States DCF data submission

The total number of persons employed in the Dutch aquaculture sector is estimated at 467, corresponding to 332 FTE. From 2010 to 2011, the number of employees has gone down by 5%. This decline is in line with observed trends. Note that the estimated number of employees for 2008 excludes the freshwater sector. The aquaculture sector is dominated by men. The average FTE per enterprise has decreased by 4%, in line with the development trend. Labour productivity dropped by 53%. This drop reflects the bad performance of the mussel sector in 2011. Aggregation of information might unjustly suggest that oyster and freshwater fish have a similar drop in productivity. The average wage fluctuates strongly. This fluctuation is difficult to explain and is probably caused by variation in the panel providing information.

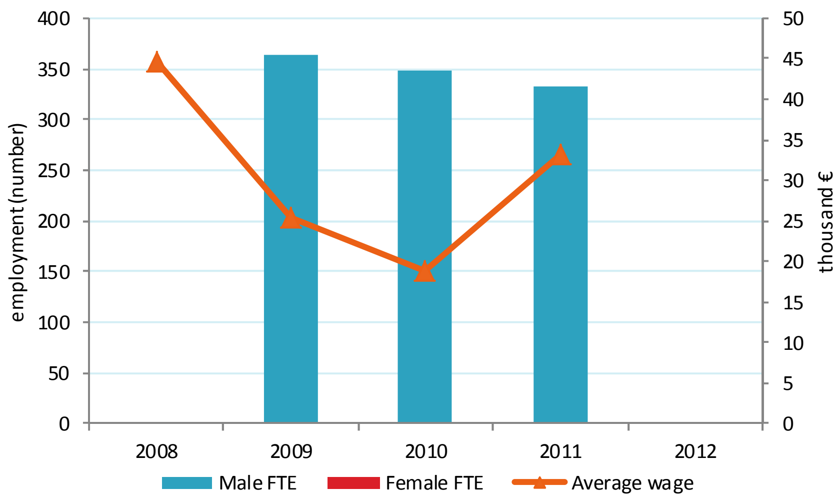


Figure 4.19.1 Employment trends for the Netherlands: 2008-2012.

Source: EU Member States DCF data submission

The number of enterprises and FTEs has decreased from 2008 to 2011, but the average number of FTE per enterprise has been rather constant over the period. The decrease in number of enterprises is largely the result of the exit of freshwater aquaculture companies. Over the last years, we have witnessed a slow but steady decline in the number of companies due to economic problems or retirement. This particularly concerns companies producing catfish. Although new private initiatives do show up every now and then, no known new companies have been established in the last years.

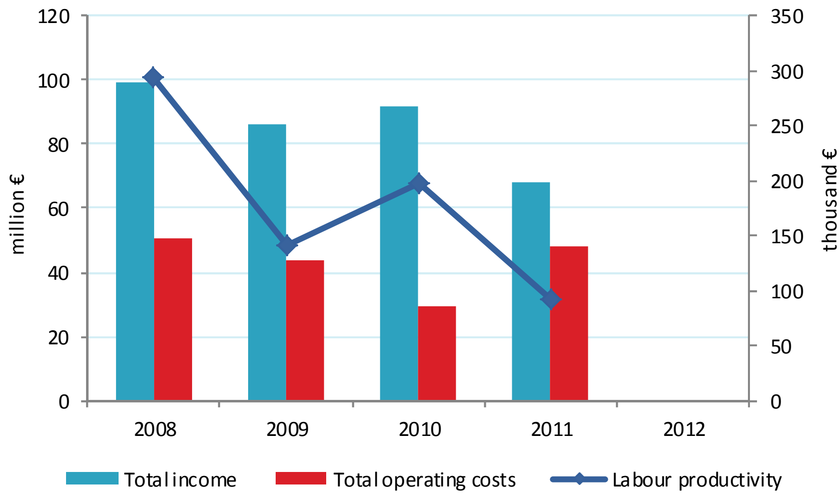


Figure 4.19.2 Income, costs, wages and labour productivity trends for the Netherlands: 2008-2012.

Source: EU Member States DCF data submission

In 2011, the decrease in sales weight and sales volume is accompanied by an increase in total operating costs. Between 2010 and 2011, these increased by 63%. Compared to the 2008-2010 average, a 17% increase is observed.

4.19.4 Economic performance

From 2010 to 2011, total income decreased by 26%. The total income is dominated by the turnover from the sale of fish and shellfish from the farms, which contributes 95% of total income, leaving only 5% to other sources of income.

Table 4.19.3 Economic performance of the Dutch aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2011-10	Development 2011/(2008-10)
Income (million €)								
Turnover	90.2	77.8	90.3	64.4		95%	-29%	-25%
Other income	9.1	8.1	1.7	3.4		5%	93%	-47%
Subsidies	0.0	0.0	0.0	0.0		0%	0%	0%
Total income	*99.3*	*85.9*	*92.1*	*67.8*		*100%*	*-26%*	*-27%*
Expenditures (million €)								
Wages and salaries	8.8	9.2	6.6	11.0		16%	67%	34%
Imputed value of unpaid labour	0.0	0.0	0.0	0.0		0%	0%	0%
Energy costs	6.9	6.4	4.3	7.1		10%	65%	21%
Repair and maintenance	5.2	4.7	4.4	6.3		9%	44%	33%
Raw material: Feed costs	8.9	7.3	4.1	5.4		8%	32%	-20%
Raw material: Livestock costs	11.2	6.6	3.3	8.2		12%	148%	16%
Other operational costs	9.4	9.7	6.9	10.2		15%	47%	17%
Total operating costs	*50.4*	*44.0*	*29.6*	*48.2*		*71%*	*63%*	*17%*
Capital Costs (million €)								
Depreciation of capital	6.2	8.8	5.5	4.2		6%	-22%	-38%
Financial costs, net	8.5	17.8	3.3	5.7		8%	73%	-42%
Extraordinary costs, net	1.1	3.0	0.5	0.1		0%	-86%	-96%
Capital Value (million €)								
Total value of assets	222.3	195.3	21.4	21.8		32%	2%	-85%
Net Investments	8.3	11.4	4.4	2.6		4%	-40%	-67%
Debt	139.7	121.0	79.5	114.6		169%	44%	1%
Input & Production (thousand tonnes)								
Raw material: Feed		7.8	6.7	7.4			11%	2%
Raw material: Livestock		34.7	29.1	10.1			-65%	-68%
Performance Indicators(million €)								
Gross Value Added	57.7	51.0	69.0	30.6		45%	-56%	-48%
Operating cash flow	48.9	41.9	62.5	19.6		29%	-69%	-62%
Earning before interest and tax	42.8	33.1	57.0	15.3		23%	-73%	-65%
Net profit	34.2	15.3	53.7	9.6		14%	-82%	-72%
Capital productivity (%)	26.0	26.1	323.4	140.0				
Return on Investment (%)	19.2	16.9	267.0	70.3				
Future Expectation Indicator (%)	1.0	1.3	-5.1	-7.4				

Source: EU Member States DCF data submission

The expenditures in 2011 are dominated by wages and salaries (16%), other operational costs (15%), cost of livestock 12%) and energy cost (10%). Wages and salaries show a steep increase in 2011, from 6.6% to 11% although relative increase is much smaller compared to long term development. The large variation in livestock costs is largely explained by the varying expenditures of the mussel sector on livestock; expenditures in 2008 were roughly €9.1 million whereas in 2010 they only reached circa €900.000. In this context, 2011 expenditures on livestock, €5.7 million, are not abnormal. Energy costs have increased as well. Here as well, comparison to 2010 shows a relatively strong increase but compared to long term development changes are less drastic.

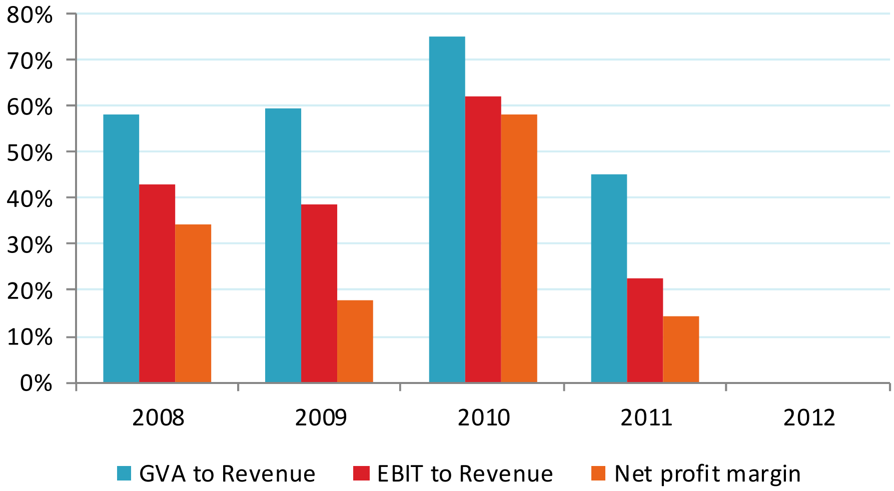


Figure 4.19.3 Economic performance for the Netherlands: 2008-2012

Source: EU Member States DCF data submission

The gross value added for the sector as a whole decreased by 30% but both EBIT and net profit were still positive. The total value of assets remained stable between 2010 and 2011. The total level of debts increased considerably compared to 2010. However, it is still below 2008 and 2009 levels.

4.19.5 Main species produced and economic performance by segment

Aquaculture production in the Netherlands can be divided into three main segments:

- Segment 1: blue mussel on bottom cultures
- Segment 2: oysters on bottom cultures
- Segment 3: freshwater fish, mainly European eel and North African catfish.

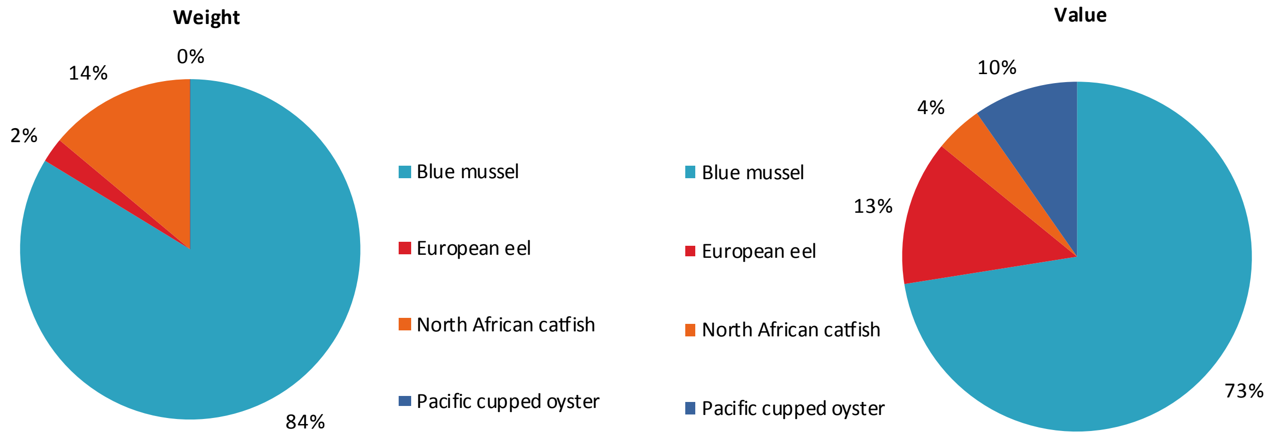


Figure 4.19.4 Main species in terms of weight and value in Dutch production: 2011.

Source: EU Member States DCF data submission

Segment 1: mussels on bottom cultures

Traditionally, the largest sector in Dutch aquaculture is mussels culture, consisting of 58 active companies. The data shows that total sales volume in 2011 was considerably lower than in 2010, dropping from €56.1 million to €31 million. With prices remaining almost the same, this is explained by a decreased production in 2011. Production levels have reached historical lows. Nevertheless, the mussel sector remains by far the largest sector in the Netherlands. Profit margin dropped to 10% in 2011. For comparison: in 2010 profit margin peaked at 65%, in 2009 it was 21%.

Segment 2: Oysters on bottom culture

The oyster industry is quite different from the mussel industry. The scale of production is lower, companies are smaller and the majority of the entrepeneurs combine the culture of oysters with other activities. The capital invested in the vessels is much lower (average age around 70 years) than for the mussel sector, resulting in a higher return on investment and capital productivity, but labour productivity is much lower than in the mussel sector. Total sales volume in 2011 is 3.5 thousand tons, comparable with 2010 levels. In 2011 the economic revenues were in general positive with a total net profit of €3.3 million.

Segment 3: Freshwater aquaculture on land

The third sector of aquaculture in the Netherlands consists of freshwater aquaculture. European eel and catfish are the two most important species. For a variety of reasons the number of companies and the production of both species declined steeply over the last decade. In 2011, this decline has continued, mainly caused by a reduction of active companies producing catfish. Other species which are grown by a small number of companies are trout, tilapia, carp and pikeperch. Fresh water aquaculture is a relatively small sector in the Netherlands. In 2011, total income remained stable, even though total sales volume decreased by 26%. This only partially explained by the reported increase in price because this concerns wholesale price. In the last years we have witnessed the proliferation of direct sales with considerably higher retail prices.

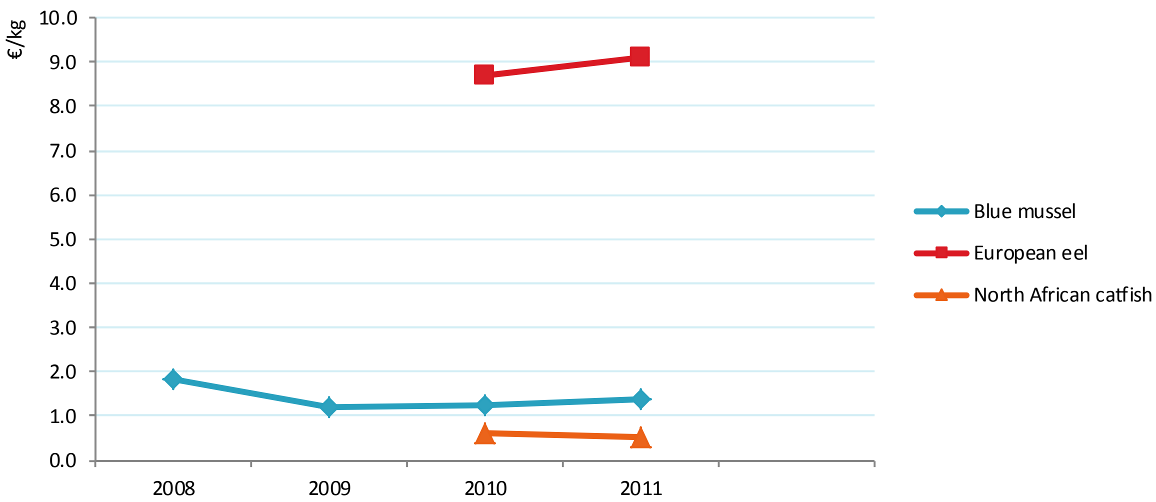


Figure 4.19.5 Average prices for the main species produced in the Netherlands: 2008-2012.

Source: EU Member States DCF data submission

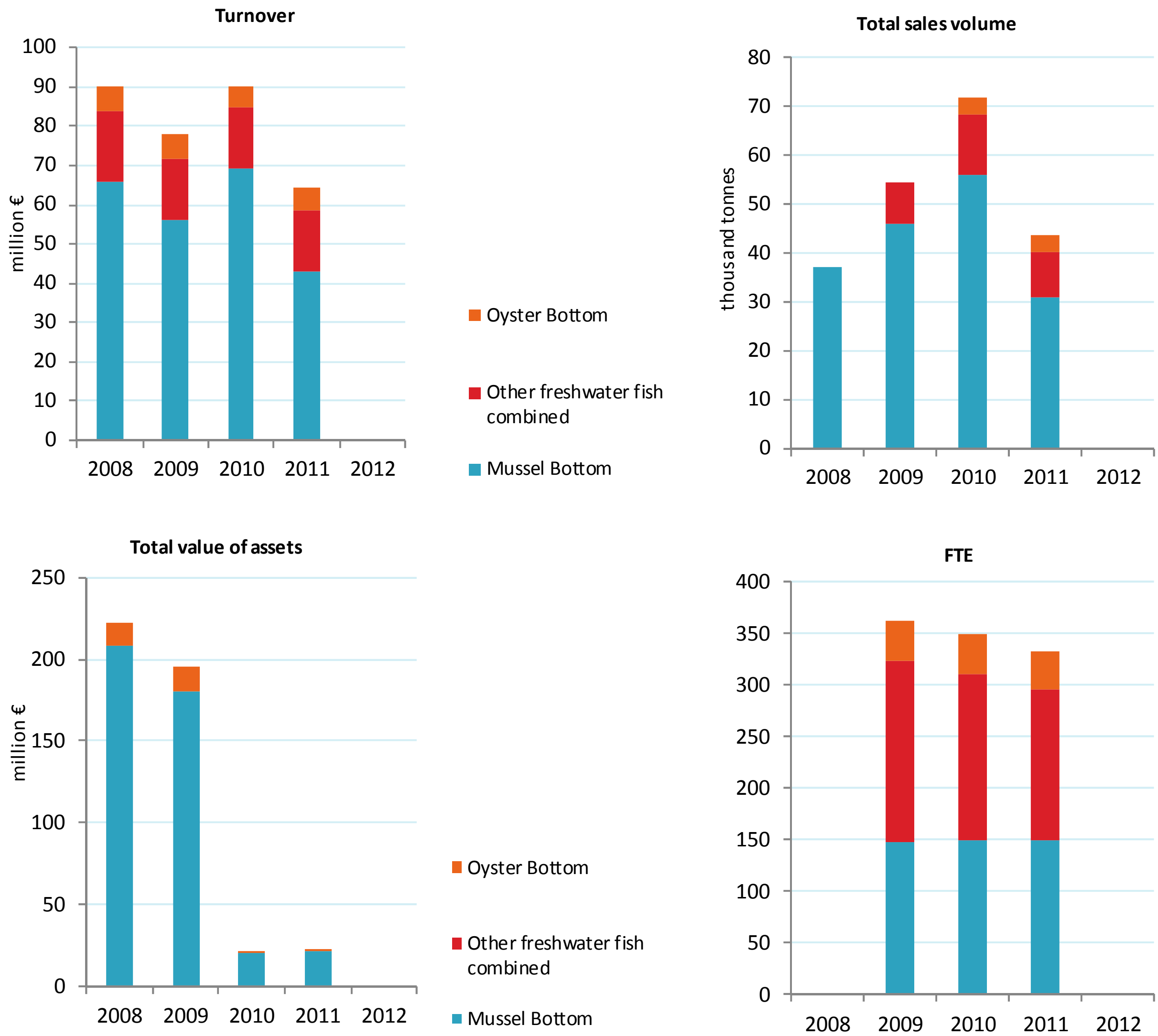


Figure 4.19.6 Structural development of Dutch aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

In table 4.19.4, the economic performance of the three Dutch segments is shown. From the table it can be seen that the gross value added is positive for all segments, but overall production, income and profit shows a significant decrease compared to 2010.

Table 4.19.4 Economic performance of main Dutch aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2011-10	Development 2011/(2008-10)
Mussel Bottom								
Total Income	72.9	61.2	70.7	46.3		100%	-35%	-32%
Gross Value Added	49.8	43.7	59.3	22.7		49%	-62%	-55%
Operating cash flow	42.4	35.8	53.4	13.0		28%	-76%	-70%
Earning before interest and tax	38.8	29.4	48.6	9.5		20%	-80%	-76%
Net profit	31.4	12.8	45.6	4.5		10%	-90%	-85%
Total sales volume (thousand tonnes)	37.0	46.0	56.1	31.0			-45%	-33%
Other freshwater fish combined								
Total Income	20.2	18.3	15.8	15.7		100%	-1%	-13%
Gross Value Added	4.6	3.9	6.1	3.3		21%	-46%	-32%
Operating cash flow	4.3	3.5	6.0	3.1		20%	-48%	-32%
Earning before interest and tax	2.2	1.4	5.4	2.5		16%	-53%	-15%
Net profit	1.0	0.2	5.0	1.8		12%	-64%	-13%
Total sales volume (thousand tonnes)		8.5	12.2	9.1			-26%	-12%
Oyster Bottom								
Total Income	6.2	6.3	5.5	5.8		100%	5%	-4%
Gross Value Added	3.3	3.4	3.7	4.5		78%	23%	31%
Operating cash flow	2.2	2.6	3.0	3.5		61%	16%	34%
Earning before interest and tax	1.8	2.2	3.0	3.3		57%	9%	40%
Net profit	1.8	2.2	3.0	3.3		57%	10%	42%
Total sales volume (thousand tonnes)			3.6	3.5			-4%	-4%

Source: EU Member States DCF data submission

In Figure 4.19.7, the economic indicators for the three Dutch segments are presented. From the figures it can be seen that EBIT is positive for all segments. The mussel sector shows weak performance in 2011, whereas the oyster sector did better. Performance of the freshwater sector shows a decreasing trend since 2008, despite some yearly fluctuations.

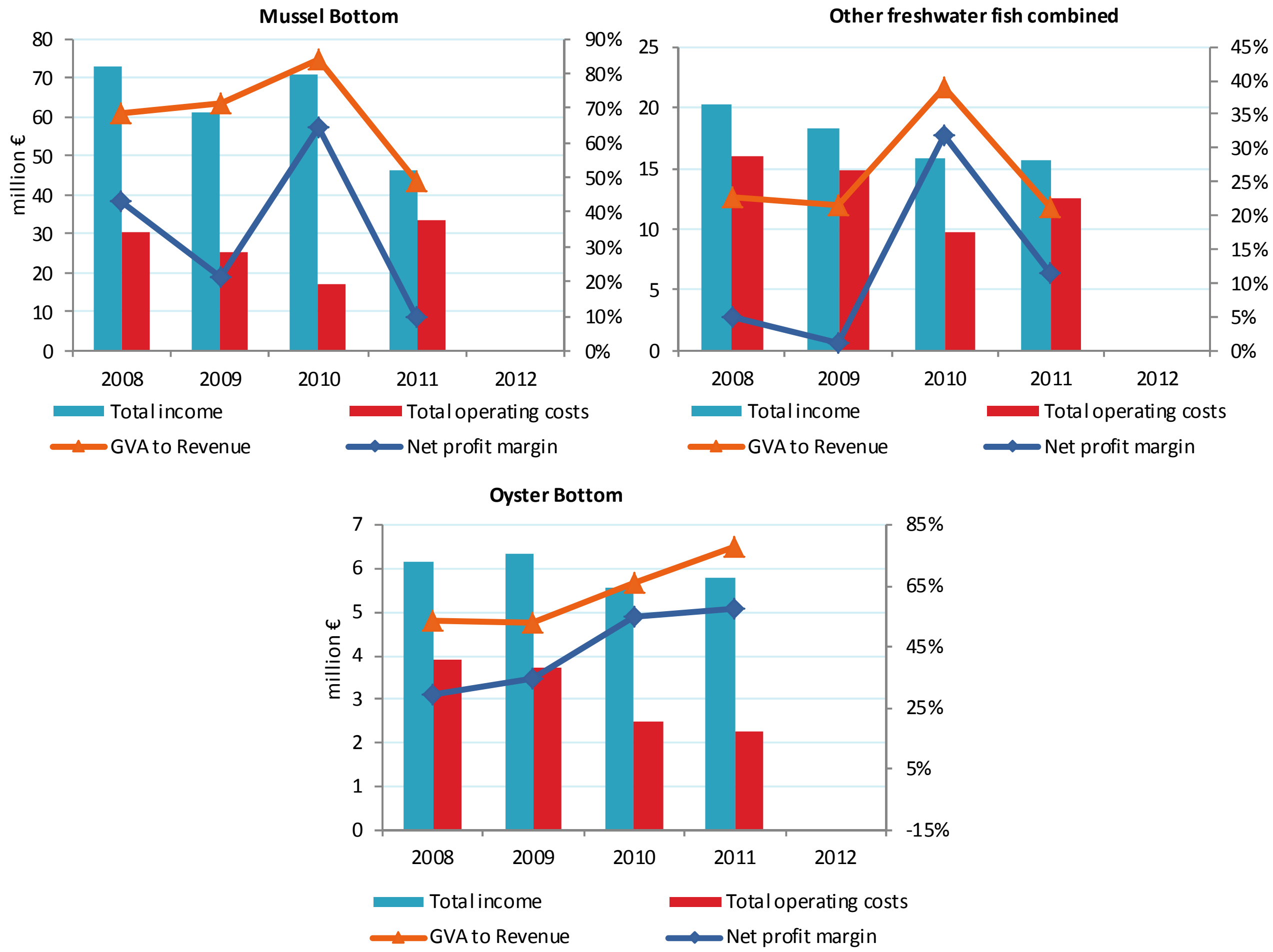


Figure 4.19.7 Economic performance indicators for the main Dutch segments: 2008-2012.

Source: EU Member States DCF data submission

In Figure 4.19.8 the operational cost structures for the three Dutch segments are presented.

Segment 1: mussels on bottom cultures

Most important costs items include wages and salaries (27%), other operational costs (22%), livestock costs (15%), repair and maintenance (14%) and energy costs (13%). Within other operational costs, rental costs for the area where the mussels are farmed are important. 2011 witnessed an strong increase in the costs of livestock, compared to 2010 and 2009.

Segment 2: Oysters on bottom culture

Most important costs items for the oyster sector are wages and salaries (40%), repair and maintenance (18%), other operation costs (17%) and energy costs (14%). The variable “other operational costs” also includes the costs of lease of the growing area (approx. 8%).

Segment 3: Freshwater aquaculture on land

By far the most important cost is feed (41%), followed at a distance by livestock costs (18%) and energy costs (15%). Data presented here shows that the sector realised a profit margin of 12% in 2011. Behind the averages economic performance presented here, there is much variation between the companies, with some making profits while others make continuing losses. One should be careful in the interpretation of these figures as the DCF data is collected through a panel that might not represent the entire population of freshwater aquaculture companies correctly.

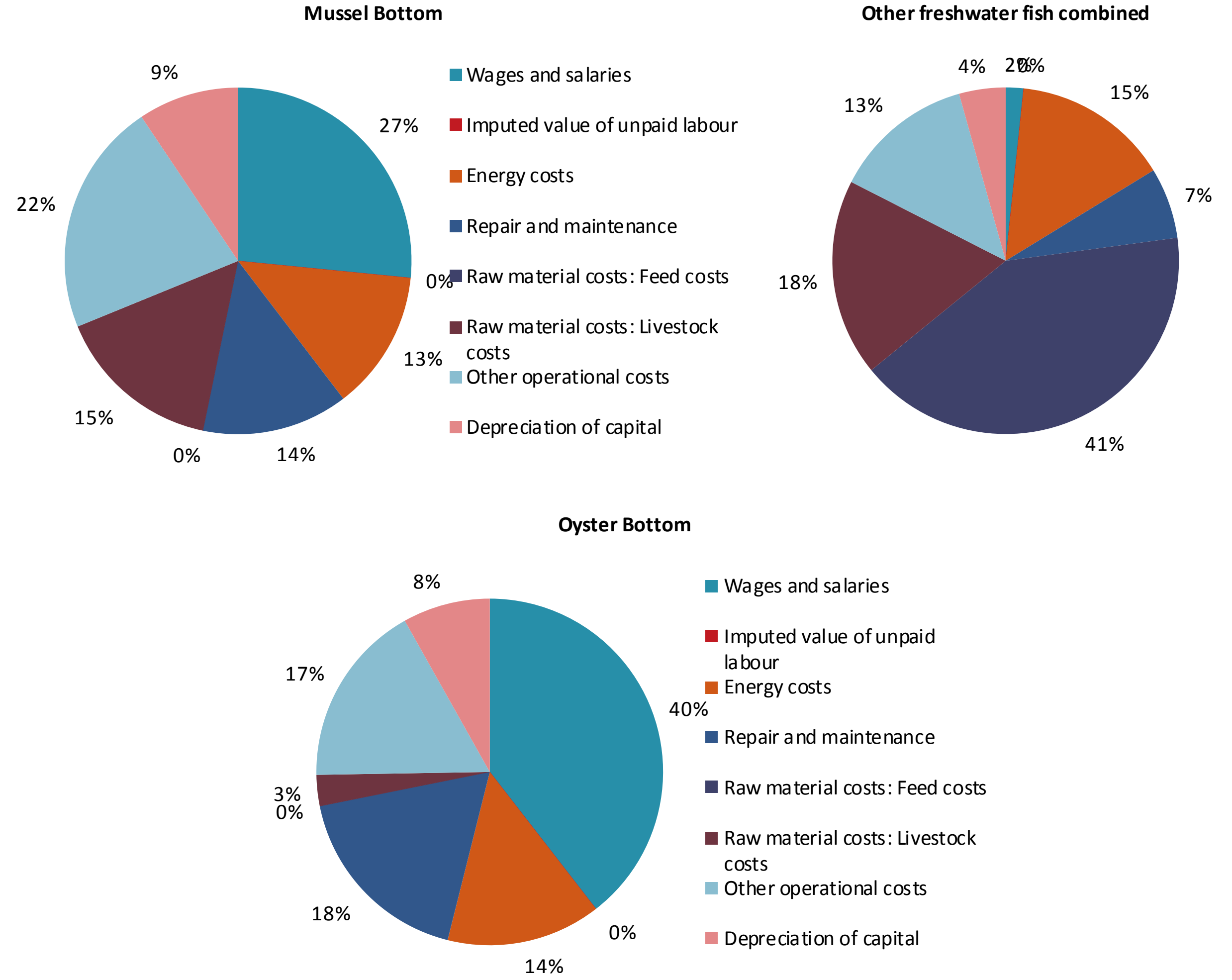


Figure 4.19.8 Cost structure of the main segments in the Netherlands: 2011.

Source: EU Member States DCF data submission

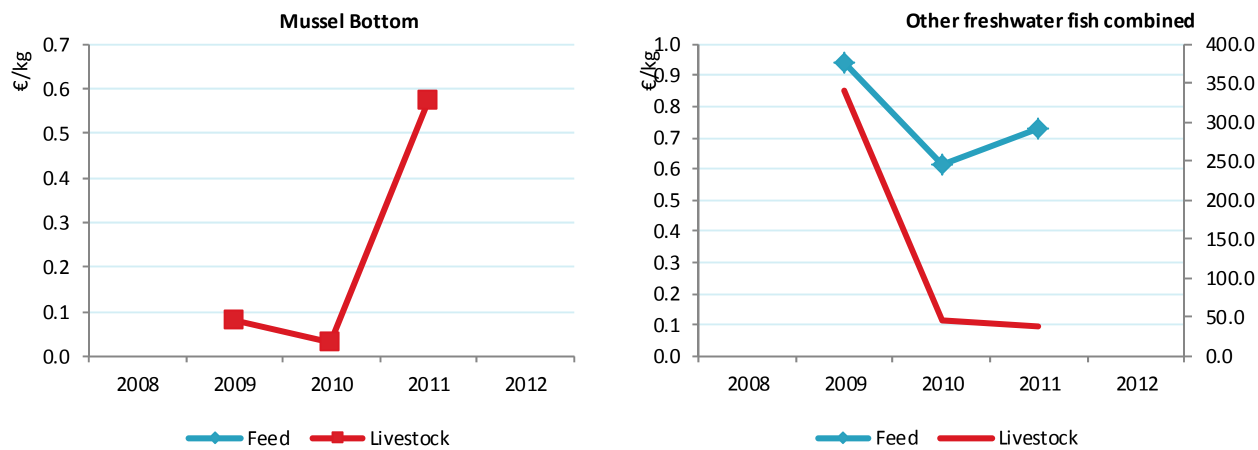


Figure 4.19.9 Feed and livestock prices for the main Dutch segments: 2008-2012.

Source: EU Member States DCF data submission

4.19.6 Trends and triggers

Current production trends and main drivers

The decreased economic performance of the aquaculture sector in 2011 is largely explained by low production levels of blue mussels. In 2011, the mussel sector was not allowed to collect mussel spat in the Wadden Sea by bottom trawling, effectively limiting total production. Problems with mussel spat collection are a recurrent issue and the sector is in transition towards the use of mussel spat collection technologies, rather than bottom trawling. This could increase production levels in the future although reportedly there is high variation in mussel spat collected per year. In the long term, offshore mussel spat collection might be an impulse to the sector.

The oyster sector has remained stable in 2011 and no major market developments are foreseen in the coming years.

The last years, the freshwater aquaculture has continued to decrease as companies stop production. This trend continued in 2011 but a positive sign is that the total sales volume has not decreased. Although still based on anecdotal evidence, there are signs that the remaining companies succeed in business model innovation to increase revenues. Direct sales to consumers of processed products, even online, can increase revenues.

Market structure

The market structure of Dutch aquaculture has not witnessed major changes in the last years. For mussel and oyster production, the number of companies producing and trading remains stable. In many ways, 2011 was a bad year. If the sector succeeds in organised mussel spat collection there are little reasons to expect major changes in the coming years. The sector continues to have close contact with research institutes and (local) politics.

The freshwater aquaculture sector shows some signs of change. Apart from the decreasing number of companies, there are signs that direct sales and local sales become more important. The sector is not well organised and lacks structural contact with research institutes.

Issues of special interest

Mussel spat collection is a challenge to the mussel sector. It is still a question how much mussel spat can be collected, in the Wadden Sea and offshore. Recently, interest in combination with offshore wind energy has increased. This might be a solution to spatial conflicts in the heavily used North Sea, and it might come with some synergy reducing operating costs.

In the last years, academic and business interest in production of seaweeds has grown. The first commercial seaweed farms are established in 2013 and might prove to be an impulse for the aquaculture sector in the Netherlands. The research project Zeeuwse Tong (Sealand Sole) has illustrated the feasibility of co-production of fish, algae and shellfish but no commercial follow-up is established yet. New private initiatives for aquaculture have focussed on new species and/or production using warm waste water from industrial plants. Some of these initiatives might prove to be a structural addition to the Dutch aquaculture sector.

Outlook for 2013 and 2014

Due to restriction in mussel spat collection by bottom trawling, the future performance of the mussel sector depends heavily on the capacity to collect mussel spat via other technologies, most notable the “mosselzaadinvang installaties” (MZI). In 2012, the sector was allowed to fish for mussel spat in autumn and MZI's generated a relatively large amount of mussel spat. In 2013, supply of mussel spat was lower again (-7%) and this will affect total production levels.

Regarding oysters, there is little reasons to expect major changes in 2013 and 2014.

With regards to freshwater aquaculture, the decline in number of companies is expected to continue. Experiments notwithstanding, there are no signs that the sector will undergo major structural changes in the coming years. It is likely that the remaining producers will focus on direct sales to consumers and restaurants, rather than compete on the wholesale market with imported whitefish.

4.19.7 Data Coverage and Data Quality

Data quality

The account statistic for 2011 is based on a sample of 17 aquaculture companies, which covers 15% of the total population of 115 farms. These 17 companies provide detailed information to LEI Wageningen UR, that is used for extrapolation to the entire sector. Additional aggregate information on sales volume and value of mussels, oysters and eel production is available from Statistics Netherlands.

Information on the number of companies is retrieved from Dutch Food Safety Authority and own databases of LEI Wageningen UR. Problem with the data of Food Safety Authority is that covers all companies who are permitted to produce fish, included many in-active companies.

Data quality differs considerably for the three sectors. Information on the mussel sector comes from 10 companies (17% of in total 58 companies). A total of 4 oyster companies provide detailed information to LEI Wageningen UR (21% of in total 19 companies). Concerning freshwater aquaculture, 3 companies provide detailed information (8% of in total 38 companies). Out of these two companies, 2 produce catfish, 1 produces eel.

Data availability

Data is collected in accordance with the Dutch National Plan. After collecting the information and having it checked by accountants, the companies voluntarily submit data to LEI Wageningen UR. As some companies work with financial years running from July to July, submission of this information can take place late. Once all information is collected, it is processed by LEI Wageningen UR.

Confidentiality

Obviously, the fact that such a low number of companies deliver information is a problem for confidentiality. When collecting data, LEI Wageningen UR explicitly mentions that the information will be treated confidentially. General guidelines that segments should include more than 10 enterprises would be hard to put into practice, given the low number of companies in the oyster and freshwater segments.

Differences in DCF data compared with other official data sources

When comparing the Dutch data for DCF with the value and production registered by EUROSTAT, the following remarks can be made.

First, the DCF data does not cover 2012, whereas EUROSTAT data does.

Secondly, the EUROSTAT data mentioned production of marine finfish (ca. 3.2 million kg in 2011). Most likely, this concerns the produce of marine (flat)fish under experimental conditions, and not commercial production.

Apart from these two differences, the DCF and EUROSTAT are generally in line with each other. Differences for mussel and oysters sector can largely be explained by the extrapolation that affects total production levels.

Difference in production and value of freshwater aquaculture have decreased in 2011. Particularly in 2010, very different production levels were reported. The EUROSTAT data show a steep decline in 2011, compared to 2010 bringing them closer to DCF data..

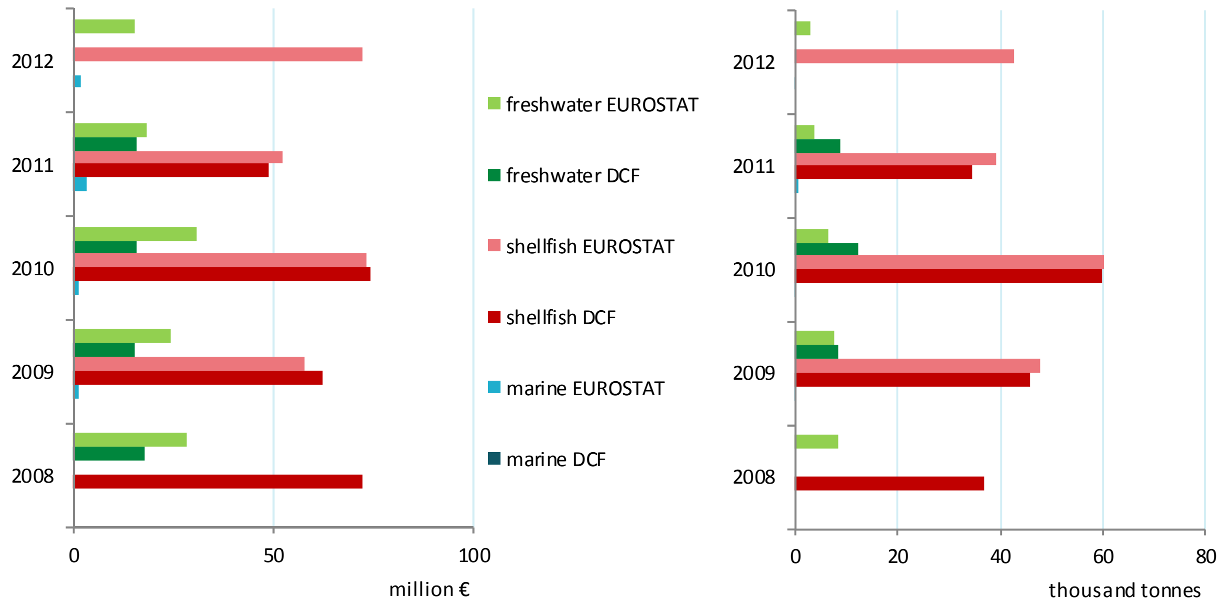


Figure 4.19.10 Comparison of DCF data with EUROSTAT data for the Netherlands: 2008-2012

4.20 POLAND

4.20.1 Summary

Production volume and value

According to the data submitted by Poland to EUROSTAT the total volume of aquaculture production of fish was 33.2 thousand tonnes in 2012 and it increased by 14.5% compared to the FAO data for 2011. The total value of production was 105.1 million euros in 2012 and there was also an annual increase of 70.6% recorded. From 2008 to 2012, the total volume decreased by 9.8%, whereas the total value increased by 43.4%.

Overall industry structure and employment

In 2012 there were 840 aquaculture land-based farms. The sector was dominated by small enterprises with less than 5 employees. 59% of the Polish farms had less than 5 employees in 2012.

Main segments

The biggest segment is the production of common carp. In 2012 common carp represented 55% of the total volume of production and 41% of the whole total value of aquaculture production.

The next segment of the production is harvesting of rainbow trout, which contributed 32% of the total volume and for 27% of the total value of aquaculture production.

Many farms produced in polyculture more than one freshwater species, mainly African and European catfishes, grass carp, silver carp, bighead carp, crucian carp, pike, tench and sturgeon.

There are few fish farms in Poland producing sturgeon, tilapia, barramundi using recirculation system.

The only segment, covered by DCF data collection consists of fish farms that breed and rear Atlantic salmon fry and that cooperate with the Panel for Restocking appointed by the Minister of Agriculture and Rural Development for stocking Polish Marine Areas.

Current production trends and main drivers (Trends and triggers)

Carp is produced for the domestic market. Export opportunities are just about hundred tonnes per year. Most carp is sold in December before Christmas Eve in the form of live fish and fresh whole fish.

The main factor which stimulates the production of rainbow trout, in addition to domestic demand, is export, which in 2012 stands at 6.3 thousand tonnes (59% of total production in 2012). About 77% of the export of trout goes to the German market, mainly smoked.

Outlook

In Poland freshwater aquaculture production in volume is dependent on the prevailing meteorological conditions. In the case of carp too low autumn temperature shortens the feeding period and growth of fish. However, in the case of trout too high temperature continuing in the period from June to August limits feeding and weight gain of fish. The main limiting factors in achieving maximum potential yields are outbreaks of viral diseases and also pressure of fish- eating animals (cormorants, otters).

It is expected that in 2013-2014 aquaculture production of all species will increase because of favourable meteorological conditions, reducing fish-eating animals pressure and if fish farms epizootic conditions will not deteriorate.

4.20.2 Production and sales

According to the data submitted by Poland to EUROSTAT the total volume of aquaculture production of fish was 33.2 thousand tonnes in 2012 and increased by 14.5% compared to the FAO previous year data. The total value of production amounted to 105.1 million euros and there was also an increase of 70.6%. From 2008 to 2012, the total volume decreased by 9.8%, whereas the total value increased by 43.4%. Aquaculture in Poland consists only of land-based freshwater farms and total volume and value of aquaculture production is equal to freshwater volume and value.

Total production includes not only fish for the food market but also production of stocking material. In 2012 the sector produced and sold 3.7 thousand tonnes of seed and stocking materials of many species for sale, among them Atlantic salmon fry to stocking Polish Marine Areas. Total value of sold juveniles amounted to 25.2 million euros in 2011.

Table 4.20.1 Production and sales for Poland: 2008-2012.

Variable	2008	2009	2010*	2011*	2012	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***36.8***	***36.5***	***36.5***	***29.0***	***33.2***	*15%*	***-4%***
Marine	0.0	0.0	0.0	0.0	0.0		
Shellfish	0.0	0.0	0.0	0.0	0.0		
Freshwater	36.8	36.5	36.5	29.0	33.2	*15%*	***-4%***
Production value (million €)	***73.3***	***76.4***	***67.6***	***61.5***	***105.1***	*71%*	***51%***
Marine	0.0	0.0	0.0	0.0	0.2		
Shellfish	0.0	0.0	0.0	0.0	0.0		
Freshwater	73.3	76.4	67.6	61.5	104.9	*71%*	***50%***
Hatcheries & nurseries (million units)	***0***	***0***	***0***	***0***	***0***	***0%***	***0%***
Eggs	0	0	0	0	0	*0%*	***0%***
Juveniles	0	0	0	0	0	*0%*	***0%***

*Note: EUROSTAT data is missing for 2010-2011, therefore FAO data been used
Source: EUROSTAT

4.20.3 Industry structure and employment

In 2012 there were 840 aquaculture land-based farms mainly carp farms. The sector is dominated by small enterprises with less than 5 employees. 59% of the Polish farms had less than 5 employees, 26% had 6-10 employees and 15% more than 10 employees. A legal form called “natural person” was dominating (81% of all aquaculture entities), next were legal persons (15%) and “other” (4%). That means that the aquaculture farms were managed mainly by micro and small family enterprises or small and medium companies. The total number of persons employed in the Polish aquaculture sector 5,585, corresponding to 4,377 FTEs.

Table 4.20.2 Structure of the Polish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises					*840*		
<=5 employees					500		
6-10 employees					216		
>10 employees					124		
Employment (number)							
Total employees					5,583		
Male employees							
Female employees							
FTE					4,377		
Male FTE							
Female FTE							
Indicators							
FTE per enterprise							
Average wage (thousand €)							
Labour productivity (thousand €)							

Source: EU Member States DCF data submission

4.20.4 Economic performance

Within the framework of DCF Poland did not collect economic data for freshwater species in accordance with the provisions of Chapter IV, Part A, point of 2.2. Commission decision of 6 November 2008 (2008/949/WE). For this reason the economic performance includes only information on fish farms that breed and rear Atlantic salmon fry and cooperate with the Panel for Restocking appointed by the Minister of Agriculture and Rural Development to stocking Polish Marine Areas and is presented in Salmon Hatcheries and nurseries segment.

4.20.5 Main species produced and economic performance by segment

The biggest sector is the production of carp. In 2012 common carp stands for 55% of the total volume of production and for 41% of the whole *total value of* aquaculture *production*. The volume of production of common carp increased to 18.3 thousand tonnes (about 27%) and the value to 42.9 million euros (about 46%).The silver carp stands for 2% of the total volume of production and for 6% of the total value. According to the Office of Cartography and Geodesy, the total registered area of earth ponds was 76.3 thousand ha. Carp farms are widespread all over the country but the largest facilities are located in central and southern Poland where climatic conditions are warmer and thus more advantageous. Carp production is carried out in earth ponds. In 2012, according to the Central Office of Cartography and Geodesy, the total registered area of earth ponds was 76.3 thousand ha.

The next sector is harvesting of rainbow trout, which contributed 32% of the total volume of production and for 27% of the *total value of* aquaculture *production*. Production of rainbow trout decreased to 10.7 thousand tonnes (about 4%). On the other hand, the total value of the production was 28.7 million euros, which corresponds to an increase of 23%. Trout production is carried out in concrete ponds that are supplied with water from rivers or other running sources with partial recirculation of water. Trout farms are located in the north on the Baltic Sea coast and in southern Poland in the Carpathian foothills in rich terrain with clear, cool waters.

According to the data submitted by Poland to EUROSTAT the total volume of aquaculture production of fish was 33.2 thousand tonnes in 2012 and increased by 14.5% compared to the FAO previous year data. The total value of production amounted to 105.1 million euros and there was also an increase of 70.6%. From 2008 to 2012, the total volume decreased by 9.8%, whereas the total value increased by 43.4%.

In terms of volume another important species were chars nei (2%) goldfish - *carassius auratus* (1%). In terms of volume sturgeons nei (6%) and tench (2%). Production of other freshwater species amounted 3.7 thousand tonnes and the value of production was 16.2 million euros. The other freshwater species constituted 16% of turnover in aquaculture and have 8% share in volume of production.

Figure 4.20.1 Main species in terms of weight and value in Polish production: 2012.

Source: EUROSTAT

In 2012 average prices for rainbow trout increased by 28% to 2.7 euros/kg, for common carp by 15% to 2.3 euros/kg and for other freshwater fish by 8% to 2.8 euros/kg. Average prices for Atlantic salmon fry, produced for stocking Polish Marine Areas remained at the previous years' level. From 2008 to 2012 rainbow trout prices increased by 36%, common carp by 22% and other freshwater fish by 14% whereas average prices for Atlantic salmon fry to stock Polish Marine Areas decreased by 13%. Throughout the period 2008-2012 rainbow trout average prices were higher than the prices of common carp: in 2008-2011 by 2.5% and in 2012 by 14%.

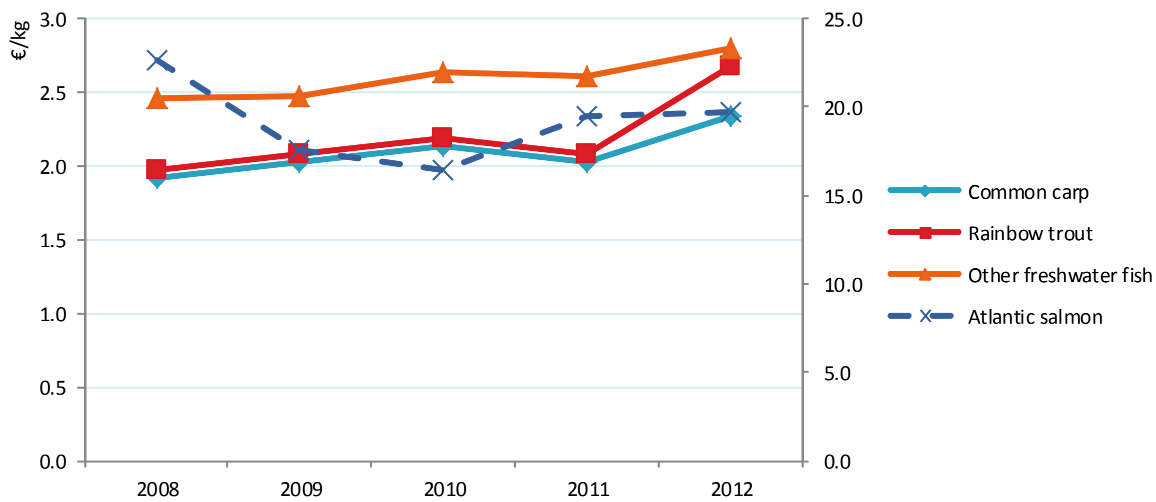


Figure 4.20.2 Average prices for the main species produced in Poland: 2008-2012.

Source: EUROSTAT; EU Member States DCF data submission

The economic performance includes only information on fish farms that breed and rear Atlantic salmon fry and cooperate with the Panel for Restocking appointed by the Minister of Agriculture and Rural Development to stocking Polish Marine Areas. (Collecting economic data for freshwater species is not mandatory, in accordance with the provisions of Chapter IV, Part A, point of 2.2. Commission decision of 6 November 2008 (2008/949/WE)). In 2012, there were five such farms.

The total income of analysed farms amounted to 3.8 million euros and increased by 20% compared to the previous year. Total production of analyzed fish farms was 1249 tonnes of fish and stocking materials and increased by 39% compared to the previous year.

Ratio analysis shows that the condition of these farms was better compared to the previous year. The contribution to the national economy, measured by GVA indicator, was 1.4 million euros and increased by 86%. Operating cash flow increased to 0.8 million euros (by 126%) and also earnings before taxes and interest (EBIT) increased to 0. 6 million euros (by 83%). Net profit also increased to 0.6 million euros.

Table 4.20.3 Economic performance of main Polish aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	*% of total income*	Change 2012/11	Development 2012/(2008-11)
Salmon Hatcheries & nurseries								
Total income		*3.0*	*3.7*	*3.2*	*3.8*	*100%*	*20%*	*16%*
Gross Value Added		*1.0*	*1.3*	*0.7*	*1.4*	*36%*	*86%*	*34%*
Operating cash flow		*0.5*	*1.1*	*0.4*	*0.8*	*22%*	*129%*	*28%*
Earning before interest and tax		*0.3*	*0.8*	*0.1*	*0.6*	*16%*	*328%*	*41%*
Net profit		*0.3*	*0.8*	*0.1*	*0.6*	*15%*	*425%*	*55%*
Total sales volume (thousand tonı		*1.1*	*1.2*	*0.9*	*1.2*		*39%*	*21%*

Source: EU Member States DCF data submission

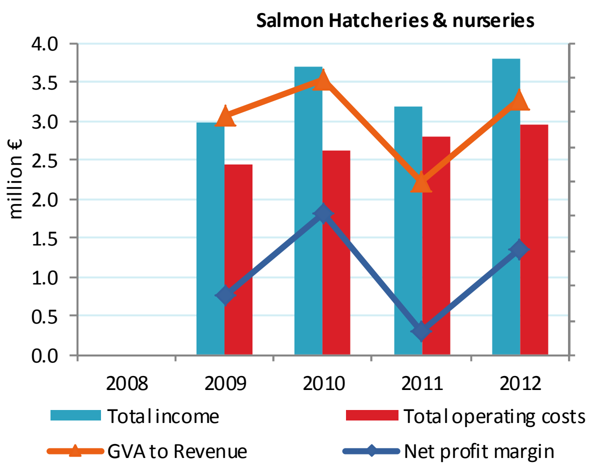


Figure 4.20.3 Economic performance indicators for the main Polish segments: 2008-2012.

Source: EU Member States DCF data submission

The operating costs structure has not changed in comparison to the previous year. More than half of the cost of operating costs (53%) had the purchase of feed. Other costs were labour costs (wages and salaries and imputed value of unpaid labour) (19%) and purchase of livestock (11%). Share of other elements of the cost was lower and range from 7% to 3%, respectively for depreciation of capital and energy costs and other operational costs.

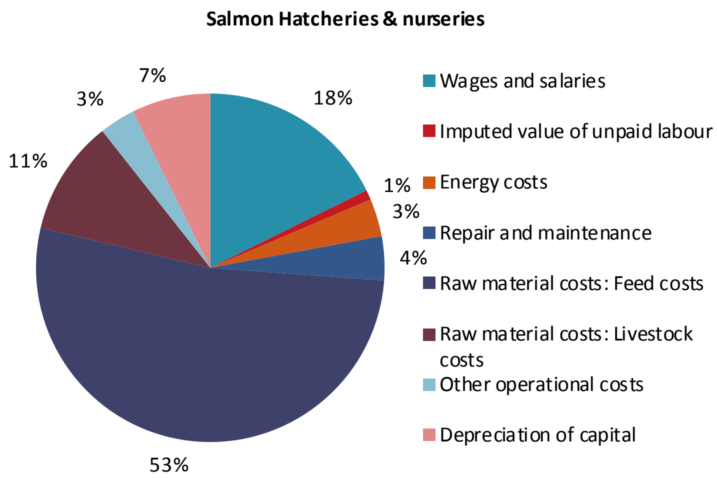


Figure 4.20.4 Cost structure of the main segments in Poland: 2012.

Source: EU Member States DCF data submission

4.20.6 Trends and triggers

Current production trends and main drivers

In Poland freshwater aquaculture production in volume is dependent on the prevailing meteorological conditions. In the case of carp too low autumn temperature shortens the feeding period and growth of fish. However, in the case of trout too high temperature continuing in the period from June to August limits feeding and weight gain of fish. The main limiting factor in achieving maximum potential yields are outbreaks of viral diseases and also pressure of fish- eating animals (cormorants, otters) which are protected.

Restocking of the Polish maritime areas is carried out under the Fisheries Act of 19 February 2004 (Journal of Laws of 2004, No. 62, pos. 574) by the Minister of Agriculture and Rural Development and is funded annually by the state budget. The statutory guarantee for the restocking creates good prospects for fishing farms which produce Atlantic salmon juveniles for the purpose of restocking Polish marine areas.

The investments in aquaculture were supported by the European Fisheries Fund by grants under the Operational Programme "Sustainable Development of the Fisheries Sector and Coastal Fishing Areas 2007-2013". Under Priority Axis 2 -" Aquaculture, inland fishing, processing and marketing of fishery and aquaculture products" the limit of funds for support investments in aquaculture (measure 2.1) is 50.2 million Euro and the limit of measure 2.2 "Aqua-environmental measures" is 58.5 million Euro.

Since the beginning of the Programme to the end of 2012 the amount of signed contracts for the co-financing of investments in measure 2.1 and 2.2. almost exhausted available limit of funds. The majority of operations implemented under measure 2.1 consists of development and modernisation of the aquaculture production facilities, investment in aquaculture diversification towards prospective or new species and in development of sustainable aquaculture. Within the measure 2.2 Aqua-environmental measures there are two kinds of actions to be carried out: 1. supporting the use of traditional or environmentally friendly practices and techniques in breeding and farming fish; 2. protecting fish genetic resources. Fish farms located in Nature 2000 areas can get financial assistance under the action 2.2.

In recent years fish farmers more often process their products by themselves and offer fresh fillets or smoked fish to increase sales.

Outlook

The main reason for the increase are the favourable meteorological conditions and investments support by the European Fisheries Fund.

Market structure

Carp are produced for the domestic market. Export opportunities are just about hundred tonnes per year. Most carp are sold in December before Christmas Eve in the form of live fish and fresh whole fish. The increase in carp production resulted in 2012 in an decrease in the import of carp to 2.6 thousand tonnes, representing an decrease of 28% compared to the previous year. The largest number of carp comes to Poland from Czech Republic (72%) and Lithuania (19%).

The main factor which stimulates the production of rainbow trout, in addition to domestic demand, is export, which in 2012 stands at 6.3- thousand tonnes (59% of total production in 2012). About 77% of the export of trout, mainly smoked, goes to the German market. As a result of the decreasing production of trout import increased each year, reaching 7.8 thousand tonnes in 2012, which accounted for growth by 6% compared to the previous year. The largest number of trout comes to Poland from Turkey, Norway and Denmark (respectively 27%, 19% and 19%).

In 2012 in domestic market the availability and marketing of fresh aquaculture products improved and developed as a result of permanent offer of sale of MAP packaged fresh fish (including trout and tilapia) in discount stores in Biedronka and Lidl and supermarkets (Kaufland).

Poland also imported 26.4 thousand tonnes of other freshwater fish, about 23.2% less than a year ago. Among them the most accounted for pangasius (65%) imported mainly from Vietnam and tilapia (19%) from China.

Issues of special interest

In recent years production of new species is developed and the new techniques of production has been introduced. There are few land based farms producing sturgeon, barramundi, North African catfish - Clarias gariepinus and Wels Catfish - Silurus glanis. In 2012 the largest and most modern fish farm in Poland in a closed circuit water system was opened in the village of Bońki near Płońsk . The target production is expected to reach 1.3 thousand tonnes, mainly including new thermophilic species, such as tilapia. The project was financed with the participation of the European Fisheries Fund (EFF).

There was a new trend in Polish aquaculture: the implementation of certification for product safety and organic production. So far only the barramundi farming near Olsztyn has implemented GLOBAL GAP.

Some Polish extensive fish ponds, due to the biological diversity of habitat and animal species of special importance for Poland, were included in the Natura 2000 areas. In this case, many farms are turned into multifunctional pond fish farms, which also offer services in recreation, maintaining biodiversity and improving water management.

Outlook for 2013 and 2014

It is expected that in 2013-2014 aquaculture production of all species will increase because of favourable meteorological conditions, reducing fish-eating animals pressure and if fish farms epizootic conditions will not deteriorate. Improved marketing of fresh aquaculture products in the domestic market should also be able to increase production.

4.20.7 Data Coverage and Data Quality

Data quality

Poland is not obliged to collect the freshwater aquaculture economic data in accordance with the provisions of Chapter IV, Part A, point of 2.2. Commission decision of 6 November 2008 (2008/949/WE).

DCF data includes only fish farms that breed and rear Atlantic salmon juveniles and cooperate with the Panel for Restocking appointed by the Minister of Agriculture and Rural Development (MARD) to restocking Polish marine areas and the maintenance and conservation of diadromous fishes in the surface inland waters. In 2012, there were five such farms. A questionnaire was used to collecting all data. Completion and return of the questionnaire was voluntary. In 2012 only three completed questionnaires returned.

The economic performance was based on DCF data.

Eurostat data refers to the total volume and value aquaculture production. The overview of the aquaculture sector was based on the volume and value data submitted by Poland to Eurostat and FAO.

The total employment data was based on the data from questionnaire RRW-22 “Statement of the surface of ponds and the amount of fish produced in fish ponds and other devices used for breeding or rearing in 2012".

4.21 PORTUGAL

4.21.1 Summary

Production volume and value

In total, the Portuguese aquaculture sector produced around 10 thousand tonnes in 2012, which corresponded to an increase of 12,2% from 2011 to 2012, while the total value of the production was 53, 659 million euros, which correspond to a decrease of 8,2% over the same period, justified by reduction of average sale prices of some species, namely clams. From 2008 to 2012, the total volume increased by 48%, whereas the total value increased by 43%.

Overall industry structure and employment

In 2012, the Portuguese aquaculture comprised 1443 farms which employed 2572 workers, of which 2056 are men and 517 are woman. The sector is dominated by small enterprises with less than 5 employees. 97% of the Portuguese enterprises had less than 5 employees, in 2012.

Main segments

The production in Portugal can be divided into four main segments. The most important (in terms of production weight) is the land based production of other marine fish (turbot) on growing. The production techniques used are tanks and recirculation systems.

The second most important segment is the marine production of clam bottom culture, which are produced in bottom (small areas of land near the beach, usually with less than 1 ha). The third segment consists of oyster bottom culture. The fourth segment produces sea-bass and sea-bream in ponds and cages.

Current production trends and main drivers (Trends and triggers)

The production of Portugal is mainly to internal consumption, whereas the oysters harvested from system based on long lines are exported to France. Turbot are export to other UE countries.

Outlook

Production is expected to increase due to new production units, namely new offshore units for mussels, a new production unit for sole and the increase in production of turbot.

Some projects were put in place but the enterprises have many difficulties in getting financing near the banks making the execution rates very low, between 20% and 30%.

4.21.2 Production and sales

Production have been steadily increasing over the years, namely the marine and Shellfish. Freshwater production have been decreasing, due to low acceptance of this kind of product in the national market and difficulties in competing with other countries in foreign markets. Sales have been increasing over the years, but prices decreased, namely the shellfish (mussels and clams), due to the increase in production.

Table 4.21.1 Production and sales for Portugal: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***6.9***	***6.2***	***6.5***	***7.9***	***10.2***	*29%*	*48%*
Marine	3.0	2.4	2.5	3.8	5.8	*51%*	*98%*
Shellfish	3.2	3.3	3.3	3.5	3.9	*11%*	*17%*
Freshwater	0.7	0.5	0.7	0.5	0.5	*-7%*	*-22%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		*0%*
Sales value (million €)	***41.0***	***37.2***	***41.7***	***55.1***	***58.8***	*7%*	*34%*
Marine	16.8	13.2	16.1	24.0	34.1	*42%*	*94%*
Shellfish	22.5	22.9	24.1	28.9	23.3	*-19%*	*-5%*
Freshwater	1.7	1.2	1.6	2.1	1.4	*-34%*	*-15%*
Hatcheries & nurseries	0.0	0.0	0.0	0.0	0.0		*0%*

Source: EU Member States DCF data submission

4.21.3 Industry structure and employment

Distribution by gender shows a dominance of the male work force, representing 80% of total job. The representation of female workers has been constantly increasing in the last years, from 12% in 2009 to 20% in 2012.The total number of persons employed in the Portuguese aquaculture sector was 2572, corresponding to 2083 FTEs. From 2011 to 2012, the number of employees increased by 12%. The female workforce has been constantly increasing from 12% in 2009 to 20% in 2012. The average FTE per enterprise increased 20% from 2011 to 2012, and the average wage increased from 7.2 to 8.1 thousand euros, corresponding to a decrease of 13% over the same period.

Table 4.21.2 Structure of the Portuguese aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*1,463*	*1,454*	*1,459*	*1,447*	*1,443*	*0%*	*-1%*
<=5 employees	1,446	1,443	1,443	1,433	1,403	*-2%*	*-3%*
6-10 employees	11	7	9	9	35	*289%*	*289%*
>10 employees	6	4	7	5	5	*0%*	*-9%*
Employment (number)							
Total employees	2,347	2,306	2,320	2,300	2,572	*12%*	*11%*
Male employees		2,024	1,889	1,824	2,056	*13%*	*8%*
Female employees		282	430	476	517	*9%*	*31%*
FTE		1,227	1,228	1,733	2,083	*20%*	*49%*
Male FTE		1,085	1,004	1,378	1,645	*19%*	*42%*
Female FTE		142	224	356	438	*23%*	*82%*
Indicators							
FTE per enterprise		0.8	0.8	1.2	1.4	*20%*	*50%*
Average wage (thousand €)		7.5	7.2	7.2	8.1	*13%*	*10%*
Labour productivity (thousand €)		13.8	10.0	22.3	24.5	*10%*	*59%*

Source: EU Member States DCF data submission

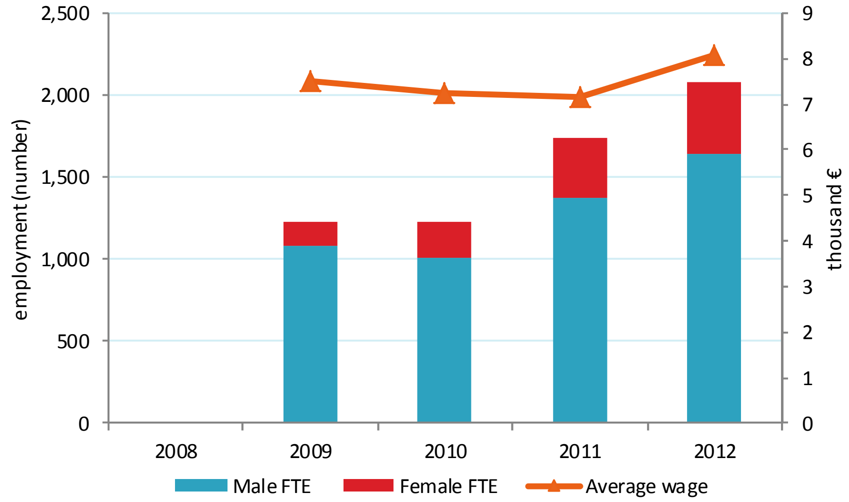


Figure 4.21.1 Employment trends for Portugal: 2008-2012.

Source: EU Member States DCF data submission

The number of enterprises remained stable from 2008 to 2012, but the average number of FTE per enterprise has been increasing over the period. At the same time, the average wage has been increasing; however, the enterprises have managed to increase labour productivity. The labour productivity is measured as gross value added per full time employee. From 2011 to 2012 the labour productivity increased by 13.8% and from 2008 to 2012 the labour productivity increased by 59%.

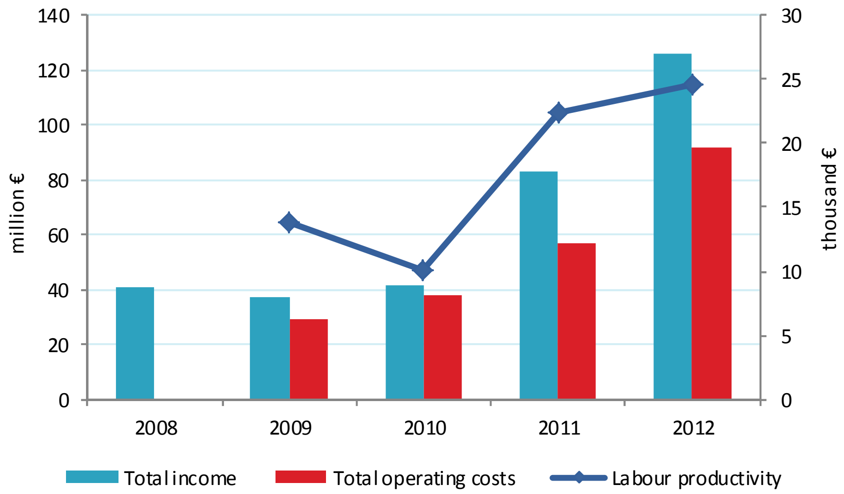


Figure 4.21.2 Income, costs, wages and labour productivity trends for Portugal: 2008-2012.

Source: EU Member States DCF data submission

4.21.4 Economic performance

From 2011 to 2012, total Income increased by 51%, while the operational cost increased by 61%. The total income is dominated by the other income, which contributes 53% of total income, leaving only 47% to the sale of fish from the farms.

Table 4.21.3 Economic performance of the Portugal aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	41.0	37.2	41.7	55.1	58.8	*47%*	*7%*	*34%*
Other income	0.0	0.0	0.0	28.2	67.4	*53%*	*139%*	*855%*
Subsidies	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*	*0%*
Total income	*41.0*	*37.2*	*41.7*	*83.3*	*126.2*	*100%*	*51%*	*148%*
Expenditures (million €)								
Wages and salaries		7.0	7.1	9.5	14.0	*11%*	*47%*	*77%*
Imputed value of unpaid labour		2.2	1.8	2.9	2.8	*2%*	*-3%*	*24%*
Energy costs	2.0	3.4	2.2	3.6	6.3	*5%*	*76%*	*125%*
Repair and maintenance		3.1	5.4	1.2	2.1	*2%*	*81%*	*-35%*
Raw material: Feed costs	6.5	6.6	7.1	10.6	11.0	*9%*	*3%*	*42%*
Raw material: Livestock costs	0.0	6.0	12.2	15.1	26.2	*21%*	*74%*	*215%*
Other operational costs	12.2	1.0	2.6	14.1	29.5	*23%*	*109%*	*295%*
Total operating costs	*20.7*	*29.5*	*38.3*	*57.0*	*91.9*	*73%*	*61%*	*153%*
Capital Costs (million €)								
Depreciation of capital		0.4	5.1	10.0	26.9	*21%*	*169%*	*420%*
Financial costs, net		0.1	0.2	5.4	20.1	*16%*	*272%*	*957%*
Extraordinary costs, net		0.7	0.1	0.0	0.0	*0%*	*0%*	*-100%*
Capital Value (million €)								
Total value of assets		188.3	223.8	246.2	260.8	*207%*	*6%*	*19%*
Net Investments		172.1	179.1	3.2	15.8	*13%*	*391%*	*-87%*
Debt		79.9	121.0	7.0	14.5	*11%*	*107%*	*-79%*
Input & Production (thousand tonnes)								
Raw material: Feed	8.2	7.6	7.3	3.9	7.5		*92%*	*11%*
Raw material: Livestock	0.1	0.1	0.5	0.7	0.6		*-18%*	*62%*
Performance Indicators(million €)								
Gross Value Added		17.0	12.3	38.7	51.0	*40%*	*32%*	*125%*
Operating cash flow		7.8	3.4	26.3	34.2	*27%*	*30%*	*174%*
Earning before interest and tax		7.3	-1.6	16.3	7.4	*6%*	*-55%*	*1%*
Net profit		7.2	-1.8	10.9	-12.7	*10%*	*-216%*	*-333%*
Capital productivity (%)		9.0	5.5	15.7	19.6			
Return on Investment (%)		3.9	-0.7	6.6	2.8			
Future Expectation Indicator (%)		91.2	77.8	-2.8	-4.2			

Source: EU Member States DCF data submission

The expenditures are dominated by other operational costs (23%), cost of livestock (21%) and cost of wages and salaries (11%), in 2012. These costs have been increasing over the period 2008-2012. The total expenditures make up for 73% of the total income.

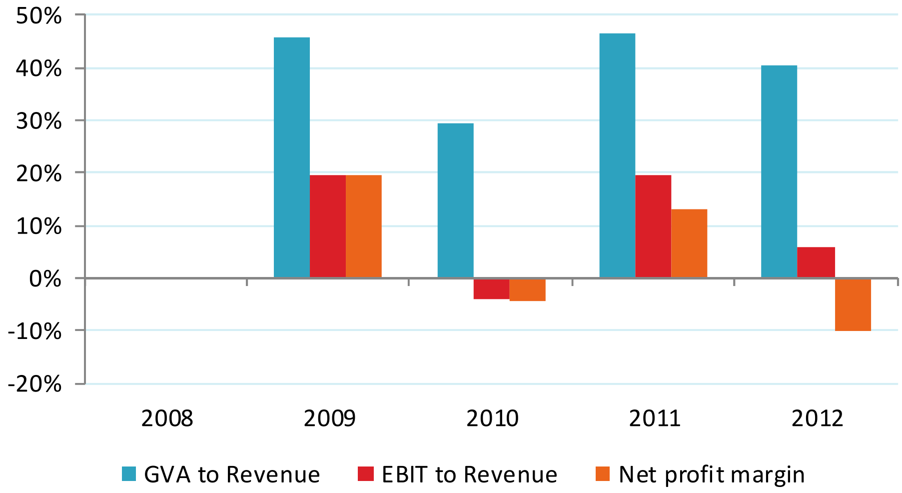


Figure 4.21.3 Economic performance for Portugal: 2008-2012

Source: EU Member States DCF data submission

The gross value added for the sector as a whole increased by 32% and both EBIT and net profit decreased. Net profit is negative in 2012. The total value of assets and debts increased by 6% and 107%, respectively. The net investment increased 391%, but it is still below the net investment in 2008.

4.21.5 Main species produced and economic performance by segment

The production in Portugal can be divided into four main segments. The most important (in terms of production weight) is the land based production of other marine fish (turbot) on growing. The production techniques used are tanks and recirculation systems.

The second most important segment is the marine production of clam bottom culture, which are produced in bottom (small areas of land near the beach, usually with less than 1 ha). The third segment consists of oyster bottom culture. The fourth segment produces sea-bass and sea-bream in ponds and cages.

In Portugal, the land based other marine fish (turbot) aquaculture production is mainly located in the Central region of Portugal. The marine production of clam bottom is located in Algarve. The marine production of oyster bottom is located along the coast of Portugal, mainly southern and central zones. The marine production of Sea Bass and Sea Bream in ponds and cages is located in Southern Portugal (mainly Algarve), Lisbon and centre region.

Exports of aquaculture products consist mainly in turbot (98%), Oyster (1%) and Sea bass (1%). Exports represent 42% of total production.

The main species produced in Portugal is turbot, which makes up 43% of the total volume and 38% of total value of production. The second most important species is grooved carpet shell, which makes up 23% of the volume and 38% of the value total production. Sea bream makes up 8% of total production weight and 9% of total value and Sea bass makes up 5% of the total weight and 6% of total production value.

Figure 4.21.4 Main species in terms of weight and value in Portugal production: 2012.

Source: EU Member States DCF data submission

The price of turbot has been decreasing since 2010 essentially due to the increase in the production over the last years. Sea bass, Sea bream and Rainbow trout prices have been increasing due to high demand of these species, for which the national production is unable to cover.

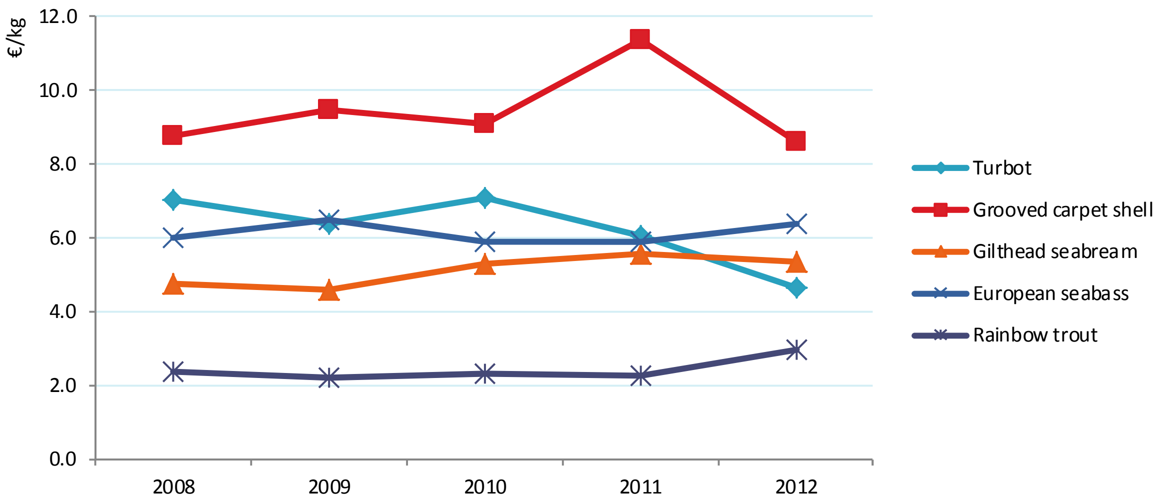


Figure 4.21.5 Average prices for the main species produced in Portugal: 2008-2012.

Source: EU Member States DCF data submission

The most relevant segments in the Portuguese aquaculture are analyzed below.

Segment 1: Other marine fish on growing

The most important segment is other marine fish on growing. The techniques used are tanks. The product from theses farms is mainly turbot. The segment consists of 6 production units. The production volume was 4385 tonnes with a corresponding value of 20.5 million. The production volume accounts for 35% and the value accounts for 43% of the total Portuguese production.

Segment 2: Clam bottom

The second most important segment is the clam bottom farms producing Grooved Carpet Shell. In 2012, there were 1282 farms. The production volume was 2280 tonnes with a value of 19.6 million euro. The segment covers 22% of the volume and 33% of the value of total Portuguese production.

Segment 3: Sea bass and Sea bream on growing

The main species produced in this segment are Sea bass and Sea bream in ponds and cages. There are 47 farms in this segment. The production technique is semi-intensive and intensive in open systems. The production volume was 1415 tonnes with a corresponding value of 13.6 million euro, in 2012.

Segment 4: Oyster bottom

The last segment is oyster bottom. The production was 771 tonnes with a corresponding value of 2.7 million euro, in 2012. The segment has 47 farms.

From figure 4.21.6 it can be seen that the turnover from the Portuguese aquaculture sector has been increasing, along with the sales volume, the total value of assets and the total number of FTE .

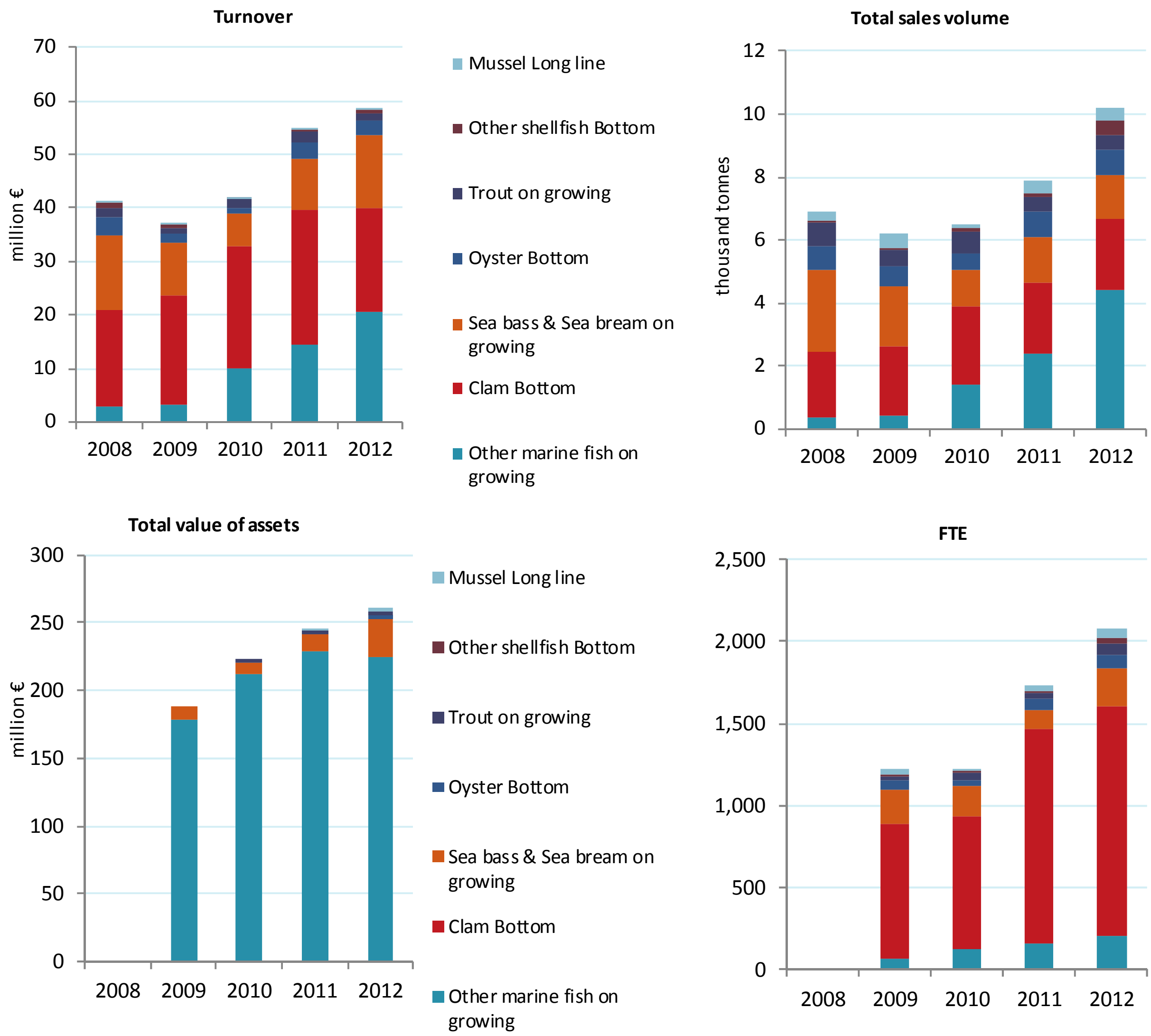


Figure 4.21.6 Structural development of Portuguese aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

In table 4.21.4, the economic performance of the four Portuguese segments is shown. From the table it can be seen that the gross value added is positive for all segments, but the net profit is negative for other marine fish on growing and Sea bass and Sea bream on growing for most years from 2008 to 2012.

Table 4.21.4 Economic performance of main Portuguese aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Other marine fish on growing								
Total income	2.8	3.3	10.0	42.4	63.3	100%	49%	333%
Gross Value Added		-4.6	-10.2	6.2	15.9	25%	156%	656%
Operating cash flow		-6.0	-12.3	3.6	12.5	20%	248%	356%
Earning before interest and tax		-6.0	-16.7	-4.3	1.9	3%	145%	122%
Net profit		-6.0	-16.8	-9.3	-4.6	7%	51%	57%
Total sales volume (thousand tonnes)	0.3	0.4	1.4	2.4	4.4		82%	282%
Sea bass & Sea bream on growing								
Total income	14.0	9.9	6.1	9.8	34.3	100%	251%	245%
Gross Value Added		0.7	-0.6	3.9	15.4	45%	292%	1042%
Operating cash flow		-2.0	-2.7	2.5	12.2	36%	388%	1743%
Earning before interest and tax		-2.4	-3.1	1.4	-0.3	-1%	-123%	78%
Net profit		-2.5	-3.3	1.1	-11.0	-32%	-1084%	-613%
Total sales volume (thousand tonnes)	2.6	1.9	1.1	1.4	1.4		-2%	-21%
Clam Bottom								
Total income	18.1	20.4	22.7	25.0	19.6	100%	-22%	-9%
Gross Value Added		19.3	22.0	24.2	18.8	96%	-23%	-14%
Operating cash flow		15.3	18.4	17.0	10.9	56%	-36%	-36%
Earning before interest and tax		15.3	18.4	17.0	10.9	56%	-36%	-36%
Net profit		15.3	18.4	17.0	10.9	56%	-36%	-36%
Total sales volume (thousand tonnes)	2.1	2.2	2.5	2.2	2.3		2%	1%
Oyster Bottom								
Total income	3.5	1.6	1.2	3.2	2.7	100%	-13%	17%
Gross Value Added		1.1	0.9	3.0	2.4	88%	-19%	46%
Operating cash flow		0.8	0.5	2.6	1.9	68%	-29%	41%
Earning before interest and tax		0.8	0.4	2.6	1.9	68%	-29%	46%
Net profit		0.8	0.4	2.6	1.7	63%	-34%	35%
Total sales volume (thousand tonnes)	0.8	0.6	0.6	0.8	0.8		-6%	14%

Source: EU Member States DCF data submission

In Figure 4.21.7, the economic indicators for the four Portuguese segments are presented. From the figures it can be seen that EBIT is positive for all segments excluding the Sea bass and Sea bream on growing farms.

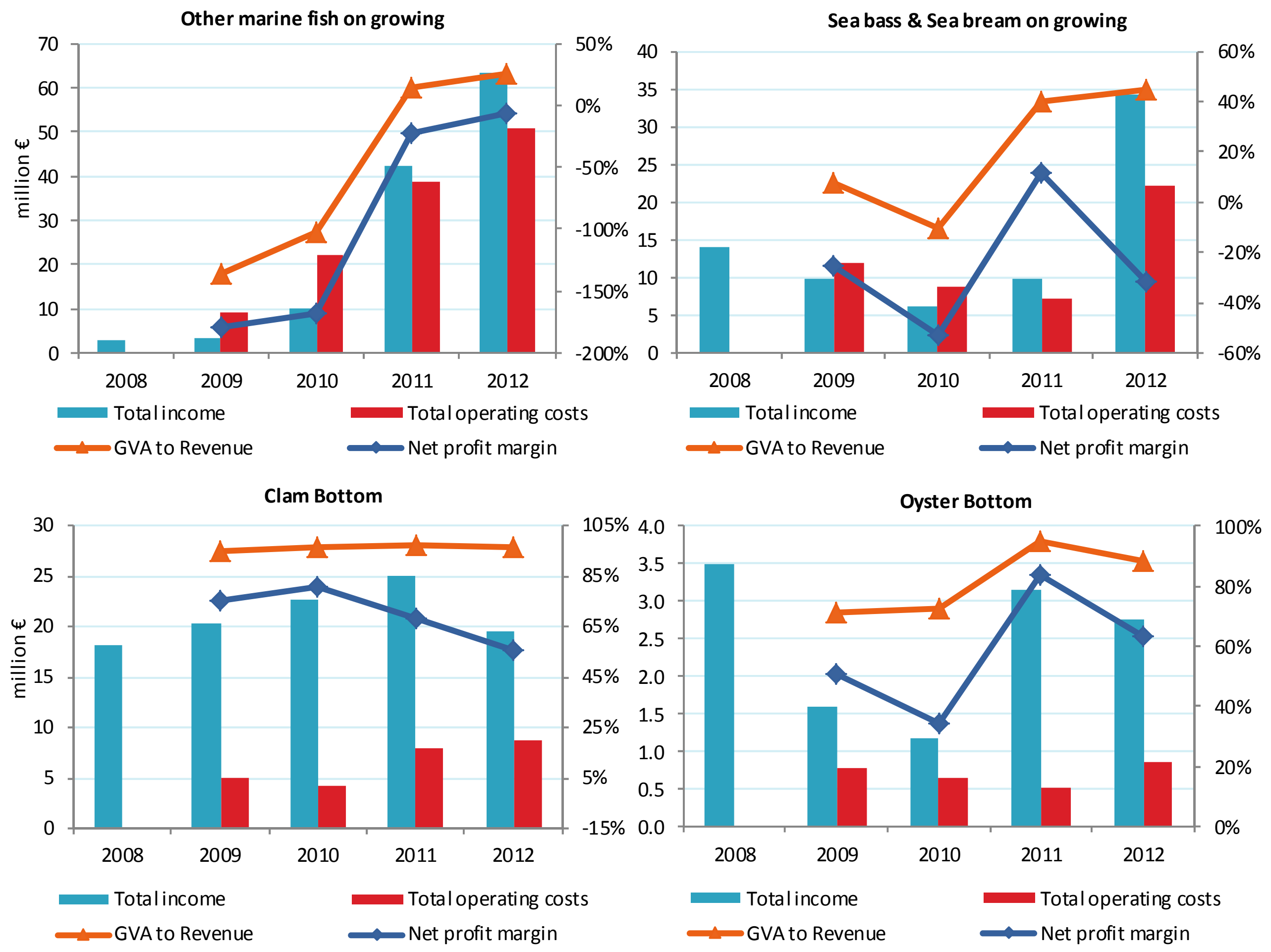


Figure 4.21.7 Economic performance indicators for the main Portuguese segments: 2008-2012.

Source: EU Member States DCF data submission

In Figure 5.7.8, the operational cost structures for the four Portuguese segments are presented.

Segment 1: Other marine fish on growing

Production in this segment is intensive (mainly turbot). This segment, with only 6 enterprises, is the most relevant, having a turnover of about 20.5 million Euros.

Some enterprises in this segment have high operating costs (other operational costs are more than half of total operational costs) and with the sales not yet stabilized, making it very difficult to make a reliable analysis.

Segment 2: Clam bottom culture

With 1,282 enterprises and a turnover of about 19.6 million Euros this is the second most relevant segment in Portuguese aquaculture. Enterprises are mostly small familiar units run by the owner and their relatives. Bottom culture has a very low level of investments and operational costs are mostly wages and salaries.

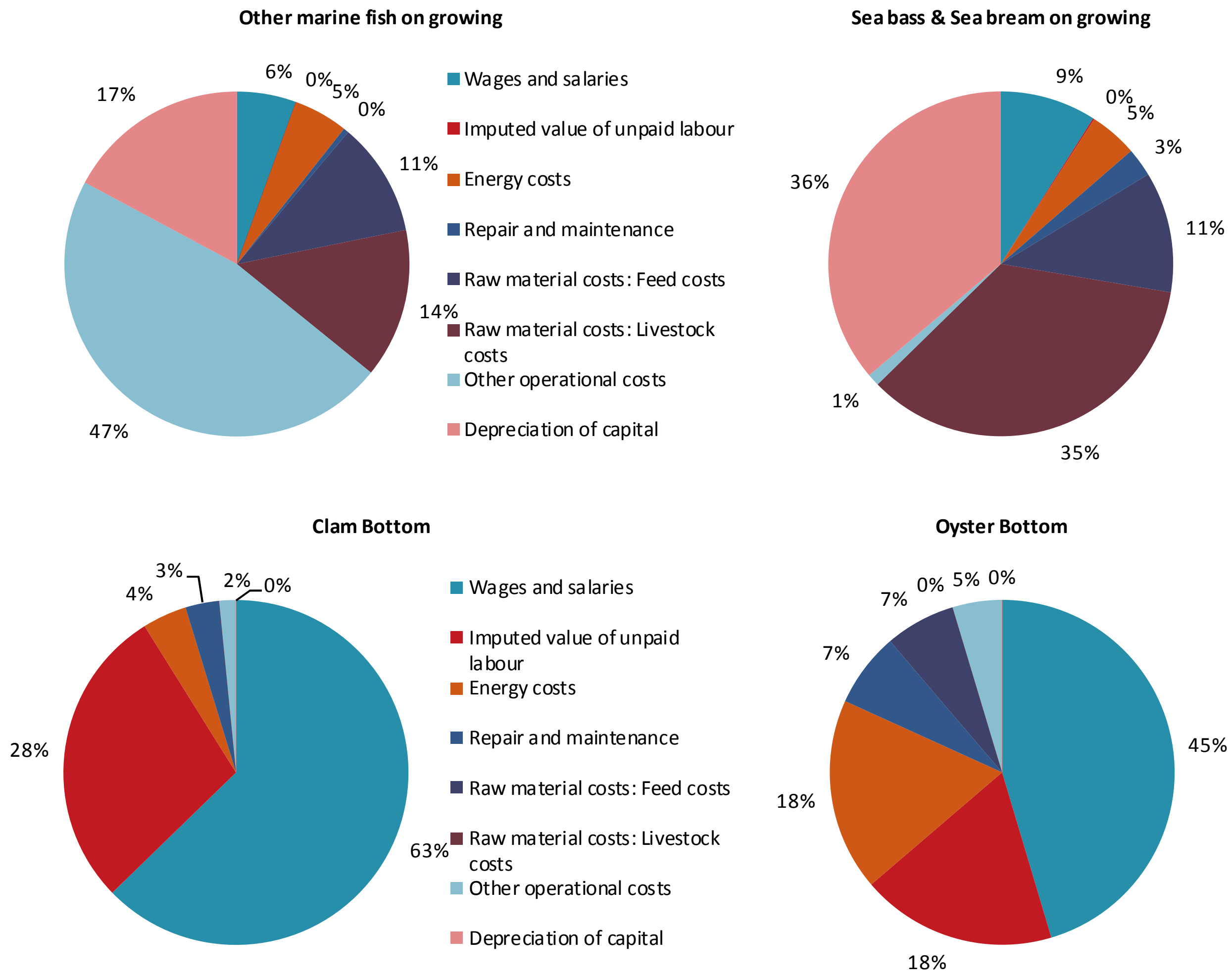


Figure 4.21.8 Cost structure of the main segments in Portugal: 2012.

Source: EU Member States DCF data submission

Segment 3: Sea-bass and Sea-bream on growing

Composed by 47 enterprises, this segment has a turnover of about 13.6 million Euros. It is mostly characterized by traditional production using earth ponds with high maintenance costs and low production densities. The welfare of fish and the environment are taken in high regard and the final product is of high quality. Also included in this segment are 6 cages, characterised by high densities of fish and high livestock and feed costs.

Segment 4: Oyster bottom

Composed by 47 enterprises mostly in the centre of the country, this segment has sales value of around 2.7 million Euros. The enterprises are mostly small familiar units run by the owner and its relatives. Bottom culture has a very low level of investments and operational costs are mostly wages and salaries.

Figure 4.21.9 Feed and livestock prices for the main Portuguese segments: 2008-2012.

Source: EU Member States DCF data submission

4.21.6 Trends and triggers

Current production trends and main drivers

The increase in production in 2012 was mainly because of finfish, especially turbot, sea bream and sea bass. Production is expected to grow in the next few years because of new projects under development. These new enterprises will produce mussels and sole.

Portuguese aquaculture is largely confined to offshore sites and estuaries. Almost 90% of aquaculture facilities are located in public domain areas, based on 10-year private concessions, renewable for successive identical periods. The industry is characterized by a great deal of extensive farming, largely family-based. There has been a move to encourage aquaculture as an alternative for fishermen facing reduced fishing quota.

The subsectors in the Portuguese aquaculture are related with the following production systems:

Extensive: The extensive production develops in areas between tides, called intertidal zones, with the cultivation of bivalve molluscs such as clams and oysters. These production units are included in segments 8.3 and 9.3. Most of the units are in the Algarve and Centre regions.

Semi-intensive: Included in segment 6.2, the earthen ponds are the main production system for sea-bass and sea-bream in Portugal. Different farms uses various levels of stocking densities and pond sizes, but in general these are semi-intensive systems covering large areas with ponds ranging from one to several hectares and production levels from 0.5 to 6 Kg/m3 (mostly around 2 kg/m3) at the end of the production cycle. Although sea-bass and sea-bream are traditionally the target species produced in such ponds, there is commonly natural stocking from wild larvae of other fish species, including Senegalese sole. Previous attempts at on growing sole in ponds in a polyculture regime with sea-bass and sea-bream shows promising growth rates. Species in polyculture regime from different trophic levels have also been considered an efficient and environmentally sound strategy to minimize the impacts of aquaculture systems, because an important fraction of dissolved nutrients and organic matter is recycled within the pond. The difficulties faced by this type of aquaculture are largely related to its high production costs (mainly high labour costs and high land costs) that compromise its economic sustainability due to the low productivity of these systems. There is currently a trend of reconverting the culture practiced in the earth pounds from a fish culture to a mollusc culture, with the consequent decrease in the volume of sea-bass and sea-bream produced.

Intensive: Corresponding to segments 3.2 and 3.4, the intensive production in Portugal refers to the cultivation of turbot and sole. In 2012 some new developments happened with the production of sole in closed systems and in intensive regime as well as the installation of a maternity of sole. Production costs are high, but the selling price per kg compensates.

Investments in aquaculture are based on spatial planning, seeking not only to minimize possible conflicts with other users with an appetite for the same locations, but also compatible with other uses of the same space, in particular those involved in the conservation of ecosystems, with a view to the sustainable development of aquaculture practices. They will privilege environmental standards in the implementation of the physical structures, but, mainly, in the use of aquaculture production methods compatible with the protection and improvement of the environment. Investments to introduce improvements in management practices of production and marketing including through the intensification of new information and communication technologies are also encouraged. Structural modernisation is also being promoted within the current fisheries management plan. These objectives are consistent with those established by the EU in the Common Fisheries Policy, and particularly the 2002 Strategy for the Sustainable Development of European Aquaculture, which promotes environmental, economic and social sustainability. The intervention of the Fund was very important however the fact of not being able to compete for large companies has limited investment, innovation and use of new technologies as well as the presentation of new products for new markets. Reality denotes that SME's have not been able to match the expectations of the Commission nor the demands and market needs in terms of diversification of products and certification of production.

Production of sole with a new hatchery and on growing unit, currently producing sole and using and developing new techniques and diets.

There are some new pilot projects developing new techniques and diets.

Production is expected to increase due to new production units, namely new offshore units for mussels, a new production unit for sole and the increase in production of turbot.

Some projects were put in place but the enterprises have many difficulties in getting financing near the banks making the execution rates very low, between 20% and 30%.

National production is expected to grow in 2011-2013 due to the new production units and the increase of production of turbot.

Market structure

The Portuguese aquaculture is mostly based on bottom culture units, about 1300 establishments, with strictly family labour. With the definition of new aquaculture sites in off-shore areas it is expected the emergence of new enterprises with logistical support or even aiming a restructuration in the national sector.

With the emergence in 2009 of a big company, the overall cost structure become greatly altered and irregular as it is not yet stabilized, making it impossible to have a correct cost structure.

Considerable investment was made in 2009 and 2013 (offshore) that will have expected positive impacts in the next 2 years productions.

The need to differentiate Portuguese products acted as a driver to the certification of the national production, with some facilities intended to convert to a bio-ecological model of organic aquaculture production. The goal of national fisheries policy in regard to aquaculture is to increase production and product diversity, but also product quality, so as to improve the sector's competitiveness.

Portugal is taking the first steps in organic certification, and in 2013 certificate a unit of mussel with a system of production in long lines in this kind of certification.

The processing and marketing of fishery products must respond to changing consumer trends and profiles, seeking to expand and diversify its business, adjusting it to market developments, betting on internationalization and joint control of marketing channels in order to enhance the ability to generate added value. To strengthen this capacity is essential to a strong focus on quality and innovation of processes and products, as well as in the introduction of improvements in the management and organization of companies.

Most aquaculture products are consumed locally, with export sales making up only 6% of the total. Overall sales figures, when compared to the significant investments in aquaculture in the period prior to 2007, seem rather modest. However, some investments (notably in a turbot farm which is about to begin operations) will bring returns in the longer term.

Issues of special interest

Many projects were conducted in order to improve new species, methods and technologies which contribute to the increase of the production and to the reduction of environmental impacts of semi-intensive and intensive aquaculture. The proportion of nutrients utilized for fish growth can be maximized, for example by selecting very digestible ingredients that facilitate nutrient assimilation and promote the improvement of FCRs (Feed Conversion Ratios), and at the same time reducing the amount of waste and nutrient output from fish farms (Black 2001, World Bank 2006). Eco-friendly feeds, in which fishmeal protein is replaced by vegetable protein sources, may also contribute to the reduction of aquaculture's ecological footprint by reducing the pressure on natural fisheries resources).

The EMFF is the proposed new fund for the EU's maritime and fisheries policies for the period 2014-2020. In line with the ambitious reform of the common fisheries policy, the Fund will help support coastal communities in diversifying their economies. It will finance projects to create new jobs and improve quality of life along European coasts.

One of the developments on competitiveness is the conversation to eco-management and audit schemes and organic aquaculture.

Outlook for 2013 and 2014

The Portuguese producers expect an improvement in the situation for 2013 and 2014 by comparison with 2011. For that contributes the implementation of the maritime spatial plan (POEM), which will help to reduce uncertainties regarding licensing, facilitate investment and speed up the development of industries.

To promote the growth of the aquaculture production in Portugal, a procedure was developed for two areas (APA – Aquaculture Production Area) in the open ocean, coastal and territorial waters elsewhere on mainland. The procedure also defines the general conditions to be observed by the respective installation and allow the holders to obtain the exploration license. The procedure was based on information collected on a pilot area of aquaculture production since 2008 in Armona (Algarve – Portugal).

4.21.7 Data Coverage and Data Quality

Data quality

The account statistics for 2012 is based on a census on the 1443 aquaculture farms. The operation is carried out annually between January and April.

The Portuguese Directorate General for Natural Resources, Security and Maritime Services (DGRM) has registered the total population of farms and enterprises engaged in aquaculture production in Portugal. It is mandatory for all aquaculture producers in Portugal to report the production in volume and value each year at the farm level. The operation of data collection was expanded in order to fulfil the needs of DCF and socio-economic data is now collected. The same operation fulfils the administrative needs for information, EUROSTAT and DCF. The data is collected at farm level.

While production data is mandatory, economic data is provided voluntarily. Answer rates vary accordingly to the type of unit, with bottom units having an answer rate of 46% and other units having an answer rate of 69%. The low rate of responses is a tendency in the last 3 years and the administration is enforcing the response with some administrative measures that include sanctions if production is not delivered one year and may include the removal of the license in case of non-response for 2 years.

Due to the low response rates, variables are estimated for the whole population and quality indicators calculated.

Data availability

Data for the aquaculture sector is published once a year aggregated by type of unit and species. The aquaculture statistics are published on an annual publication, “Estatísticas da Pesca”, in collaboration between DGRM and the Portuguese National Statistics Institute (INE) approximately 18 months after the end of the reference year.

Confidentiality

Confidentiality rules are applied when the number of units in a segment in less than 3. In this case units are aggregated, when possible, to a similar segment, under statistical evidence that both populations are homogeneous. When aggregation is not possible, data provided doesn’t include the confidential values and may not include other values if it’s possible to achieve the same information by subtracting totals to the known segments.

Differences in DCF data compared with other official data sources

Portuguese data collection uses the same base to provide information to Eurostat, FAO and DCF. Differences on the data result from the disaggregation requested by the data calls and the time of the year where data is provided. When data changes (new data is received or resubmission of data by some enterprises), new sets are compiled and disseminated to the different end users, accordingly to data revision policies. Other than this, differences between sources should not happen.

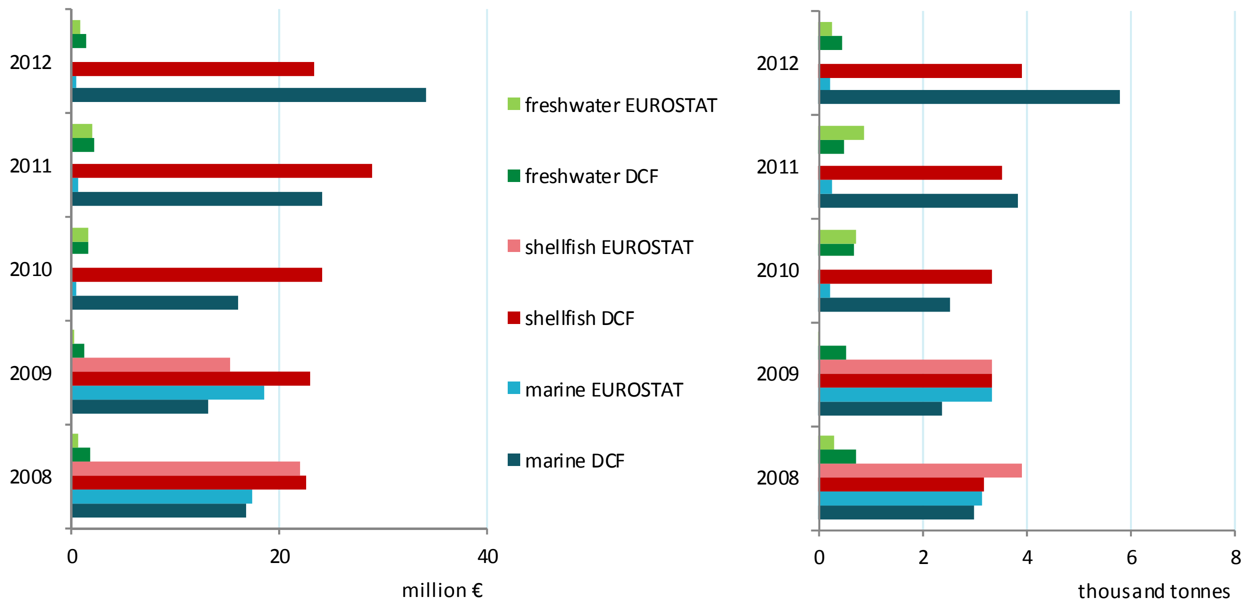


Figure 4.21.10 Comparison of DCF data with EUROSTAT data for Portugal: 2008-2012

4.22 ROMANIA

4.22.1 Summary

Production volume and value

The Romania aquaculture sector produced 10,005 thousand tonnes in 2012 which corresponded to an increase of 20 % from 2011 to 2012. The total value of production was 13.712 million euros, corresponding with a decrease comparing with 2011 of 11% over the same period. From 2009 to 2012, the total volume increased by 27%, and the total value by 23%. It should be mentioned that Romania started to collect data for fresh water aquaculture in 2009, due to the fact the marine aquaculture was missing – only one pilot farm for mussels at that time existed; this segment is still under development, the quantities produced are not at all significant in total production, comparing with the first one.

Overall industry structure and employment

In 2012, the total licenses issued for aquaculture farms were more than 900, which were distributed on 430 enterprises. The Romania aquaculture sector is dominated by small enterprises with less than 5 employees, accounting for 65% of the Romania in 2012.

Main segments

The production in Romania can be divided into four main segments. The largest segments are the land based farm for carp production. The first one is carp combined production, which consists of a combination of hatcheries, nurseries and on growing farms. The production in the land based farms is typically using the extensive technologies. The production techniques are used in primarily ponds, tanks and lakes. The second most important segment is the carp on growing production, using the same technologies as for the first segment.

The third segment is trout combined consisting of land based recirculation systems farms and tanks. The fourth one is trout on growing using the same techniques. Finally, we could mention that are other small segments producing trout and carp in cages, mussel on bottom lines, and some trout hatcheries and nurseries, but the quantities are very small, insignificant, as percentage in total production at national level.

It should be mentioned that some quantities of eggs are produced for human consumption and for industry use, but the demand on the domestic market has to face the concurrence of the super markets mainly.

Current production trends and main drivers (Trends and triggers)

The portion sized fresh water carp and rainbow trout is mainly sold on domestic market (99%), as a whole fish, eggs mainly and juveniles for on growing less.

Outlook

The Romania aquaculture is not benefiting from subsidies (state or other sources), only under some projects funded from EFF were recorded; also the bank sector is not friendly with the agriculture producers, in general, and with aquaculture ones especially. In the same time there still are juridical issues related with the nature of the ownership of the land and the buildings, technical installations of the farms, the juridical actual status being not yet finalised, especially for the former big fish farms belonging to the state ex-enterprises for fish farming (big structure enterprises, generally one in each county of the country – in areas suitable for aquaculture).

4.22.2 Production and sales

The aquaculture production is oriented to domestic market facing the strong competition of super markets chains and it is sold for human consumption in Romania. The sales are oriented to other kind of shops and local county markets, able to accept the carp and the associated other fresh water species, according to the extensive technology used. The level of the production has a variable cycle, as stated in Table 4.22.1, illustrating the market conditions – see comments as mentioned above, and the impact of the economic crises and its consequences, marking the sales evolution, resulting in a drastic decline of total volume from 12,863 tonnes in 2010 to 8,353 tonnes in 2011, and a significant increase to 10,005 tonnes in 2012. The value of production had a similar evolution with a decline from 31.2 million euros in 2010 to 16.4 million euros in 2011, followed by an increase up to 18.1 million euros in 2012. This is a significant trend of recovering of the sector in volume and value that is expected to continue in 2013, and may be in 2014. The percentage of freshwater species is more than 95% - fish for human consumption (common carp, trout, silver carp, bighead carp, grass carp, crucian carp – mainly) and few percentages of eggs and juveniles. The supply for local processing industry is more accidental than a characteristic of the sales.

Table 4.22.1 Production and sales for Romania: 2009-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2009-11)
Sales weight (thousand tonnes)		***7.3***	***12.9***	***8.4***	***10.0***	*20%*	*5%*
Marine			0.0	0.0	0.0	*-61%*	*-37%*
Shellfish		0.0	0.0	0.0	0.0	*601%*	*29%*
Freshwater		7.3	12.7	8.3	9.9	*19%*	*5%*
Hatcheries & nurseries			0.1		0.1		*-61%*
Sales value (million €)		***13.9***	***31.2***	***16.4***	***18.1***	*11%*	*-11%*
Marine			0.0	0.1	0.1	*-48%*	*-17%*
Shellfish		0.1	0.0	0.0	0.0	*521%*	*-57%*
Freshwater		13.8	30.9	16.2	18.0	*11%*	*-12%*
Hatcheries & nurseries			0.3		0.1		*-58%*

Source: EU Member States DCF data submission

The analysis has as results the following: 99% of the production is fresh water aquaculture, as in volume and value in 2011 and also in 2012. So, the conclusion is the Romania aquaculture is not diversified; the new attempts are recorded in a certain number of farms for marine species and sturgeon for on growing, but with insignificant percentage. It should be underlined the fact the production cycle of sturgeons species is longer than the other ones, minimum 3/4 years for meat and 6/7 years for eggs (9-11 years for caviar as example).

In 2012 the biggest ratio of the total aquaculture production is for freshwater species, mainly cyprinids species family (European once – 4455 tonnes, and Asian once - such as: silver carp, bighead carp and grass carp – 4378 tonnes) respectively 89%, and only 11% other species, such as: sturgeon, European eel and trout. Trout is sharing 10.7%, respectively 1074 tonnes, and the marine species and sturgeon only 0.3% - 9.18 tonnes, in the total production.

4.22.3 Industry structure and employment

Considering the evaluation of the evolution and the structure by enterprises of aquaculture production, the cycle, as presented in Table 4.22.2, reveals a similar evolution marked by the lack of serious investments on new-modern technologies (for new species, especially marine once, buildings and production facilities) and the consequences of the decreasing sales resulting in reducing of the number of the enterprises in 2011 versus 2010, followed by a slight increase in 2012, up to a 430 units. The most relevant aspect is that one the enterprises with a number of 6-10 and more than 10 employees decreased in the same period of time, and increasing the small companies with less than 5 employees: 170 units in 2009 and 281 in 2012. As a final observation, it should be mentioned that the total number of enterprises increased in 2012 at 430 units versus 315 units in 2009, out of witch 65% having < 5 employees.

Table 4.22.2 Structure of the Romanian aquaculture sector: 2009-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2009-11)
Structure (number)							
Total enterprises		*315*	*444*	*319*	*430*	*35%*	*20%*
<=5 employees		170	227	207	281	*36%*	*40%*
6-10 employees		79	101	63	66	*5%*	*-19%*
>10 employees		66	116	49	83	*69%*	*8%*
Employment (number)							
Total employees		2,669	3,933	2,669	2,968	*11%*	*-4%*
Male employees		2,135	3,330	2,135	2,549	*19%*	*1%*
Female employees		534	603	534	419	*-22%*	*-25%*
FTE		2,542	3,932	2,542	2,523	*-1%*	*-16%*
Male FTE		2,065	3,330	2,065	2,210	*7%*	*-11%*
Female FTE		477	603	477	313	*-34%*	*-40%*
Indicators							
FTE per enterprise		8.1	8.9	8.0	5.9	*-26%*	*-29%*
Average wage (thousand €)		3.3	2.8	2.6	2.3	*-11%*	*-21%*
Labour productivity (thousand €)		9.9	3.3	4.9	5.7	*17%*	*-6%*

Source: EU Member States DCF data submission

The total number of persons employed in the Romania aquaculture sector in 2012 was 2968, corresponding to 2523 FTEs. From 2011 to 2012, the number of employees is increased with a number of 299. From 2009 to 2012, is the same increase, i.e. 299 numbers of employees, respectively 11%. In 2012, only 14% of the employees in the sector were women.

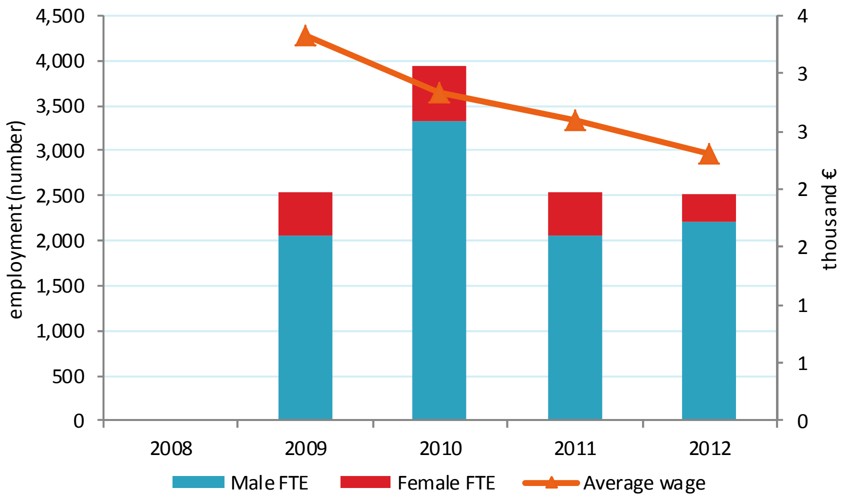


Figure 4.22.1 Employment trends for Romania: 2009-2012.

Source: EU Member States DCF data submission

The average FTE per enterprise decreased 27% from 2009 to 2012, whereas the average wage decreased from 3.3 to 2.3 thousand euros, corresponding to a decrease of 30%.

The number of enterprises and FTEs has increased from 2009 to 2012, but the average number of FTE per enterprise has been decreasing over the period, due to the fact the number and percentage of the enterprises < 5 employees increased. At the same time, the average wage has been decreasing; however, the enterprises have managed to increase labour productivity. The labour productivity is measured as gross value added per full time employee. From 2011 to 2012 the labour productivity increased with 2.2 thousand euros, but from 2009 to 2012 the labour productivity decreased from 9.7 thousand euros to 5.7 thousand euros.

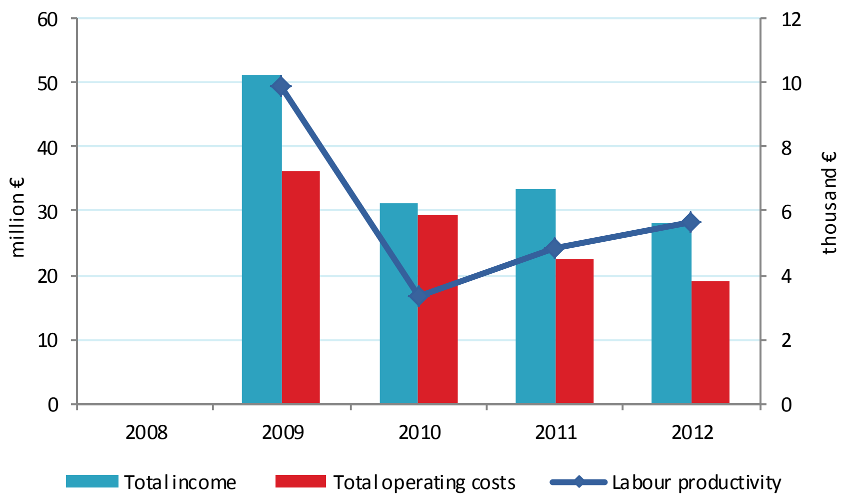


Figure 4.22.2 Income, costs, wages and labour productivity trends for Romania: 2009-2012.

Source: EU Member States DCF data submission

The explanations are based on the level of employee's number evolution between 2009 – 2012, more or less constant, and the drastic reduction of the total income in the same period of from 52.7 million euros to 28.0 million euros, due to the fact that the data were provided aggregated to both groups of enterprises, as main and non main activity.

4.22.4 Economic performance

From 2011 to 2012, total income decreased by 16%, while the operational cost decreased by 15%. The total income is dominated by the turnover from the sale of fish from the farms, which contributes 65% of total income, leaving only 33% to other income and only 2% for subsidies.

Table 4.22.3 Economic performance of the Romanian aquaculture sector: 2009-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2009-11)
Income (million €)								
Turnover		27.8	62.3	32.8	36.3	*65%*	*11%*	*-11%*
Other income		77.7	0.0	23.8	18.7	*33%*	*-22%*	*-45%*
Subsidies		0.0	0.0	10.2	1.1	*2%*	*-89%*	*-66%*
Total income		*105.5*	*62.3*	*66.8*	*56.1*	*100%*	*-16%*	*-28%*
Expenditures (million €)								
Wages and salaries		14.9	21.6	12.8	11.4	*20%*	*-11%*	*-31%*
Imputed value of unpaid labour		2.0	0.7	0.4	0.3	*1%*	*-19%*	*-69%*
Energy costs		6.5	3.3	2.7	1.8	*3%*	*-31%*	*-56%*
Repair and maintenance		11.3	2.2	1.6	1.4	*3%*	*-12%*	*-72%*
Raw material: Feed costs		9.4	14.7	14.5	11.6	*21%*	*-20%*	*-10%*
Raw material: Livestock costs		9.1	10.9	10.3	9.8	*18%*	*-5%*	*-3%*
Other operational costs		19.0	5.1	2.7	1.6	*3%*	*-42%*	*-82%*
Total operating costs		*72.3*	*58.5*	*45.0*	*38.0*	*68%*	*-16%*	*-35%*
Capital Costs (million €)								
Depreciation of capital		5.7	7.6	6.6	5.3	*10%*	*-19%*	*-19%*
Financial costs, net		0.8	1.6	0.3	0.4	*1%*	*57%*	*-50%*
Extraordinary costs, net		2.6	4.2	0.1	0.4	*1%*	*452%*	*-84%*
Capital Value (million €)								
Total value of assets		351.7	762.9	148.3	131.8	*235%*	*-11%*	*-69%*
Net Investments		31.8	39.4	7.1	19.8	*35%*	*180%*	*-24%*
Debt		99.0	117.8	23.4	24.1	*43%*	*3%*	*-70%*
Input & Production (thousand tonnes)								
Raw material: Feed		22.0	55.7	13.8	25.1		*82%*	*-18%*
Raw material: Livestock		6.8	10.1	6.1	7.2		*17%*	*-6%*
Performance Indicators(million €)								
Gross Value Added		50.1	26.1	24.8	28.6	*51%*	*16%*	*-15%*
Operating cash flow		33.2	3.8	21.8	18.1	*32%*	*-17%*	*-8%*
Earning before interest and tax		27.5	-3.7	15.2	12.8	*23%*	*-16%*	*-2%*
Net profit		26.7	-5.3	14.9	12.3	*22%*	*-17%*	*2%*
Capital productivity (%)		28.5	6.8	33.4	43.4			
Return on Investment (%)		15.7	-1.0	20.5	19.4			
Future Expectation Indicator (%)		14.8	8.4	0.7	22.0			

Source: EU Member States DCF data submission

The structure of the expenditures shows that the feed costs is 21%, livestock costs is 18% and wages and salaries 20%, in 2012. The expenditures to feed and livestock have been reduced due to the good prices on the local market as a result of good crop in agriculture raw materials in 2011, whereas the expenditures for wages and salaries have been declining from 2010 to 2012. The total expenditures totalise 68% of the total income.

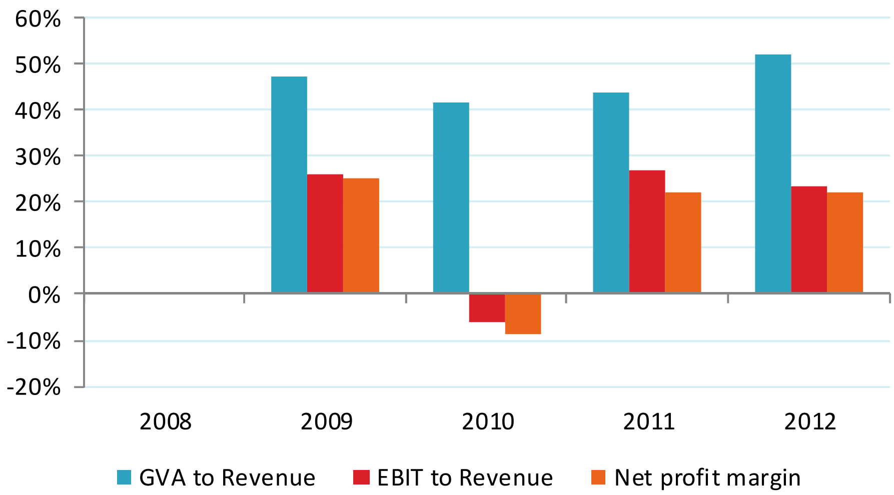


Figure 4.22.3 Economic performance for Romania: 2009-2012

Source: EU Member States DCF data submission

The gross value added for the sector as a whole increased by 16% and both EBIT and net profit was positive in 2012. The total value of assets decreased in 2012 comparing with 2011 by 11% and debts increased by 3%. This is mainly due to the decreasing number of bigger farms and increasing the number of small farms. The net investment increased 180%, but it is still below the net investment in 2010 before the financial crises effects began, due to the sign of these and the subsidies based on the EFF funding.

4.22.5 Main species produced and economic performance by segment

The aquaculture production in Romania is divided into four main segments. The largest segment is the land based production of combined carp, consisting in a combination of hatcheries, nurseries and on growing farms. The production in the land based farms is typically using the extensive technologies. The production techniques are used in primarily ponds, tanks and lakes.

The second most important segment is the carp on growing production, using the same technologies as for the first segment. Also the production is based on similar techniques such as primarily ponds, tanks and lakes.

The third segment is trout combined and eggs trout consisting of land based recirculation systems farms and tanks. The fourth one is trout on growing using the same techniques.

It should be mentioned that in all four segments some quantities of eggs are generally produced for human consumption and for processing industry use, but the demand on the domestic market has to face the concurrence of the super markets mainly.

The land based fresh water aquaculture production is spreaded in the majority counties around the country on camp and hills. The trout production is located in counties near mountains were the farms are concentrated and more than 80% still pending on state ownership in a special company of forests administration.

As stated above, the main species produced in Romania are cyprinids and trout species in 2012, as it is also in the previous years. On the first place there are the cyprinids species family (European once, and Asian once - such as: silver carp, bighead carp and grass carp) comprising 76%. This is the result of the development of aquaculture before ‘90s, where the quantity was prevailing to the quality. For this reason the Asian cyprinids were largely introduced in culture. The second species is trout sharing 9%, followed by crucian carp with 9%. Species more valuable, such as sturgeon, European eel, and the marine species have only 4% in the total production.

Figure 4.22.4 Main species in terms of weight and value in Romania production: 2012.

Source: EU Member States DCF data submission

The most important as per the price value on the market is trout having 23% from the total production value. The most important cyprinids species have only 50% in total value production – prices are smaller than the turbot are, also the crucian carp having 4% and other species 4 % in total production value in 2012. This is corresponding to the prices level distributed through the species list according with the quality of the fish species.

The Romania aquaculture sector is dominated by carp and trout species, both segments combined and on growing. The most relevant segments in the aquaculture are analyzed below.

Segment 1: Carp combined

The carp combined is the best important segment; land based fresh water farms, combining the production of hatcheries and nurseries with grow out farms. Extensive aquaculture in poly-culture (mixed species on growing) is using largely the ponds, lakes and tanks (with a small proportion). The product is starting over 2 kg per individual, generally, with a total of 5723 tones, 57% from the total production, and 9.500 million euros as total turnover in 2012. Being the biggest component of the sector the value of assets is 3.43 million euros and the FTE 1087 from a total of 2012. The production is dedicated 99% to the domestic market, small specialized shops, market places in the cities and some quantities to the super market chains and less than that to the local processing industry.

Segment 2: Carp on growing

This segment – carp on growing – is characterized by the strict activity on fating the individuals with 2994 tones and 4.260 million euros of turnover in 2012. There are no big differences from the first top segment, technologies being similar, as there are for carp combined.

As a general remark the extensive production in multi species is unchanged since the realizing period of the old farms, as well as the techniques used, not benefiting in a large scale of new investments I modernizing both of these, and constructing new once. Despite this general situation of the fishery in Romania and the decreasing of total production and turnover, the segment has net profit.

Segment 3: Trout combined

Trot combined, as the third segment of the aquaculture sector, also is land based fresh water trout farms. In most cases enterprises combine the production in hatcheries and nurseries with growing farms. The techniques used are ponds, raceways and some recirculation system. The product from theses farms are mainly portion size trout over 280 grams with white meat. As above mentioned the farms are still pending on the state management provisions in the same state company for forests administration and located on the Sub-Carpathian hills. The production volume was 571 tonnes with a turnover of 2.190 million euros in the total production of Romanian aquaculture.

Segment 4: Trout growing

The fourth segment is the trout growing, mainly raceways and some recirculation system farms. Besides the first trout segment, also this one have same locations and ownership legal frame. In 2012, the production volume was 488 tones bringing turnover about 1.9 million euro. The segment is with a positive net profit.

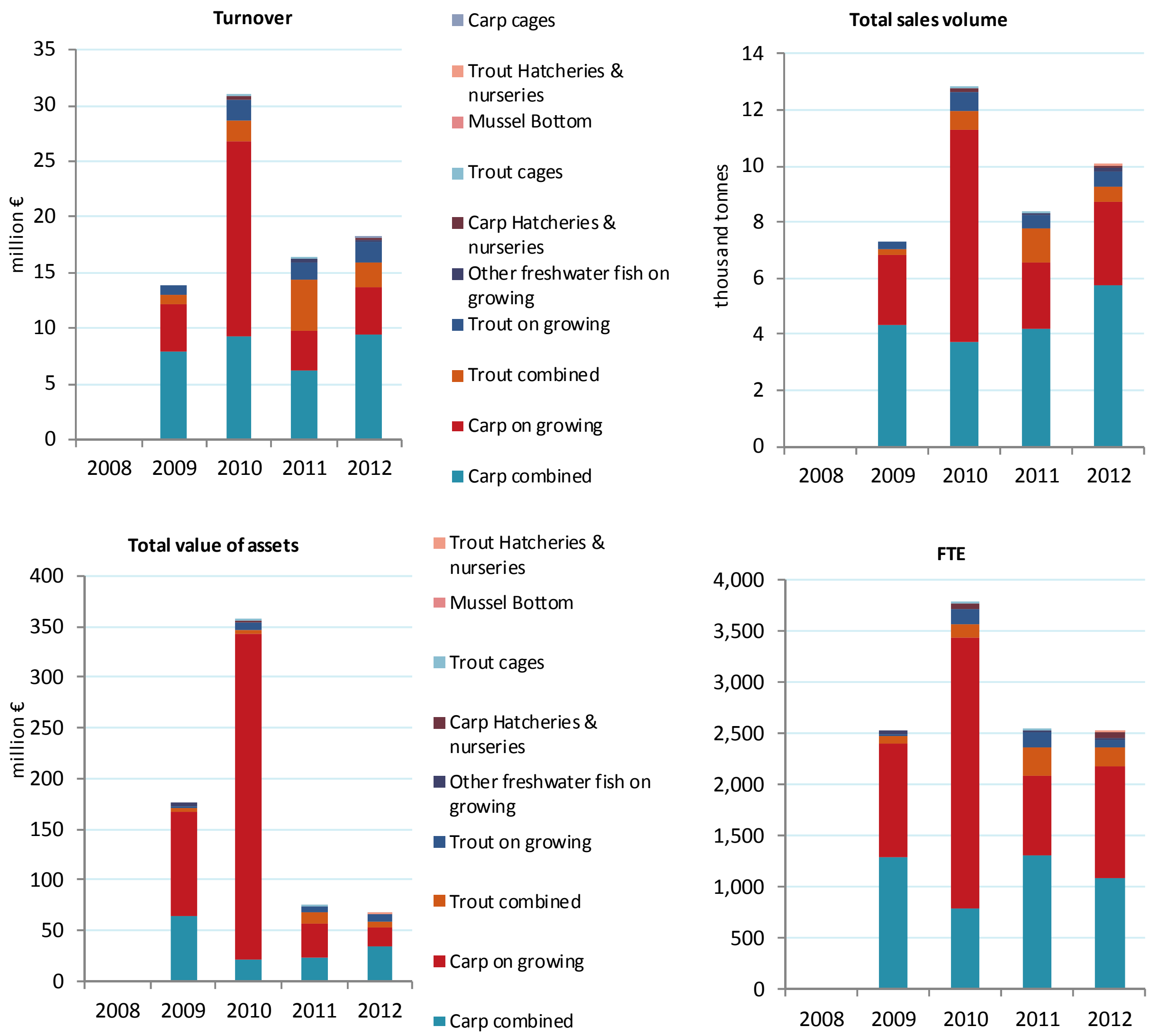


Figure 4.22.5 Structural development of Romanian aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

In figure 4.22.5, the importance of each sector can be seen, namely the carp both segments are bigger than the segments of trout in what it concerns the assets value, employees number as FTE, and, as above mentioned, for total production and turnover.

As a general comment both segments hatcheries and nurseries combined with on growing farms for carp and trout appear to be less profitable than the carp and trout on growing, being very clear that is more difficult for this types of farms to adapt to the market. Also the domestic market is uncovered by governmental measures facing a hard competition with the imported fish material, even of juveniles for on growing coming from Hungary, Bulgaria and Greece, mainly, see Table 4.22.4.

Table 4.22.4 Economic performance of main Romanian aquaculture segments: 2009-2012 (in million €).

Variable	2008	2009	2010	2011	2012	*% of total income*	Change 2012/11	Development 2012/(2008-11)
Carp combined								
Total income		*14.1*	*9.3*	*15.4*	*13.7*	*100%*	*-11%*	*6%*
Gross Value Added		*1.3*	*3.1*	*7.2*	*5.9*	*43%*	*-18%*	*53%*
Operating cash flow		*-3.6*	*0.5*	*10.0*	*3.9*	*28%*	*-62%*	*68%*
Earning before interest and tax		*-5.2*	*0.0*	*8.8*	*2.3*	*17%*	*-74%*	*92%*
Net profit		*-5.3*	*-0.4*	*8.8*	*2.1*	*15%*	*-76%*	*110%*
Total sales volume (thousand tonnes)		*4.3*	*3.8*	*4.2*	*5.7*		*37%*	*40%*
Carp on growing								
Total income		*33.6*	*17.5*	*9.5*	*9.1*	*100%*	*-4%*	*-55%*
Gross Value Added		*21.7*	*9.0*	*0.7*	*5.9*	*65%*	*688%*	*-44%*
Operating cash flow		*18.7*	*2.1*	*-1.8*	*3.9*	*43%*	*315%*	*-39%*
Earning before interest and tax		*17.5*	*0.2*	*-3.3*	*3.1*	*34%*	*192%*	*-36%*
Net profit		*17.3*	*-0.1*	*-3.4*	*3.0*	*34%*	*189%*	*-34%*
Total sales volume (thousand tonnes)		*2.5*	*7.5*	*2.4*	*3.0*		*26%*	*-28%*
Trout combined								
Total income		*1.4*	*1.9*	*6.0*	*2.8*	*100%*	*-54%*	*-11%*
Gross Value Added		*0.8*	*0.9*	*3.2*	*1.3*	*47%*	*-59%*	*-20%*
Operating cash flow		*0.5*	*0.5*	*1.9*	*0.6*	*20%*	*-71%*	*-43%*
Earning before interest and tax		*0.4*	*-0.6*	*1.6*	*0.5*	*16%*	*-71%*	*0%*
Net profit		*0.4*	*-0.7*	*1.5*	*0.5*	*16%*	*-71%*	*7%*
Total sales volume (thousand tonnes)		*0.2*	*0.7*	*1.2*	*0.6*		*-54%*	*-19%*
Trout on growing								
Total income		*1.4*	*1.9*	*1.8*	*2.1*	*100%*	*16%*	*23%*
Gross Value Added		*0.6*	*0.4*	*0.7*	*1.0*	*49%*	*36%*	*67%*
Operating cash flow		*0.5*	*-0.2*	*0.4*	*0.6*	*31%*	*81%*	*242%*
Earning before interest and tax		*0.4*	*-0.4*	*0.3*	*0.4*	*21%*	*72%*	*403%*
Net profit		*0.4*	*-0.5*	*0.3*	*0.4*	*21%*	*71%*	*662%*
Total sales volume (thousand tonnes)		*0.3*	*0.7*	*0.4*	*0.5*		*12%*	*5%*

Source: EU Member States DCF data submission

Table 4.22.4 the economic indicators for the main Romania segments are presented. From the Table it can be seen that GVA, EBIT and Net profit are positive in 2012 and in increasing level with the previous year 2011 for the segments carp and trout on growing. Furthermore, net profit is positive for the same segments, whereas the both segments hatcheries and nurseries combined had a negative profit, as well as the GVA and EBIT. Then sales on the market of for both last segments are pending of a lot of factors: availability on the market for buyers (a lot of these are importing the biological material, from: Bulgaria, Hungary, Greece – mainly), the expenditures are bigger due the fact that the feed is little different and not chipper than for the on growing only, there is a need for a qualified employees.

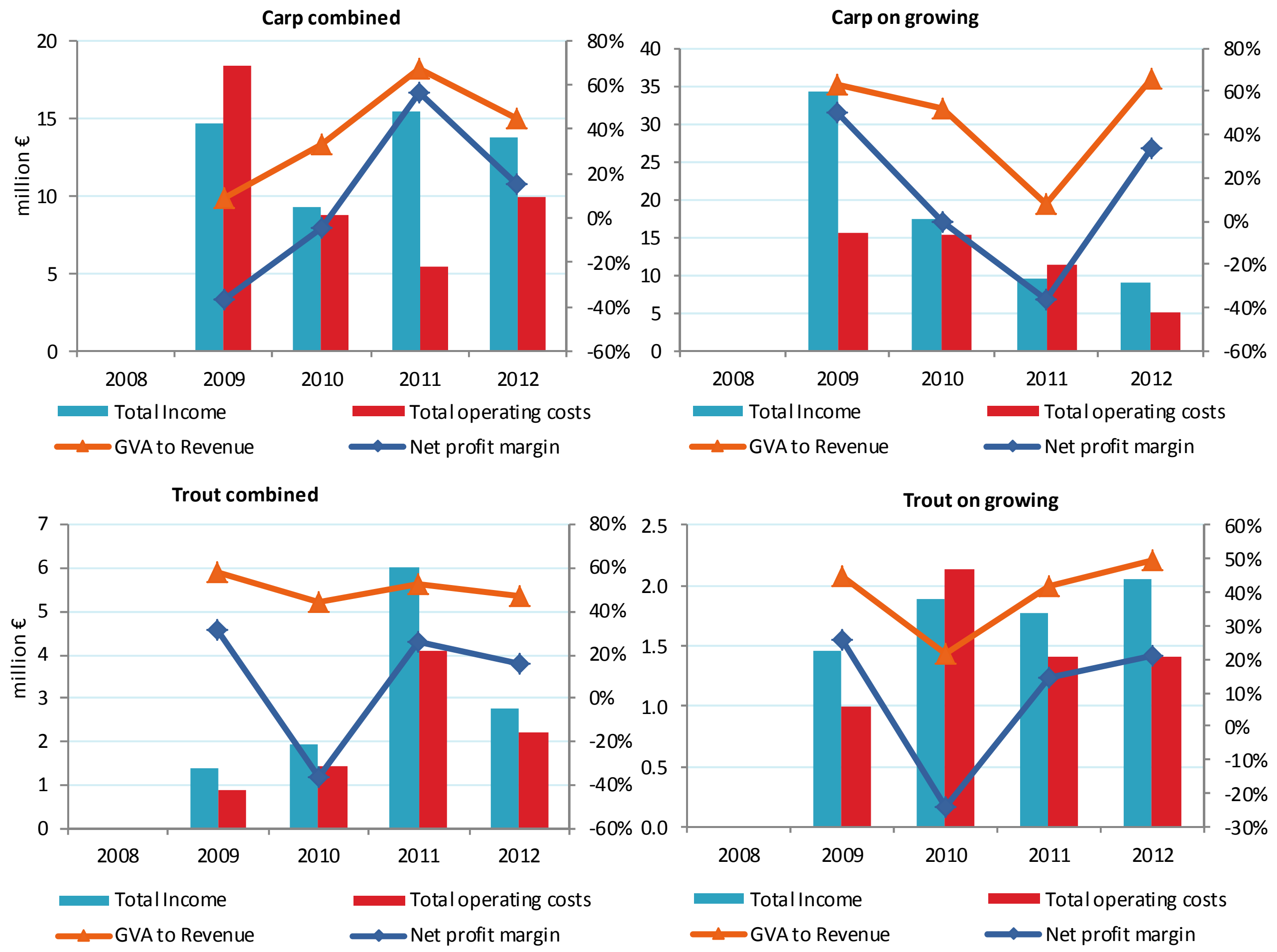


Figure 4.22.6 Economic performance indicators for the main Romanian segments: 2009-2012.

Source: EU Member States DCF data submission

Figure 4.22.7 the operational cost structures for the Romania main segments in 2012 is presented. A general comment should be done: the vast majority of the aquaculture farms are located in open spaces, far from cities/localities, and due to the extensive technologies and multi-species cultured species the costs for: energy, repair and maintenance, imputed value for unpaid labour are minim 8% and maximum 11% in total costs structure, and depreciation of capital is between 5-13% and operational costs 1 to 4%. Meantime the wages and salaries costs with a third importance have a level between 21-35% in total costs. For the other elements of the costs structure the situation is as follow:

Segment 1: Carp combined – the traditional costs elements for any land based farm are the raw material costs, both live stock and feed ones, covering 54% of total costs.

Segment 2: Carp on growing – the main costs are represented, also by both live stock and feed costs for 36% in 2012 (the proportion was 11% and 25%), due to the other costs, namely wages and salaries 35%.

Segment 3: Trout combined – the feed costs are 49% and live stock costs 6% in total costs.

Segment 4: Trout on going - the feed costs are 49% and live stock costs 9% in total costs.

The conclusion could be assumed is that one the main costs, traditionally, are raw material (both live stock and feed) between 36% - carp on growing and 58% - trout on growing.

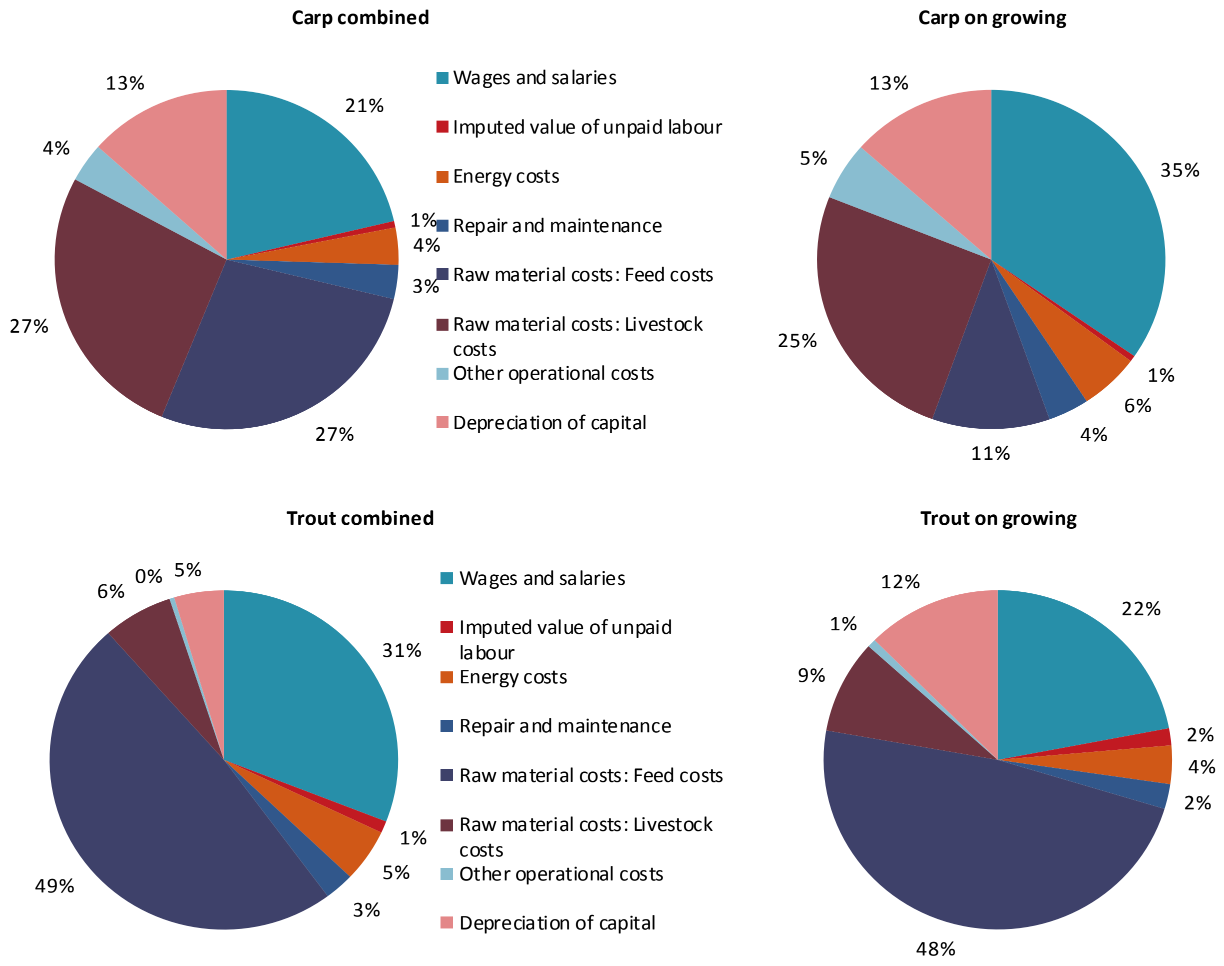


Figure 4.22.7 Cost structure of the main segments in Romania: 2012.

Source: EU Member States DCF data submission

Considering the prices for live stock and feed could be observed the evolution of its level on fig. 4.22.8 showing the consequences of the economic crisis beginning in 2009 but especially coming in 2010.

For trout combined and trout on growing the costs level and values have been reported aggregated, but it is not creating a difficulty assessing the real situation, observed for the whole sector, namely: for the live stock the prices graph curve presents an increase in 2010 versus 2009, and a continuing increasing evolution in 2011, followed by a reduction in 2012, when the effects of the economic crisis were lees influencing the market.

Refereeing to feed it should be noted that the market in Romania is still a volatile one, and strongly depending on the raw material domestic production (barley, corn, sun-flower seeds meal, etc) basically the most available source for buying the raw materials by the actors in the aquaculture sector analyzed.

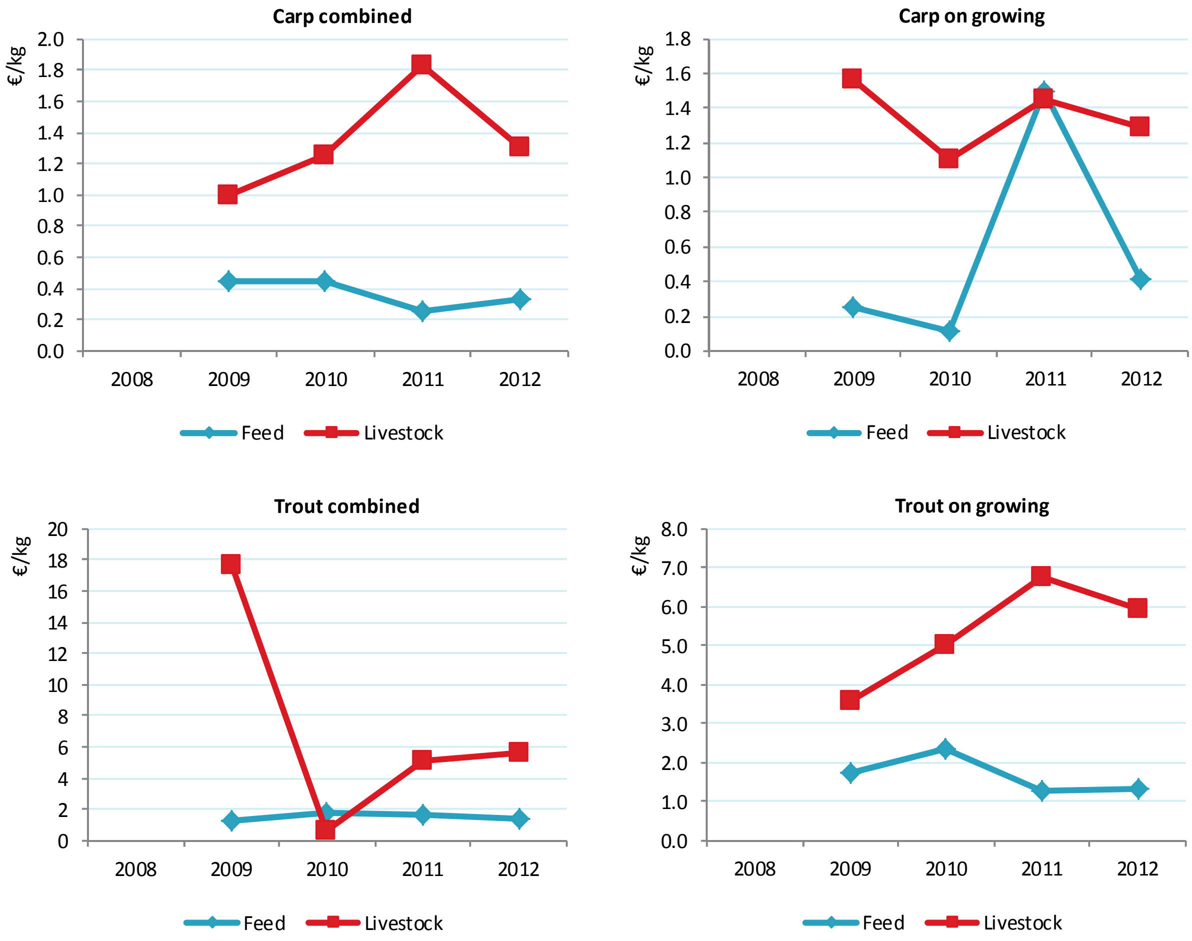


Figure 4.22.8 Feed and livestock prices for the main Romanian segments: 2009-2012.

Source: EU Member States DCF data submission

In this respect the curve shows the dependence on that internal market for the prices, with a relative constant level for a specialized demand, such as trout producer/farms – having better qualified staff - with a slightly reduction of prices between 2010-2012 corresponding to a good crop, and an increasing trend in the end of the period that could be underlined in 2013 prices level. The carp sector is not specialized at the same level as trout sector is, without reasonable specialists hired in the farms, so the prices evolution is indicating big fluctuations due to the disproportionate reactions of the people leading/managing the carp farms.

4.22.6 Trends and triggers

Current production trends and main drivers

The main reason for the increase in the freshwater aquaculture production in Romania is the increasing demand on the market based on the slightly increase of the average salaries throughout economy recovering after the economic crises effects. The need to increase the local production is also a mean to reduce the dependence from the import of such a products supported by the fact that more than 100,000 tones are imported annually. The price is driven by the trout price, which has remained at the relative constant level during the analyzed period. However to expand the production further the industry needs new licenses, modernizing the existent farms, and training of the staff, new technologies to be applied. If no measures in these directions and no coherent management of the segment aiming these issues the industry production will stay at the current level around 10,000 tonnes, with slightly increasing opportunities.

The land based production has shown an inconsistent trend of production over the years and a high dependency on the direct consumption market – fresh fish - and less connection with the local processing industry.

Marine aquaculture in Romania is still far from market demand and the continuous changes of the customers, with to small production offered, and based on seasonal requests, especially in tourist one during the summer. However, mussel and oysters farming as a mean to reduce the environmental impact from the fishery are expected to grow, if the farms are supported to expand production.

As conclusions is observed a necessity for increasing investments in the existing facilities for modernization. A special attention should be paid on the aspect, especially for carp on growing segment, seen as an opportunity for investing in order to save money of the investors, as a an alternative for the lour level for the money placed in bank accounts; finally they are doing recreational fishery and not aquaculture production for market supply – first one, and secondly as an alternative for developing the business "potofolium". The lack in investment observed is because the ownership legal framework is not yet solved in Romania, especially for the land, and also for the old ex-state farms constructions and facilities for aquaculture. The development of marine aquaculture in Black Sea is still pending on the hydro-wheatear conditions specific for this area, namely strong storms appearing in short period of time, even hours, with high waves, the configuration of the shore – law altitude, and very cool weather starting with November and finishing late in spring, with freezing temperatures, even for he salted water of the sea. Even that there is an opportunity to develop the production throughout measures encouraging introduction of new, valuable species in production, and even specializing the farms.

A lack of promoting actions for fish and fish products consumption is observed, actually. Also a law qualification of the investors, staff in aquaculture field is a reality, and there is a need for training the people engaged in this type of production.

The aquaculture sector production is not diversified both as species produced and as products offered to the market, so the investments are needed to introduce new species, for the valorisation of the existing potential at national level. The number of producer associations/organisations and for market purposes is quite limited.

The governmental support was missing over the period, including direct subsidies, no financial support or compensation scheme for the price of water usage.

The master plan for aquaculture should be putted in place including realistic measures aiming the development of the production according to the real, even natural, potential of the water surface on that target existing in Romania. The EMFF is the biggest chance on that target.

Market structure

The Romania aquaculture sector has some good labour productivity over the period investigated. The labour cost per unit of output is also relatively low compared to other countries producing trout, mainly to rate exchange RON/Euro used for analyses that could be an advantage on developing the sector.

The sector is characterized of many small producers at the primary level, especially those having less than 5 employees. This market structure can be a hindrance because the market is not well functioning and competitive.

In recent years few farms specialized for sturgeon species producers has been established. It should be noted that there is still existing and producing a European eel farm, and some introducing the cages for trout production, with big challenges for the expanding activity, but receiving a good price for their products. However, the segment is producing less than 50 tonnes and it is questionable how large the production volume can grow to become significant in total production at national level.

The Romania market is still an emergent one, not organized facilitating the sales for such products. A big quantity of fish and fish products are imported each year resulting in a huge competition from the supermarket chains for the local producers.

Issues of special interest

As above mentioned in Romania, a few farms are experimenting on the production of new species and using new technology. A part of that fresh water based land farms, the most important project, launched 1 and half year ago, and is for the production of turbot at the Black Sea littoral, as a result of using the EEF opportunities.

Outlook for 2013 and 2014

For the Romania aquaculture producers 2013 is expected to be better than 2012. The reason is that the Romania sector opportunities are at a higher level, making an historical analysis on production volume. The economic crisis and its main consequences are over passed. The market potential, comparing with the imported quantities, is other opportunity for production encouraging. The new EMFF regulation, especially its provisions stimulating aquaculture production is expected to increasing the investments in the sector for on growing production, and stimulating the increase of GVA o the products. The regulation should provide the producers with an incentive to introduce more environmental friendly technology in order to raise production. However, it is questionable if the production increase will influence significantly on the production in short time, i.e. 2013 and 2014.

Furthermore, the restrictive non-actions observed in the analyzed period are expected to be replaced by other ones and coherent measures putted in place in line with the new strategy could stimulate increasing production and turnover, but it is still questionable if the results would be seen in a short period of time.

4.22.7 Data Coverage and Data Quality

Data quality

The statistic for 2012 is based on a questionnaire interview method used to collect data for aquaculture farms, but the response rate – due to the law rate response – should be improved. A new legal framework on data collection for the fishery, aquaculture and processing industry will be putted in place for a better quality data.

The Romania specialized agency is updating constantly the Register of Units for Aquaculture (RUA) registering the total population of farms and enterprises, having the main activity aquaculture production. It is mandatory for all aquaculture producers in Romania to report the production in volume and value each year at the enterprise level. Furthermore, the species produced and the technique used in the production is reported. The collection of economic and socio-economic variables is based on the total population of farms obtained by the participating bodies in the National Programme for Data Collection (NPDC) of Romania. The data is collected at enterprise level, to get the most homogeneous segments in terms of species and technique. Data is collected on a voluntary basis from the owner's chartered accountant. The accountant's task is to report the accounts of his aquaculture clients to the legal authorities, where the account information is harmonized for fiscal purposes.

The extrapolation of the sample to the total population is done in two steps. In the first step all results from the collected responders are entered into a database containing information on all existing aquaculture producers in Romania, special dedicated to the NPDC. From the collected accounts an average is calculated for all indicators in each segment. In the second step, an account for the remaining population is estimated based on the average calculated in the first step and the information collected by the inspectors of the fishery agency in Romania. The underlying assumptions for this calculation are that the production function for each farm is identical within each segment. When the production function is identical, the costs and earnings can be distributed from the sales volume and value for each segment.

Data availability

Data for the aquaculture volume and value sector is published once a year on both an aggregated enterprise and species at national level. The aquaculture statistics are published on Statistics Romania's Bulletin and national agency website approximately 12 months after the end of the reference year, having similarity to the provisions of Eurostat Regulation and attributions of national agency for fishery and aquaculture.

Confidentiality

To avoid problems with confidentiality on data use, segments should in general include more than 10 enterprises. In Romania in order to present detailed data collected from the segments, the end users sould follow the EU legal provisions.

Input of experts about the segmentation on enterprise level, the homogeneity of the segments in terms of techniques and species: all enterprises provided by RUA have a high degree of homogeneity both concerning the species and technique; RUA is 100% for licenced enterprises, but if an enterprise produces more than one species, then it is recorded for all the species; also enterprises own more than one farm using different techniques are registered in RUA. There are many examples of enterprises using more than one technique.

The individual pollution issues are managed according to the environmental authority issuing the special authorisation in this respect. Furthermore, it would provide the farmers with an incentive to reduce pollution, which would lead to further development and the adoption of new environmentally friendly production methods and technologies, ensuring the environment protection.

Differences in DCF data compared with other official data sources

The data for DCF is, in most cases, in line with both value and production registered in FAO and EUROSTAT, in Romania. However data for the freshwater and marine sector provided for the DCF also contains value and volume for the hatcheries and nurseries. Especially under the measures and actions taken into account in the last years, data from Romania DCF are quite identical with Eurostat data, based on first sale prices. The differences are owed to the different rate exchange used for conversion of the values in RON into Euros by Eurostat, but this is not affecting, at all, the final results, in one hand, and in the other one revenue is production value in farm gate prices and the data collected by Statistics Romania are account data and the account year does not necessarily coincide with the calendar year. Eurostat data are different for past years due to the transmission system used at that time, involving handling data, and since 2011 data reporting system was improved.

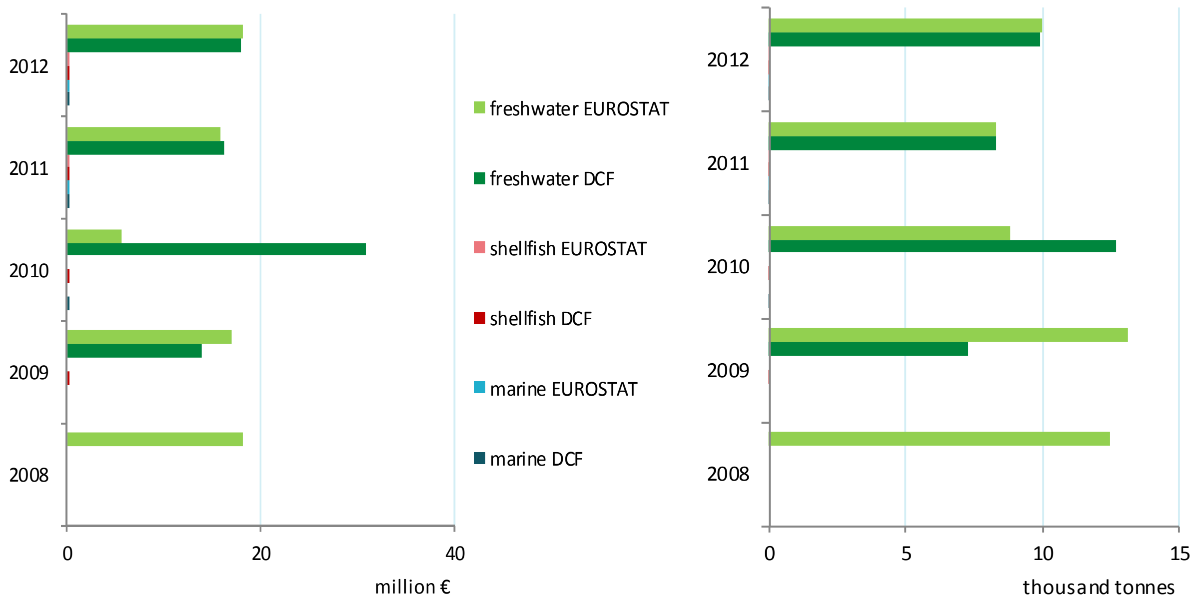


Figure 4.22.9 Comparison of DCF data with EUROSTAT data for Romania: 2008-2012

4.23 SLOVAKIA

4.23.1 Summary

The Slovakian aquaculture sector produced 1264 tonnes of freshwater species in 2012 with the value of 3.24 million Euros. In 2012 both, the quantities and value of aquaculture production increased 38.4% and 34.0% respectively. The target species were rainbow trout and common carp with the 73% and 20% respective part in total production value. Prices for target species in 2011 and 2012 period demonstrated different trends. Average prices for rainbow trout were demand driven and increased 12.5%, whereas common carp prices were considered as supply driven and decreased by 16.8%.

Production volume and value

The Slovakian aquaculture production consisted of 1264 tonnes in 2012, solely from freshwater species (see Table 4.23.1) and reached the highest level since 2008. Annual increase from 2011 to 2012 amounted 38.45%. The recovery of production since the lows in 2010 was partially related with improved economic situation. High correlation was observed with the GDP per capita (Eurostat data), when it decreased in 2008-2010 years and from 2010 to 2012 recovered to the highest number.

The same trend for value of production was observed in 2008-2012 year period, when value significantly dropped by 40.7% from 2008 to 2010 and significantly recovered to the highest value in 2012, reaching 3.24 million Euros. Despite the lowest production volume and value in 2010, at that time the average production price was highest within five year long period. Turnover from low production volume was increased by rising prices and contrary, in 2012 increased production supply negatively affected prices with the 3.24 % annual decline.

Whilst no marine or shellfish aquaculture is produced due to the landlocked nature of Slovakia there were quite stable production of fish eggs and juveniles. It fluctuated around 40 million for the 5 year period with 10.25% annual increase in 2012 to 43 million units.

Table 4.23.1 Production and sales for Slovakia: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 11-12	Development 2012/(2008-11)
Production weight (thousand tonnes)	***1.1***	***0.8***	***0.6***	***0.9***	***1.3***	***38%***	***49%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	1.1	0.8	0.6	0.9	1.3	*38%*	*49%*
Production value (million €)	***2.7***	***1.8***	***1.6***	***2.4***	***3.2***	***34%***	***52%***
Marine	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Shellfish	0.0	0.0	0.0	0.0	0.0	*0%*	*0%*
Freshwater	2.7	1.8	1.6	2.4	3.2	*34%*	*52%*
Hatcheries & nurseries (million units)	***43***	***39***	***35***	***39***	***43***	***10%***	***10%***
Eggs	28	32	27	28	25	*-11%*	***-13%***
Juveniles	15	7	8	11	18	*64%*	***76%***

Source: EUROSTAT

Main segments

Rainbow trout was the main species produced by the Slovakian aquaculture sector, representing 60% in total volume and 73% of total value of sector production. (see Figure 4.23.1). Second biggest segment is common carp 28% of the weight and 20% of the production value. Other segments could be considered of minor importance and consists of species as sea trout, grass carp and Northern pike.

Figure 4.23.1 Main species in terms of weight and value in Slovakian production: 2012.

Source: EUROSTAT

Rainbow trout average first-sale prices in Slovakia were 3.12 €/Kg in 2012, while common carp and grass carp prices were 1.82 €/Kg and 2.27 €/Kg, respectively (see Figure 4.23.2). Prices for main target species, rainbow trout and grass carp had a different trend in 2012. Average price for rainbow trout in 2012 increased by 12.5%. Common carp, which is the only other markedly sizeable segment, has relatively stable prices in 2008-2011 period but declined 16.8% in 2012.

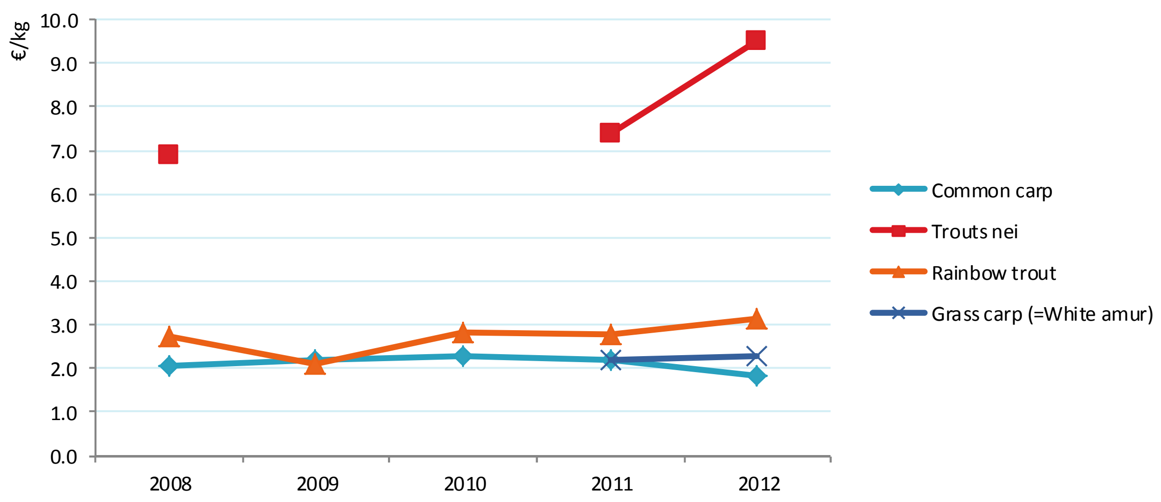


Figure 4.23.2 Average prices for the main species produced in Slovakia: 2008-2012.

Source: EUROSTAT

Trend and trigger /Outlook

Increased volumes and prices of rainbow trout in Slovakia demonstrate high importance and perspective outlook for near future in country aquaculture sector. As an example in 2012, when supply was significantly increased with a higher price, compare to 2011. Supply for rainbow trout could be considered as demand driven. Quite different price performance was observed in common carp segment, when significantly increased quantities of production pushed prices down what could be considered as supply driven.

4.23.2 Data Coverage and Data Quality

Slovakia is a landlocked country and only produces freshwater aquaculture. Because freshwater data is not compulsory under the DCF, landlocked countries were not requested to collect data under the DCF regulation. Because of the lack of DCF data for Slovakia, FAO and EUROSTAT data were used in this analysis.

4.24 SLOVENIA

4.24.1 Summary

Production volume and value

In 2011 the turnover was €532.751,00 in 2012 the turnover has increased by 34 % and amounted €715.480,00. The total sales volume decrease by 23 % from 2011 to 2012 and it was 502,10 tons in 2011 and 386,32 tons in 2012. Increased turnover in 2012 was the result of a large increase in sales of Warty Venus - VEV and Arca noae - RKQ, which achieve a high first sale prices.

Overall industry structure and employment

In 2012 Slovenia had 8 companies with 5 or less employees, one company with 6-10 employees and 2 companies with more than 10 employees. The status in employment reflects the situation in the aquaculture sector whereby the majority of small family farms operates with self employed persons, mostly one employee and some unpaid assistance from family workers.

Main segments

They are two main segments in the Slovenian aquaculture sector; Sea bass & Sea bream cages (seg3.4) and Mussel rafts (seg7.1). The most important species are Mediterranean mussel and European seabass.

In terms of sales volume mariculture shellfish farming are more important than fish farming. The major and the only cultured shellfish species, Mediterranean mussel, accounts for 82 percent of total sales volume in 2012. The production of European seabass is more important than the production of gilthead seabream. It contributes around 16 percent to total mariculture production in 2012.

Current production trends and main drivers (Trends and triggers)

Regarding techniques and species all Slovenian marine segments are very homogeneous. Marine fish farming practice is normally intensive and takes place in floating platforms where the cages are submerged into the sea. They produced mostly European seabass. Shellfish farming practice is extensive and takes place in lines of floating buoys linked together, where longlines with mussels are suspended. The major and the only cultured shellfish species is Mediterranean mussel.

Outlook

Future development of Slovenian mariculture is strongly conditioned by the small size of the Slovenian Sea. In 2007, three larger areas were designated for marine aquaculture in Slovenian territorial waters that were subsequently separated into 22 plots, for which concessions were granted for the use of marine water in 2009. It is expected that these plots will not be able to expand, due to the use of Slovenian territorial waters for other purposes. All Slovenian maritime fish and shellfish farms currently operating with about 50% capacity. In the future we can expect increasing production to maximum capacity and then stagnation of Slovenian marine aquaculture.

On the other hand, because of the good quality and quantity of inland water, Slovenia has a good chance to increase freshwater aquaculture, particularly salmonid rearing such as rainbow trout, Huchen (Hucho hucho) and brown trout. Today is in Slovenia about 60 trout farms, with a total production of only about 1,000 tonnes per year.

4.24.2 Production and sales

In 2012 were 10 companies in Slovenia dealing with shellfish farming, primarily with mussel farming (Mediterranean mussel). The shellfish are farmed using hanging ropes that are attached to rafts.

In the same year were only one company that was engaged in breeding of fish. A main space for breeding is sea bass. Main farming techniques is breeding in cages.

Table 4.24.1 Production and sales for Slovenia: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***0.3***	***0.4***	***0.1***	***0.5***	***0.4***	*-23%*	*19%*
Marine	0.1	0.1	0.1	0.1	0.1	*7%*	*8%*
Shellfish	0.2	0.3	0.1	0.4	0.3	*-27%*	*21%*
Freshwater							
Hatcheries & nurseries							
Sales value (million €)	***0.5***	***0.7***	***0.3***	***0.5***	***0.7***	*34%*	*38%*
Marine	0.4	0.5	0.3	0.4	0.4	*-9%*	*-6%*
Shellfish	0.1	0.2	0.0	0.1	0.4	*158%*	*165%*
Freshwater							
Hatcheries & nurseries							

Source: EU Member States DCF data submission

In 2011 the turnover was €532.751,00 in 2012 the turnover has increased by 34 % and amounted €715.480,00. The total sales volume decrease by 23 % from 2011 to 2012 and it was 502,10 tons in 2011 and 386,32 tons in 2012. Increased turnover in 2012 was the result of a large increase in sales of Warty Venus - VEV and Arca noae - RKQ, which achieve a high first sale prices.

The main segments in the Slovenian aquaculture sector are Sea bass & Sea bream cages (seg3.4) and Mussel rafts (seg7.1).

4.24.3 Industry structure and employment

Aquaculture in Slovenia comprises freshwater aquaculture (cold-water fish farming of salmonids, warm-water fish farming of cyprinids) and mariculture (fish and shellfish farming). Warm-water and cold-water fish farming has been practiced since the end of nineteenth century, while mariculture has a shorter history: it started at the end of the twentieth century. The major species contributing most of the production value in freshwater fish farming are rainbow trout (Oncorhynchus mykiss) and common carp (Cyprinus carpio), whilst in mariculture it is Mediterranean mussel (Mytilus galloprovincialis) and European seabass (Dicentrarchus labrax).

Mariculture practice is traditional. Fish farming takes place in cages submerged into the sea, while mussel farming takes place in a standard manner in lines of floating buoys linked together, with longline nets hung from them. In 2007, three larger areas were designated for marine aquaculture in Slovenian territorial waters that were subsequently separated into 22 plots, for which concessions were granted for the use of marine water in 2009. It is expected that these plots will not be able to expand, due to the use of Slovenian territorial waters for other purposes. Currently, all the concessions for using marine water for the breeding of marine organisms have been granted, 2 of them for breeding marine fish and 20 for breeding shellfish. The total area for breeding fish at sea (excluding shellfish farming) in 2009 was 5 663 m2 (2 plots). The area of the 20 plots at sea that are used for shellfish farming was 45.1 ha.

Due to natural circumstances, the development of marine fish farming in Slovenia is limited. Mariculture takes place in the Bay of Strunjan, the Bay of Debeli rtič (shell-fish farming) and in the Bay of Piran (fish and shell-fish farming).

Mariculture shellfish farming is more important than fish farming regarding the total volume of sales. The major and the only cultured shellfish species, Mediterranean mussel , accounts for 82 percent of total mariculture production in 2012. The production of European seabass is more important than the production of gilthead seabream. It contributes around 16 percent to total mariculture production in 2011.

Since the early eighties (1982) the production of the Mediterranean mussel (Mytilus galloprovincialis) has been increasing and in 1988 it reached a maximum of 703 tonnes. After that year a significant decline was due to the fact that exports to Italy ceased. In 1995 the production of mussels reached a minimum of 12 tonnes. In recent years, there are increases in production, particularly due to the resolution of the status of shellfish production facilities through the granting of concessions for the use of marine water: first in 2001 and then in 2003, when production reached 135 tonnes, the highest since 1992. There was also a peak in production in 2011, with 446 tonnes of Mediterranean mussels produced. Current production covers mainly the needs of the domestic market. In recent years, especially in 2010, considerable difficulties occurred in the production of shellfish due to the frequent closures of sales because of the occurrence of biotoxins, which prevents shellfish farms to be used to their full production capacity.

From 1991 onwards intensification was carried out especially with farming European seabass and seabream in the Bay of Piran. A first result of seabass production in 1992 was 5.7 tonnes. In subsequent years annual variations in production (growth and decline) were noted. In 2001 production reached its maximum with 59 tonnes, and very similar amounts were noted in 2003. Here, there was a peak in production in 2009, with 65 tonnes of seabass.

The first results of seabream production in 1992 were 4 tonnes. In the following years there was a growth in production, with some variations, until 1997 when production reached a maximum of 61 tonnes. After that year production declined and reached a minimum of 6 tonnes in 2001. In 2003 production was 16 tonnes. From 2010 to 2012, there was no production of seabream.

Slovenia is a net importer of fish and fish products. In 2012 imports were approximately four times larger than exports. There is a continuous import of fresh farmed species: seabream, seabass and salmon. The majority of the imported fish products come mainly from the European Union and are frozen, dried or processed.

Data, presented in this report, were collected only for the marine fish species.

Table 4.24.2 Structure of the Slovenian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*11*	*11*	*13*	*11*	*11*	*0%*	*-4%*
<=5 employees	10	10	11	9	8	*-11%*	*-20%*
6-10 employees	1	0	1	1	1	*0%*	*33%*
>10 employees	0	1	1	1	2	*100%*	*167%*
Employment (number)							
Total employees	29	35	31	32	34	*6%*	*7%*
Male employees	27	33	26	26	28	*8%*	*0%*
Female employees	2	2	5	6	6	*0%*	*60%*
FTE	26	32	28	28	28	*1%*	*-2%*
Male FTE	24	30	23	23	22	*-4%*	*-12%*
Female FTE	2	2	5	4	6	*25%*	*71%*
Indicators							
FTE per enterprise	2.4	2.9	2.1	2.5	2.5	*1%*	*1%*
Average wage (thousand €)	21.5	19.7	19.7	24.4	28.4	*17%*	*33%*
Labour productivity (thousand €)	85.8	66.1	85.7	179.6	104.3	*-42%*	*0%*

Source: EU Member States DCF data submission

In 2012 Slovenia had 8 companies with 5 or less employees, one company with 6-10 employees and 2 companies with more than 10 employees. The status in employment reflects the situation in the aquaculture sector whereby the majority of small family farms operates with self employed persons, mostly one employee and some unpaid assistance from family workers. Total employment in 2012 was estimated at 34 jobs, corresponding to 27,7 FTEs. The level of employment increased between 2008 and 2012, with total employed increasing by 17% while the numbers of FTEs increase by 5% over the period. With respect to the gender of those in employment, men are predominated in aquaculture sector. In 2012 only 6 women (17,6 percent) were involved. Average salary per FTE employees in 2008 was €21.512,71. In 2012 average salary per FTE employees increase for approximately 30 % regarding 2008 and amounted €28.429,67.

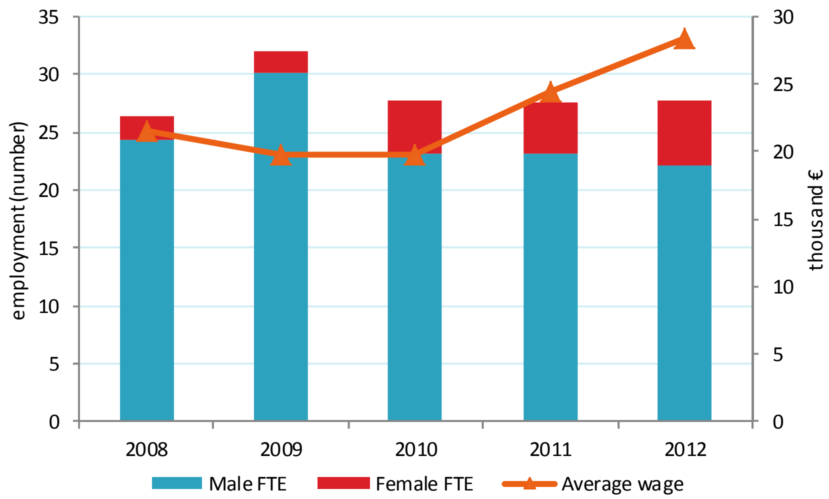


Figure 4.24.1 Employment trends for Slovenia: 2008-2012.

Source: EU Member States DCF data submission

The number of enterprises remains relatively stable while the number of total employees has increased from 2008 to 2012, but the average number of FTE per enterprise has been rather constant over the period. At the same time, the average wage has been increasing; however, the enterprises have managed to increase labour productivity. The labour productivity is measured as gross value added per full time employee. From 2008 to 2012 the labour productivity increased by 21,5%, although in 2012 observe some decreases in labour productivity in relation to 2011.

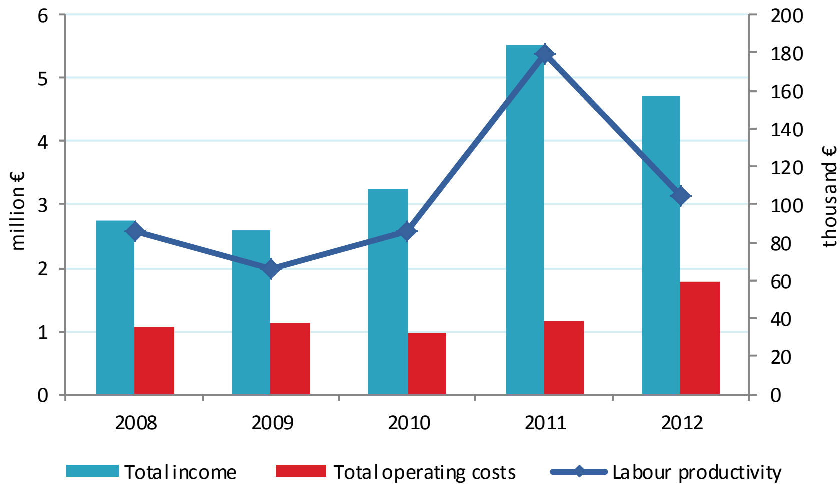


Figure 4.24.2 Income, costs, wages and labour productivity trends for Slovenia: 2008-2012.

Source: EU Member States DCF data submission

The total amount of income generated by the Slovenian aquaculture sector in 2012 was €4,7 million. This consisted of €0,7 million in turnover,€ 0,8 million in subsidies and €3,2 million in other income (Figure 4.24.2 and table 4.24.3). The total income of the Slovenian aquaculture sector decreased by 14,5 % between 2011 and 2012, while turnover increased by 34 % in the same period. The reason for decreasing value of total income is in other income which decreases for almost 37% from 2011 to 2012.

All the firms in Slovenian aquaculture sector are registered to practice aquaculture and aquaculture should be their main source of income, however most of the income gain from carrying out other activities, such as Scuba diving, underwater work, marketing...

4.24.4 Economic performance

Table 4.24.3 Economic performance of the Slovenian aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	*% of total income*	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	0.5	0.7	0.3	0.5	0.7	*15%*	*34%*	*38%*
Other income	2.2	1.9	2.5	4.9	3.2	*67%*	*-35%*	*10%*
Subsidies	0.0	0.0	0.4	0.1	0.8	*18%*	*970%*	*540%*
Total income	*2.8*	*2.6*	*3.2*	*5.5*	*4.7*	*100%*	*-14%*	*34%*
Expenditures (million €)								
Wages and salaries	0.6	0.6	0.4	0.6	0.5	*12%*	*-3%*	*-1%*
Imputed value of unpaid labour	0.0	0.0	0.1	0.1	0.2	*5%*	*123%*	*366%*
Energy costs	0.1	0.1	0.1	0.1	0.2	*3%*	*73%*	*89%*
Repair and maintenance	0.1	0.1	0.0	0.0	0.0	*1%*	*-9%*	*-19%*
Raw material: Feed costs	0.2	0.2	0.1	0.2	0.3	*7%*	*61%*	*57%*
Raw material: Livestock costs	0.1	0.1	0.1	0.1	0.3	*7%*	*140%*	*241%*
Other operational costs	0.0	0.0	0.1	0.0	0.2	*4%*	*296%*	*209%*
Total operating costs	*1.1*	*1.1*	*1.0*	*1.2*	*1.8*	*38%*	*52%*	*65%*
Capital Costs (million €)								
Depreciation of capital	0.1	0.1	0.2	0.3	0.5	*12%*	*57%*	*191%*
Financial costs, net	0.1	0.1	0.2	0.2	0.1	*3%*	*-24%*	*2%*
Extraordinary costs, net	0.1	0.1	0.0	0.1	0.1	*2%*	*-26%*	*24%*
Capital Value (million €)								
Total value of assets	3.2	3.1	4.6	6.9	10.2	*217%*	*48%*	*130%*
Net Investments	0.1	0.0	0.3	1.5	1.9	*41%*	*31%*	*305%*
Debt	2.5	2.5	3.6	5.4	6.2	*132%*	*15%*	*77%*
Input & Production (thousand tonnes)								
Raw material: Feed	0.2	0.2	0.1	0.2	0.3		*42%*	*53%*
Raw material: Livestock	0.0	0.0	0.0	0.0	0.1		*64%*	*140%*
Performance Indicators(million €)								
Gross Value Added	2.3	2.1	2.4	4.9	2.9	*61%*	*-42%*	*-1%*
Operating cash flow	1.7	1.5	2.3	4.3	2.9	*62%*	*-32%*	*20%*
Earning before interest and tax	1.6	1.4	2.1	4.0	2.4	*51%*	*-40%*	*6%*
Net profit	1.5	1.3	1.9	3.8	2.3	*48%*	*-41%*	*6%*
Capital productivity (%)	71.2	69.3	51.1	71.3	28.2			
Return on Investment (%)	49.9	45.1	45.0	57.8	23.4			
Future Expectation Indicator (%)	-1.4	-2.4	3.1	16.4	13.6			

Source: EU Member States DCF data submission

Total operating costs by the Slovenian aquaculture sector in 2012 was €1,8 million. The largest expenditure items were wages and salaries (€0,54 million) and Livestock costs (€0,31 million) (Table 4.24.3). In 2012 the total operating costs increased by 50% regarding 2011 mostly because increased expenditure of feed and livestock costs.

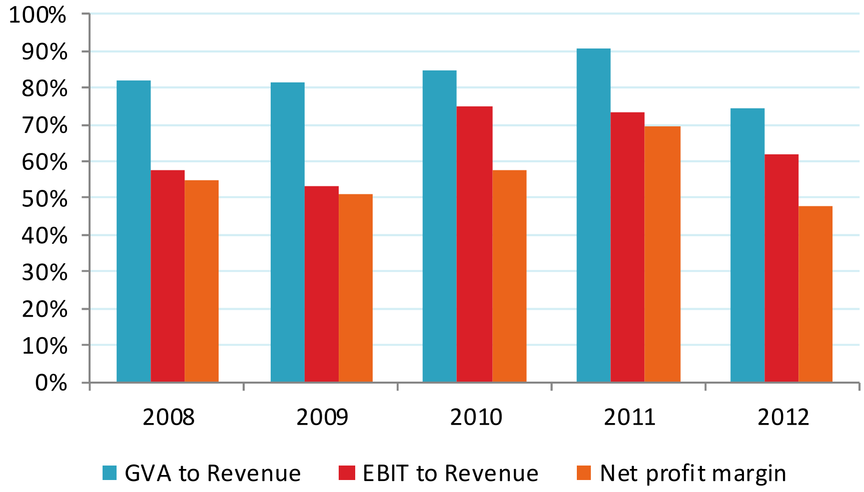


Figure 4.24.3 Economic performance for Slovenia: 2008-2012

Source: EU Member States DCF data submission

In terms of economic indicators, the amount of GVA, OCF, EBIT and Net profit generated by the Slovenian aquaculture sector in 2012 was €2,9 mio, €2,9 mio, €2,4 mio and €2,3 respectively, see table 4.24.3. Values of all economic indicators are decreased from 2011, namely due decreased value of other income in 2012.

4.24.5 Main species produced and economic performance by segment

The most relevant segments in the Slovenian aquaculture are:

- Segment 1: Sea bass & Sea bream cages (seg3.4);
- Segment 2: Mussel rafts (seg7.1).

They are two main segments in the Slovenian aquaculture sector; Sea bass & Sea bream cages (seg3.4) and Mussel rafts (seg7.1). The most important species are Mediterranean mussel and European seabass.

In terms of sales volume mariculture shellfish farming are more important than fish farming. The major and the only cultured shellfish species, Mediterranean mussel, accounts for 82 percent of total sales volume in 2012. The production of European seabass is more important than the production of gilthead seabream. It contributes around 16 percent to total mariculture production in 2012.

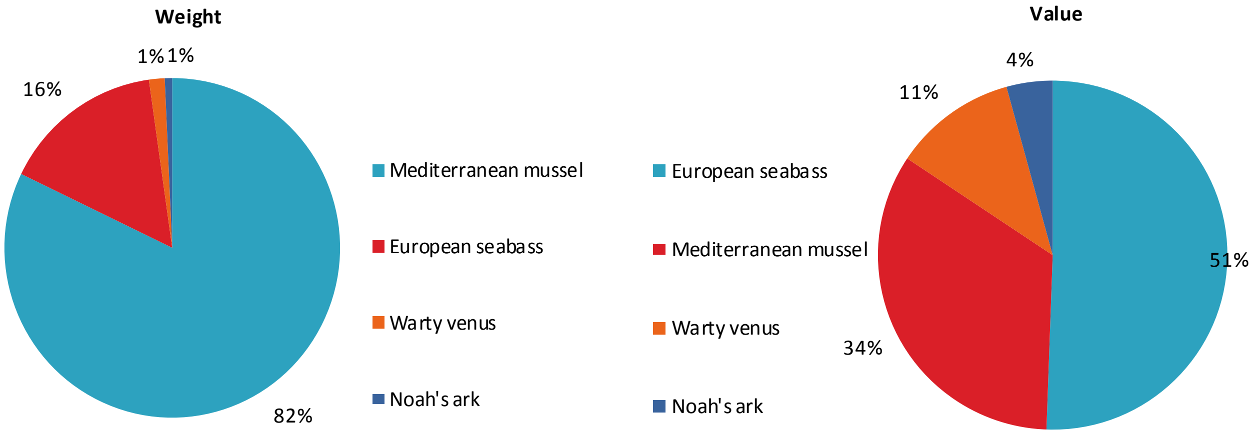


Figure 4.24.4 Main species in terms of weight and value in Slovenia production: 2012.

Source: EU Member States DCF data submission

In terms of sales volume, sales volume of the Mussel rafts segment represent 82% of the total sales volume of Slovenian aquaculture sector in 2012. Turnover from this sector represent 34% of the total turnover in the same year. In the Mussel rafts sector were 15 FTE employees in 2012, which represent 66% of all FTE employees in Slovenian aquaculture sector in the same year.

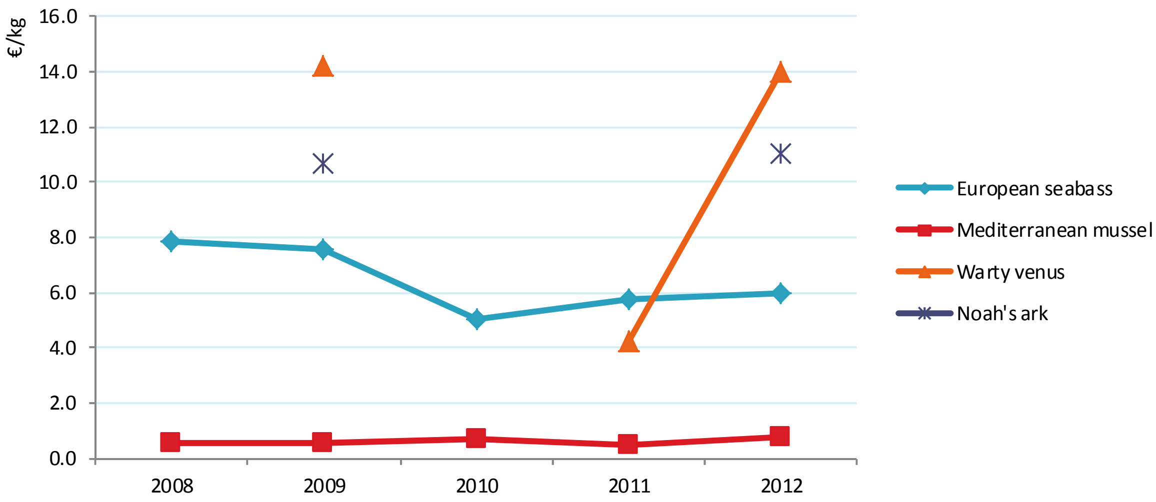


Figure 4.24.5 Average prices for the main species produced in Slovenia: 2008-2012.

Source: EU Member States DCF data submission

The average price of European seabass was €7,81/kg in 2008. In 2012 average price decrease by 23% regarding 2008 and amounted €6/kg. The main reason for decreased price of seabass is increased imports of seabass, mainly from Greece and Croatia, where the first-sales price is lower than in Slovenia. The average price of Mediterranean mussel was €0,76/kg in 2012 and increase by 46% over the period 2008-2012.

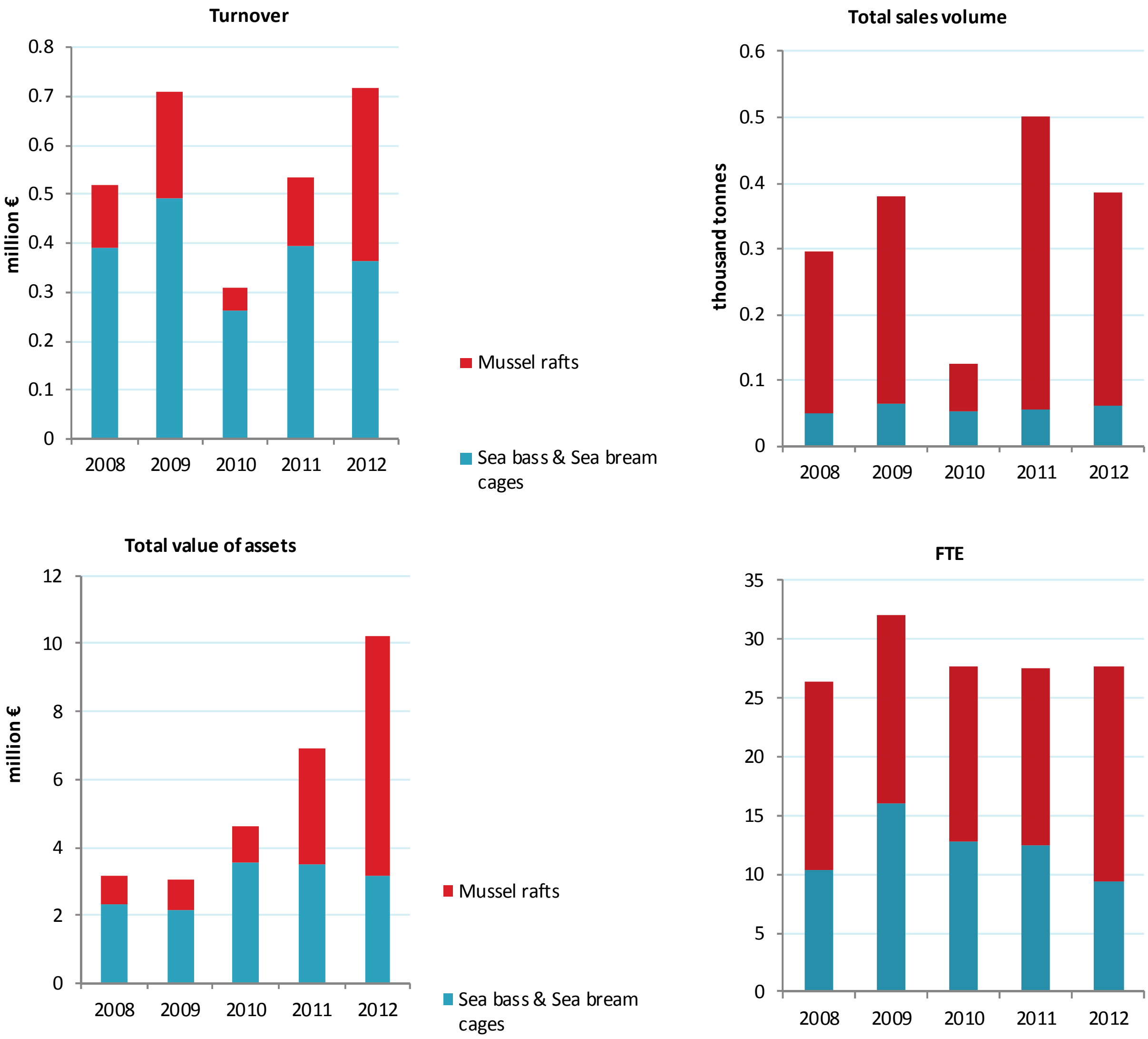


Figure 4.24.6 Structural development of Slovenian aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

In table 5.7.7, because of the confidentiality issues, only the economic performance of the Mussel rafts segments is shown. From the table it can be seen that the gross value added and net profit are positive in the period from 2008 to 2012.

Table 4.24.4 Economic performance of main Slovenian aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Mussel rafts								
Total income	*1.2*	*1.4*	*1.6*	*3.6*	*4.2*	*100%*	*17%*	*117%*
Gross Value Added	*1.1*	*1.3*	*1.4*	*3.4*	*3.1*	*75%*	*-8%*	*75%*
Operating cash flow	*0.8*	*1.0*	*1.3*	*3.2*	*3.4*	*81%*	*8%*	*119%*
Earning before interest and tax	*0.8*	*0.9*	*1.2*	*3.0*	*2.9*	*68%*	*-5%*	*93%*
Net profit	*0.7*	*0.9*	*1.2*	*3.0*	*2.8*	*66%*	*-7%*	*89%*
Total sales volume (thousand tonnes)	*0.2*	*0.3*	*0.1*	*0.4*	*0.3*		*-27%*	*21%*

Source: EU Member States DCF data submission

In terms of sales volume, sales volume of the Mussel rafts segment represent 82% of the total sales volume of Slovenian aquaculture sector in 2012. Turnover from this sector represent 26% of the total turnover in the same year. In terms of other economic indicators, the amount of GVA, OCF, EBIT and Net profit generated by the Slovenian Mussel rafts sector in 2012 was €3,1 mio, €3,4 mio, €2,9 mio and €2,8 respectively, see table 4.24.4. Values of all economic indicators in Mussel rafts sector are increased substantially from 2008 due increased productions and first sales prices of Mediterranean mussel as the most important species in this segment. In terms of sales volume and value, Mediterranean mussel represents 97% and 68% of the total sales volume and value of the Mussel rafts segment.

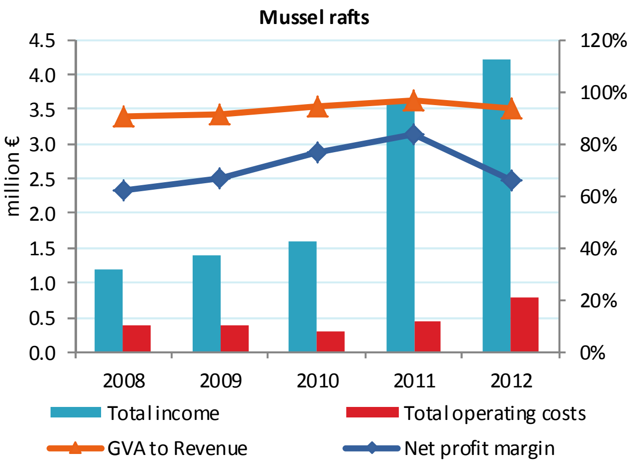


Figure 4.24.7 Economic performance indicators for the main Slovenian segments: 2008-2012.

Source: EU Member States DCF data submission

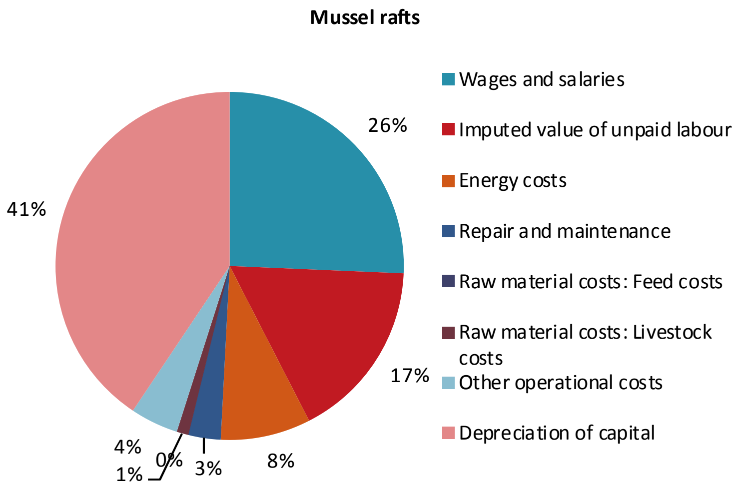


Figure 4.24.8 Cost structure of the main segments in Slovenia: 2012.

Source: EU Member States DCF data submission

The largest cost item of Mussel rafts sector in 2012 were the Depreciation of the capital, accounted for 41% of the total operational costs. Wages and salaries made up 26 % of all operational costs. Depreciation of the capital increase by 300% regarding 2011. Slovenian Mussel rafts sector has over the past few years, with the help of EU Funds, invested significantly in the new equipment and production facilities. So this new investments are the main reason for increased value of Depreciation of capital.

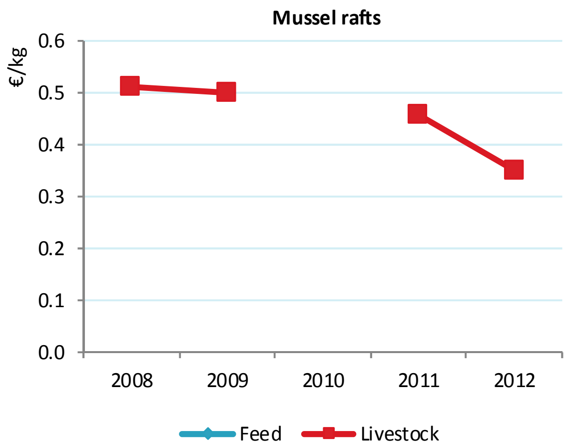


Figure 4.24.9 Feed and livestock prices for the main Slovenian segments: 2008-2012.

Source: EU Member States DCF data submission

4.24.6 Trends and triggers

The Ministry of Agriculture, Forestry and Food is responsible for fisheries and aquaculture in Slovenia. Fisheries comprise capture fisheries, aquaculture of fish and other water animals and trade in fisheries products. Inland fisheries, fish farming and fish health are managed by three main Acts: the Freshwater Fishery Act, the Livestock-breeding Act (ZŽiv) and the Veterinary Service Act (Zvet) and their regulations, ordinance, etc. Marine fisheries, fish and mussel farming are regulated by Marine Fisheries Act (ZMR-2). In fisheries and aquaculture it is necessary to take into consideration the Environment Protection Act (ZVO), the Nature Conservation Act (ZON), and the Water Act (ZV).

The main leading government agency in fisheries and aquaculture is the Directorate of Forestry, Hunting and Fisheries within the Ministry of Agriculture Forestry and Food. The main task of the Directorate is to provide overall administrative control of aquaculture and fisheries, to ensure an adequate legislative framework for aquaculture and fisheries, and to carry out related legislative tasks. The Directorate is directly involved in controlling the operation of fish farms, licensing procedure of alien species or hybrids and is also responsible for the maintenance of fish stocks in natural waters. The concessions for the use of water, which are the prerequisite for setting up a fish farm in Slovenia, are, however, granted by the Ministry of Environment and Spatial Planning. The Directorate manages that part of the state budget which is designed for fisheries and aquaculture. The funds are used for a variety of purposes, including the financing of the setting up and the management of fisheries information systems; financing of performing public service in fisheries by the Fisheries research institute of Slovenia; for the protection of natural resources Development in the Republic of Slovenia 2007-2013; as well as for the collection of data in and monitoring in fisheries. Ecological, biological research and the breeding of some indigenous species (Danube salmon, grayling, nase) are conducted in the Fisheries Research Institute of Slovenia. The Marine Biology Station of the National Institute for Biology deals with interdisciplinary research of the sea.

There has been a dynamic change in the fish production sector due to economic changes in the period from the independence of Slovenia to its accession to the European Union and after the accession. In the future it would be reasonable to support research projects such as: analysis of potential possibilities in fish farming development in Slovenia with regards to spatial and hydrological circumstances and research into the possibility of economic farming of new species. It would also be reasonable to continue with investment in the modernization of older fish farms, especially the improvement of hygienic conditions and the construction of new fish farms which comply with EU legislation technologically and ecologically. It would also be necessary to adopt all outstanding fisheries legislation and encourage the establishment of aquaculture producer organisations with a view to the development of fish farming in terms of small and medium sized family fish husbandry. These measures would facilitate the more competitive position of Slovenian fish farming. Natural circumstances and conservation requirements in Slovenia do not allow the development of large industrial farms. The establishment of producer organisations would make it easier to obtain knowledge, new technology and reduce market costs.

Typical Slovenian maritime enterprise is small family fish/shell farm with self employed persons, mostly one employee and some unpaid assistance from family workers. Regarding techniques and species all Slovenian marine segments are very homogeneous. Marine fish farming practice is normally intensive and takes place in floating platforms where the cages are submerged into the sea. They produced mostly European seabass. Shellfish farming practice is extensive and takes place in lines of floating buoys linked together, where longlines with mussels are suspended. The major and the only cultured shellfish species is Mediterranean mussel.

Future development of Slovenian mariculture is strongly conditioned by the small size of the Slovenian Sea. In 2007, three larger areas were designated for marine aquaculture in Slovenian territorial waters that were subsequently separated into 22 plots, for which concessions were granted for the use of marine water in 2009. It is expected that these plots will not be able to expand, due to the use of Slovenian territorial waters for other purposes. All Slovenian maritime fish and shellfish farms currently operating with about 50% capacity. In the future we can expect increasing production to maximum capacity and then stagnation of Slovenian marine aquaculture.

On the other hand, because of the good quality and quantity of inland water, Slovenia has a good chance to increase freshwater aquaculture, particularly salmonid rearing such as rainbow trout, Huchen (Hucho hucho) and brown trout. Today is in Slovenia about 60 trout farms, with a total production of only about 1,000 tonnes per year.

4.24.7 Data Coverage and Data Quality

Data were collected only for the marine fish species.

Regards to the data base ‘’The central register of aquaculture and commercial ponds’’ from MAFF, in 2012, there were 10 operators in Slovenia dealing with shellfish farming and one subject that was engaged in breeding of fish. The data for the operators mentioned were collected from multiple sources (AJPES, questionnaire, MAFF), allowing for cross checking. The accounting data, which are collected by the AJPES public agency, are already checked and verified. The data were collected for all 11 subjects.

In June 2013 the questionnaires for 2012 were sent to all 11 operators and 10 of them also returned the questionnaire. Therefore, the response was 91 %.

Economic data on the aquaculture sector were collected from accounting records – AJPES and through questionnaires. The national program for collection of economic data for the aquaculture sector combines information from three main resources:

1. Questionnaire information returned from the aquaculture sector on a voluntary basis,

2. Data base: ‘The central register of aquaculture and commercial ponds’ from MAFF,

3. The annual accounts of business enterprises.

The data collected from all sources are combined in such a way that a complete set of accounting items is compared for each business enterprise.

In cases where a questionnaire, as the only source, was used the response rate was 91 %. In cases where the data from annual accounts of business enterprises was used the response rate was also 100 %, because we have economic reports for all investigated companies.

The economic variables were collected on the basis of Council Regulation (EC) No 199/2008 and the Appendix X to the Commission Decision (EC) 949/2008. Slovenia has uploaded the complete set of requested data to the JRC server before the deadline.

While due to confidentiality issues because of the low number of marine fish farms, we are only presenting Mussel rafts segment (seg7.1) in the chapter 4.24.5: ‘’Main species produced and economic performance by segment’’.

In case of Slovenian data, there are differences between Eurostat and DCF data. The difference is because the Eurostat data also contain data from freshwater aquaculture and also because of better coverage of DCF data.

List of acronyms and abbreviations;

AJPES - The Agency of the Republic of Slovenia for Public Legal Records and Related Services.

MAFF - The Ministry of Agriculture, Forestry and Food of the Republic of Slovenia.

VARS - Veterinary Administration of the Republic of Slovenia.

Differences in DCF data compared with other official data sources

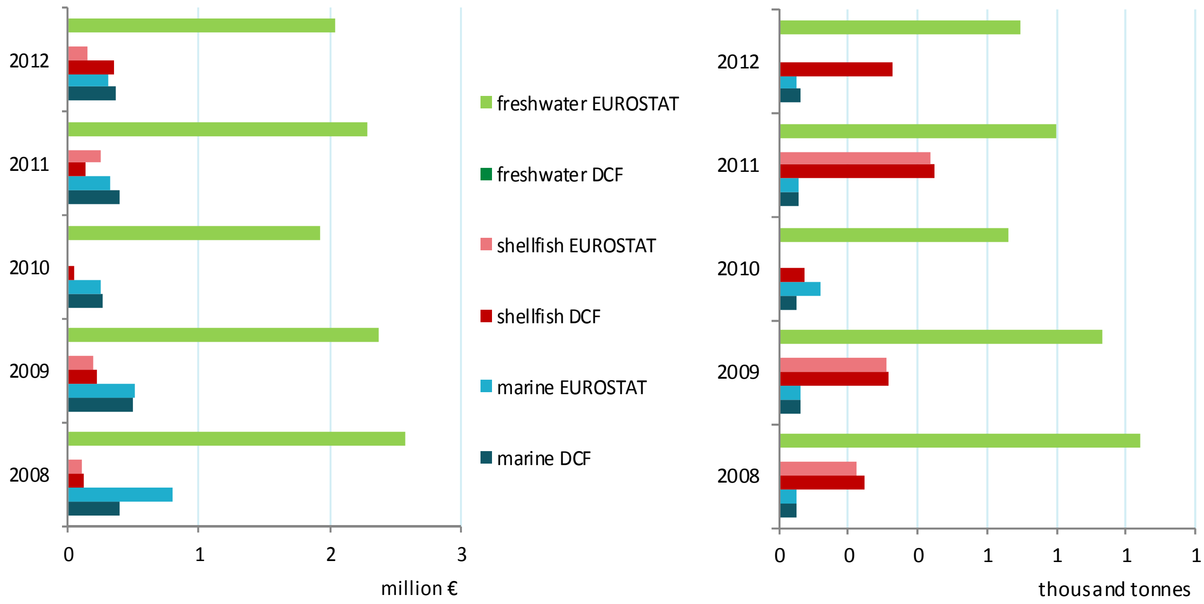


Figure 4.24.10 Comparison of DCF data with EUROSTAT data for Slovenia: 2008-2012

4.25 SPAIN

4.25.1 Summary

Production volume and value

Spain has an important aquaculture sector, whose principal feature is its high diversity, with productions in freshwater fishes, marine fishes, molluscs, crustaceans, and algae. All these aquaculture forms are spread for all the country. Beside the important production for human consumption, there are also juveniles and eggs (fishes and molluscs) which are produced in hatcheries and nurseries mostly to be grown in other establishments, but also to restock rivers or coastal zones. These quantities produce a turnover which has been increasing in the last years, until achieve the 10% of the total aquaculture industry turnover in 2012. All these forms of aquaculture generated a total income of 517.10 million euros in 2012, 8% less than previous year, which was the best year in the studied series in terms of income.

Overall industry structure and employment

Aquaculture in Spain has a significant role in the economic and social development in certain areas. Some subsectors keep a level of employment which result is important in the coastal areas, as mussel sector. Spanish aquaculture structure is based in small units, with a number of 3.032 which operate 5.312 establishments, of which most are rafts for mussels and oyster. The small firms, with less than 5 employees, dominate the Spanish aquaculture sector with the 74% of the total.

The number of employees in Spanish aquaculture is 19.892, what represents a decrease comparing with the previous year. However this reduction in the figures must not be interpreted only as a decline in employment, but rather as an adjustment in the data collection process in mussel sector in Galicia. Closer to reality is the variation in FTE figures, which shows a fall of 13%. Nearly half of the FTE corresponds with self-employed workers. The geographical distribution of the aquaculture workers shows a concentration in Galicia, mainly in mollusc farming.

Main segments

Segment 1: Bass & bream cages

Sea bass and sea bream are the main species in the Spanish aquaculture in terms of value, generating in 2012 the 42% of the total value of the Spanish production. These species are cultivated in the Mediterranean coast of Spain and in the Canary Islands in warm waters. The number of companies has been suffering a reduction process since 2008, from 59 firms to 33 last year, but the average size of the companies has grown. Also the number of people working in this segment has been reduced.

The total production achieved 29,384 tonnes in 2012, with a drop of 8.7% comparing with 2011, and the total income grew a 14% between 2011 and 2012 from 165.8 million Euro to 188.9 million Euro. This segment of the industry is the least efficient of the four segments described here. All the other indicators show a worsening in the economic situation and in the economic performance. The increase in feed price, which is the main operational cost in this segment, appears to be the primary cause of this situation.

Segment 2: Mussel rafts

The mussel production in Spain represented the 75% of the total Spanish aquaculture production in terms of quantities and the 20% of the value in 2012. Because it is a species that depends on natural conditions, its annual production can reflects strong fluctuations. However, in 2012 the production suffered a decrease of 2% compared to 2011, what it was not a significant reduction as in 2010, when red tides closed the production areas for long periods. This is the most important segment in terms of employment, in which most of the workers are self-employed and the small familiar units are the basement of the activity. Employment in 2012, with 2,221 FTE, remains stable compared with the previous years.

The mussel industry was the most profitable of the four segments analysed during 2012. However, there was a negative evolution of all economic indicators between. The reduction in market price contributed to a reduction in the total income of a 21%. As an extensive production system with low technology requirements the labour cost is the most relevant operational cost.

Segment 3: Trout combined

Trout represents the freshwater aquaculture production in Spain, since the rainbow trout facilities produce nearly the only freshwater production in Spain. Trout production activities are spread around all the regions and involve all the cultivation stages, hatcheries, nurseries and fattening facilities. Regarding the data for 2012, trout production obtained a negative economic performance since both EBIT and net profits, were negative. As in the other fish productions considered, the main operational cost is feed that in 2012 achieved the 31% of the total production cost.

Segment 4: Other marine fish in cages

This segment is mainly represented by the Atlantic Bluefin tuna fattened in cages, which with a production of 3,000 tonnes, employs 169 people with higher qualification than in other subsectors and a higher stability during the year. The economic indicators registered a negative evolution, but still are positive in 2012, mainly due to the high profitability of the captured based tuna aquaculture.

Current production trends and main drivers (Trends and triggers)

The Spanish multi-year strategic plan for Spanish aquaculture 2014-2020 highlight several issues as important areas that can influence the current production trends and that can act as drivers for future production growths and technical developments: the homogenization and simplification of the different aquaculture strategies and normative frames in the 17 regions of the country; the integrated coastal zone management and the identification of adequate areas for the aquaculture development that will help to increase the production and obtain a better use of the space and the water; the transfer of technology and knowledge to the industry; the diversification of the species produced as tool to improve the profitability and sustainability of the sector; and the improvement of the positive consumer perception about aquaculture products.

Outlook

An important cultivated fish in Spain, turbot, has less production than in previous years and it is not waited a comeback in a short term. Meagre has an enormous reduction and the expectative is very negative, with a real risk of disappearing from the Spanish aquaculture outlook. Sole and blackspot bream continue their growth; the first one has an increasing trend, which look to continue and the second one, with only one company working with it, although it is accepted by the market, it will remain in the same level it is now. The second mollusk species in Spain is oyster, which has good perspectives for next years thanks to different researches to prevent high mortalities. The production of these molluscs, whose seeds are mostly imported from other countries, will depend on the support to new hatcheries. Small and innovating companies exist in the national scene and while there are not important in total volume, they can be significant in local economies; that is the case of an abalone farm, located in Galician coast, with expectative of growing. In freshwater aquaculture, rainbow trout remains a slight recovery in 2013 and probably in 2014, although new regulating measures remain uncertainty.

4.25.2 Production and sales

In Spain, the production of aquatic products from fisheries decreased in 2012, but the obtained products from aquaculture increased. The reached production in aquaculture sector in 2012 was 271,270 tonnes, which means a decrease of 2% from the last year. Previous years Spain did not offer data for production due to there were not conversion factors to convert the units for restocking into kg. Anyway, the data of production for human consumption from EUROSTAT shows a production of 253,153 tonnes in 2008; so in this period of time this figure has increases a 7%.

The production in 2012 corresponds mainly to marine aquaculture (fish and shellfish), and only 7% is freshwater aquaculture. Besides, the marine aquaculture is represented by shellfish and just 16% of the total production is marine fish. By far the biggest sector of the Spanish aquaculture in terms of production is mussel, which represents 74.5% of the total weight.

Among the fish, Spain produced in 2012 seabream and seabass as the main marine species and the rainbow trout in freshwater; the three of them represent the 75% in the total fish weight production. But there are other species cultivated in Spain less representative in terms of weight but important in terms of value and and in terms of diversification in the aquaculture outlook: turbot, Atlantic Bluefin tuna, with high value, Senegalese sole, blackspot seabream, and meagre. Freshwater aquaculture goes on keeping constant in a lower level than 10 years ago; here the sturgeon must be mentioned as a drive in freshwater diversification.

Table 4.25.1 Production and sales for Spain: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)				***276.9***	***271.3***	*-2%*	
Marine				44.9	44.0	*-2%*	
Shellfish				213.4	207.7	*-3%*	
Freshwater				14.3	18.9	*32%*	
Hatcheries & nurseries				4.2	0.7	*-82%*	
Sales value (million €)	***462.6***	***440.0***	***469.6***	***504.3***	***482.3***	*-4%*	*3%*
Marine	253.5	234.2	271.7	281.6	314.6	*12%*	*21%*
Shellfish	124.1	116.4	111.2	110.8	90.4	*-18%*	*-22%*
Freshwater	73.4	52.7	45.9	24.0	56.5	*136%*	*15%*
Hatcheries & nurseries	11.5	36.7	40.8	88.0	20.8	*-76%*	*-53%*

Source: EU Member States DCF data submission

Among the shellfish, apart from the commented importance of mussel, there are other species cultivated as oysters, or clams. There are also smaller productions or even experimental of octopus and queen scallop among others

The turnover for that volume of production is 482.3 million Euros in 2012, decreasing more than 4% compared to 2011, the highest value of the data set. In the opposite with the weight in the percentage of shellfish, in the total turnover, the 65% comes from finfish salt water and only the 18% comes from mussel and other molluscs. In 2012, sea bass and sea bream value resulted the 42% in total Spanish aquaculture.

4.25.3 Industry structure and employment

In 2012 the number of enterprises is 3,032, which represents a slight decline compared with the previous years. These companies operate a number of 5,312 aquaculture establishments, most of them are rafts for mussels and culture parks for bivalves; 179 of these establishments operate in freshwater aquaculture and 4,953 in marine and brackish aquaculture, showing the different relevance of the two subsectors.

The small firms, with less than 5 employees, dominate the Spanish aquaculture sector, with the 74% of all of them. This number increases along the periods, in detriment of larger companies, resulting most of them small familiar units. This has special importance in mussel aquaculture, where there are few companies and lot of self-employed people, each one of them own two or three rafts as an average. In the considered years the number of companies with more than 10 employees has reduced, increasing the small firms; this has consequences in other parameters, like number of employees, temporary jobs and salaries costs.

Table 4.25.2 Structure of the Spanish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*3,101*	*3,105*	*3,066*	*3,059*	*3,032*	*-1%*	*-2%*
<=5 employees	2,028	1,976	2,127	1,914	2,269	*19%*	*13%*
6-10 employees	714	767	516	372	506	*36%*	*-15%*
>10 employees	359	362	423	773	257	*-67%*	*-46%*
Employment (number)							
Total employees	26,322	28,882	27,907	27,180	19,892	*-27%*	*-28%*
Male employees	18,344	20,692	19,852	19,799	13,670	*-31%*	*-31%*
Female employees	7,978	8,190	8,056	7,381	6,222	*-16%*	*-21%*
FTE	6,612	6,176	6,377	6,639	5,743	*-13%*	*-11%*
Male FTE	5,124	4,852	4,995	4,971	4,401	*-11%*	*-12%*
Female FTE	1,488	1,324	1,381	1,668	1,342	*-20%*	*-8%*
Indicators							
FTE per enterprise	2.1	2.0	2.1	2.2	1.9	*-13%*	*-10%*
Average wage (thousand €)	25.0	17.8	20.9	20.5	22.5	*10%*	*7%*
Labour productivity (thousand €)	15.2	15.3	27.3	26.8	20.3	*-24%*	*-4%*

Source: EU Member States DCF data submission

The number of employees in Spanish aquaculture is 19,892 in 2012, having suffered a decrease comparing with the previous year. The variation in FTE figures shows a fall in this parameter of 13%. This is an important fall, considering than it had remained constant since 2008.

In Spanish aquaculture 41% of the total FTE is self-employed people, over all in the subsector of mussel and clams farming. It is this segment where the fall in the number of people working is more accentuated, as it corresponds with the production drop.

The 69% of the employees are male and also the 77% of FTE. However, female contribution in aquaculture has decreased into a lighter way (8% in the period 2008-2012 in terms of FTE) than in the case of male FTE (12%), being in 2012 the highest percentage of women workers since 2008. The gender distribution of FTE shows that 3.1 men and 4.6 women are needed to get a full time worker, which shows a low level of stability. Average FTE per firm in 2012 has the lowest value in the series. After the increase in labour productivity in the last 2 years, the result for 2012 reveals a reduction of 24% in this indicator.

In the different segments the structure is different, being the mollusc farming where there are more self-employed people, more seasonal work and also more unpaid labour. The fish farms, which are larger companies, are more constant in the number of employees and they are more qualified.

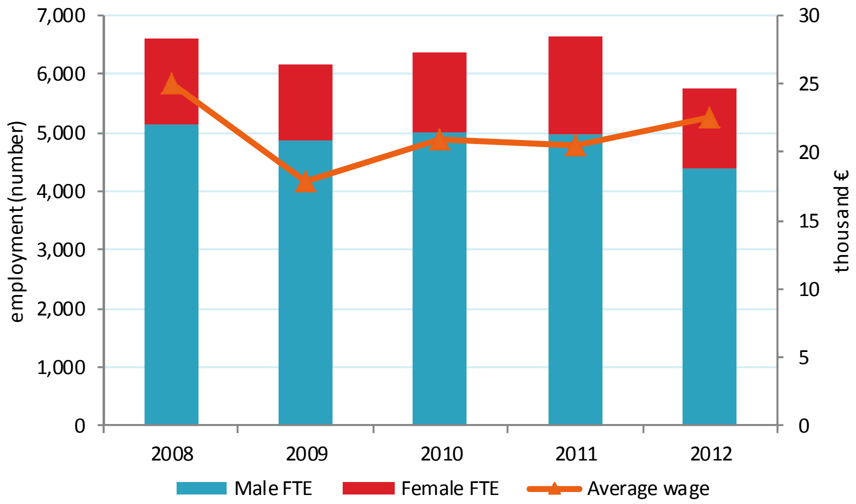


Figure 4.25.1 Employment trends for Spain: 2008-2012.

Source: EU Member States DCF data submission

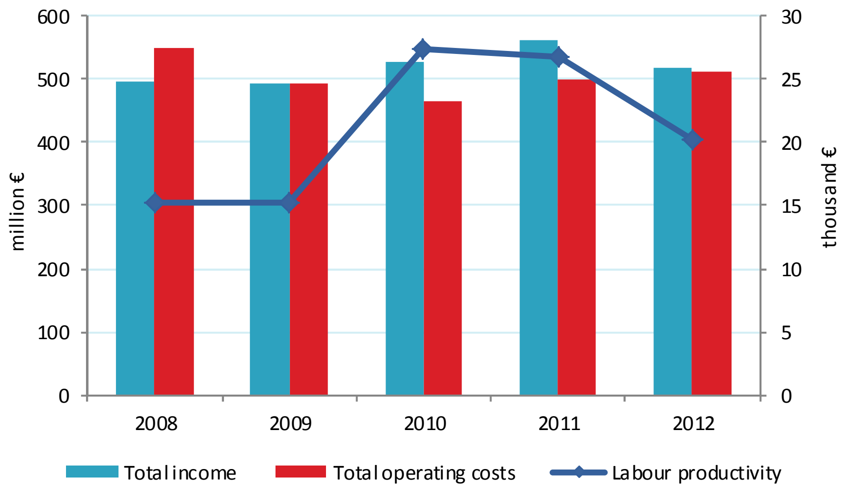


Figure 4.25.2 Income, costs, wages and labour productivity trends for Spain: 2008-2012.

Source: EU Member States DCF data submission

4.25.4 Economic performance

The turnover in 2012 has decreased a 4% respect to 2011, breaking the trend for growth in production and sales that the Spanish industry experienced during 2010 and 2011 after the collapse suffered in 2009. However, its comparison with the average during the period 2008-2011 shows and industry turnover recovering of a 3%, which confirms still a positive trend in the medium term. Almost the 93% of the Spanish aquaculture income comes from sales turnover, which represents an increase respect to 2011, when the turnover represented the 90% of the income. This increase is derived from a significant reduction of nearly the 60% in other incomes. This suggests that during 2012 the aquaculture production industry has decreased their operations in other activities different from aquaculture production as fish processing or fish trade, and has been concentrated in aquaculture production, which is its main activity. This focus on fish and shellfish production means that the profitability of the industry depends on the capacity of the companies to develop efficiency farming processes not only in terms of production indicators, but also in terms of economic ones. Direct subsidies account only for a 4% of total income, what is a decrease of 5% respect to the previous year and represents a turning point in the last four years trend. Although the amount has decreased between 2011 and 2012 in absolute terms, its relevance on total income remains is a 14% higher compared with the average subsidies during the period 2008-2011.

Table 4.25.3 Economic performance of the Spanish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	462.6	440.0	469.6	504.3	482.3	93%	-4%	3%
Other income	21.7	36.4	36.3	36.2	15.1	3%	-58%	-54%
Subsidies	11.4	16.3	20.5	20.7	19.7	4%	-5%	14%
Total income	*495.8*	*492.8*	*526.4*	*561.2*	*517.1*	*100%*	-8%	0%
Expenditures (million €)								
Wages and salaries	97.4	87.3	94.1	99.3	94.4	18%	-5%	0%
Imputed value of unpaid labour	67.9	22.9	38.9	37.0	34.8	7%	-6%	-16%
Energy costs	13.3	23.2	22.6	27.1	24.4	5%	-10%	13%
Repair and maintenance	13.6	16.1	15.6	13.9	12.9	2%	-7%	-13%
Raw material: Feed costs	96.8	118.0	116.0	123.2	143.7	28%	17%	27%
Raw material: Livestock costs	152.9	115.4	65.1	82.3	80.3	16%	-2%	-23%
Other operational costs	106.9	109.4	112.5	116.0	119.7	23%	3%	8%
Total operating costs	*548.9*	*492.2*	*464.7*	*498.9*	*510.2*	*99%*	2%	2%
Capital Costs (million €)								
Depreciation of capital	12.7	43.0	40.9	40.4	34.1	7%	-16%	0%
Financial costs, net	-23.7	-18.4	-16.8	-17.1	-16.6	3%	3%	13%
Extraordinary costs, net	15.4	-2.3	4.8	2.3	0.7	0%	-71%	-87%
Capital Value (million €)								
Total value of assets	958.5	724.7	854.6	736.7	907.0	175%	23%	11%
Net Investments	42.4	26.3	11.7	27.7	16.7	3%	-40%	-38%
Debt	469.8	441.4	476.6	358.5	429.3	83%	20%	-2%
Input & Production (thousand tonnes)								
Raw material: Feed	154.2	127.5	122.3	166.1	176.1		6%	24%
Raw material: Livestock				24.8	21.0		-16%	-16%
Performance Indicators(million €)								
Gross Value Added	100.8	94.4	174.2	178.0	116.4	23%	-35%	-15%
Operating cash flow	-53.1	0.6	61.7	62.3	6.9	1%	-89%	-61%
Earning before interest and tax	-65.7	-42.4	20.8	21.9	-27.2	5%	-224%	-66%
Net profit	-42.0	-24.1	37.6	39.0	-10.6	2%	-127%	-506%
Capital productivity (%)	10.5	13.0	20.4	24.2	12.8			
Return on Investment (%)	-6.9	-5.9	2.4	3.0	-3.0			
Future Expectation Indicator (%)	3.1	-2.3	-3.4	-1.7	-1.9			

Source: EU Member States DCF data submission

Operational costs show particular structures across species, but at the aggregated level three factors represents the 62% of the total operational expenditures in 2012; wages and salaries, feed cost and livestock cost. Labour cost represents the 18% of the operational cost in 2012 and has decreased a 5% respect 2011, but it remains stable comparing with average cost during the period 2008-2011. When it is considered the imputed value of the unpaid labour, the labour cost increase until represent the 26% of the operational cost. In a context of employment reduction as it showed in table 4.25.2, the stability in the labour can be understood as a change in the characteristic of the labour force in the Spanish aquaculture industry. Actually there are less employees but with a higher qualification. The higher average wage that they perceive compensates the reduction in the wages and salaries expenditure in absolute terms. This change in the labour force structure is motivated by the changes in the industry structure, where more and more, extensively and semi-intensively aquaculture activities are substituted by intensive productions that requires less employment but more qualified and less seasonal. All the above ends in more skilled workers under better employment conditions as was discussed in detail in the employment section. Livestock cost represents in 2012 the 16% of the operational cost in the aquaculture industry. The decline in fish production has been a trend in recent years that can be used to explain in part the decrease in expenditure of livestock purchases that again in 2012 decrease a 2% respect 2011, and what is more significant, a 23% comparing with the average cost during the period 2008-2011. Also, the higher percentage reduction in livestock quantities supplied to the industry (16%) than in its value (2%) indicates an increase in the average price of the livestock purchased during 2012 respect to 2011. The main cost in the Spanish aquaculture industry is the feed, which represents the 28% percent of total expenditures. The quantity of feed supplied to fish grew a 6% in 2012 while the value of the feed purchased during 2012 was a 17% and a 27% higher than in 2011 and the average during 2008-2011 respectively. The comparison between the evolution of the feed quantity consumed and its value shows a significant increase in feed prices. This positive trend in feed prices is the result of an increase at international markets in the price of the raw materials used in the production of fish feed. Furthermore, the advantages from the industry efforts that have allowed the substitution of fish protein by vegetable raw materials in feed production have been reduced since also the price of vegetable raw material has grown.

Capital costs include depreciations, financial costs and extraordinary costs. Depreciation of capital goods has decreased in 2012 for the first time since 2009, as it was reduced in a 16% respect the previous year. This may indicate that aquaculture firms have renewed part of their equipment's with the improved returns obtained during 2010 and 2011. Net financial costs are still negative but have increased by 3%. It is difficult to draw a single cause, but one of the drives of this situation can be the availability again of credits for businesses combined with the reduction in interest rates that helped to the development of new investments and as a consequence, an increase in the level of debt at the industry. Finally, extraordinary costs represents in 2012 less than 1% of the financial cost. The available data do not allow to provide a properly explanation of their origin. However, the particular nature of these cost, associate with circumstances that are not related with the normal activity of the company, helps to explain the absence of a clear trend during the period analysed.

The increase in the total value of assets can have its origin in two main issues. On the one hand, it can indicate that investments in equipment have been undertaken during 2012. This is consistent with the decrease in depreciation of capital and with the decrease in the number of enterprises, particularly the large ones, which rules out that the increase in the value of assets mainly comes from the establishment of new enterprises in the industry. However, the evolution of net investment that has decreased a 40% in the last year does not allow to confirm what the previous indicators suggest about the evolution of capital investments. This suggests that much of the value of assets gained during 2012 can have its origin in the variation of the livestock value. Unfortunately, with the available data it cannot be confirmed which part of this increase in the total value of assets comes from an increase in the fixed assets that are used in the production processes or from a change in the quantity and value of livestock.

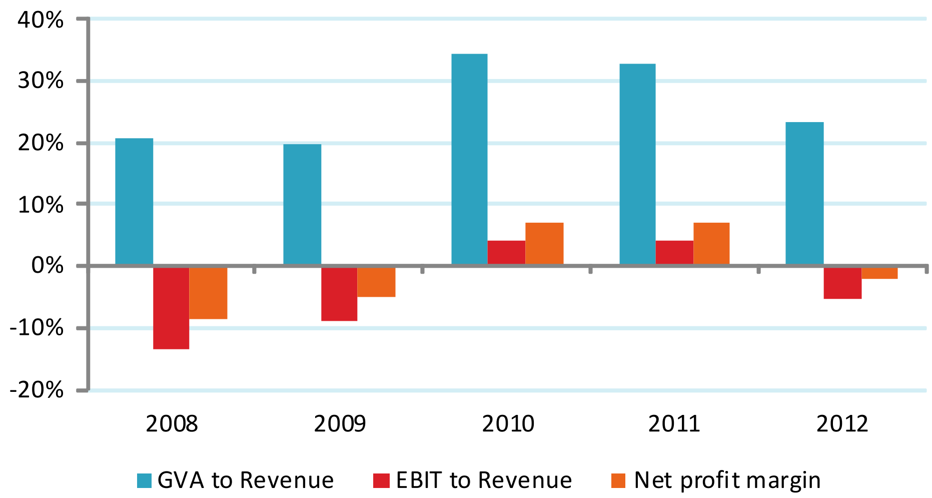


Figure 4.25.3 Economic performance for Spain: 2008-2012

Source: EU Member States DCF data submission

After a short recovery in Spanish aquaculture during 2010 and 2011, the performance indicators suffered a generalized and significant decrease in 2012 that in some cases fell into negative and that can be summarized in a turning point for the industry, which changed from positive to negative economic performance. The most relevant indicators for analysing the performance of a company or industry are EBIT and net profit. It can be seen in table 4.25.3 that between 2011 and 2012 both indicators change from positive to negative values when they decreased a 224% and a 127% respectively just in one year. Although GVA decrease from 178 million Euros to 116 million Euros mainly to the reduction in the income and the increase in the feed cost, it remained in positive result. However, when the labour cost was considered in the calculations, the EBIT went from 21.9 million Euros in 2010 to -27.2 million Euros in 2012 and net profit showed also a strong decrease from 39 million Euros to -10.6 million Euros. When considering a relative measurement as is the Return on Investment ratio, it is confirmed a decrease from a 3% in 2011 to a -3% in 2012. That means than in average during 2012 the economic performance of the assets of the Spanish companies have been negative, or in other words, for each 100 Euros of investment made in the companies, were lost three euros. Considering this, and regardless of how the activity was funded and what was the financial cost, the activities developed by the Spanish aquaculture industry were not profitable.

4.25.5 Main species produced and economic performance by segment

By far Mediterranean mussel goes on been the main harvested species in Spain, 75% of total production. It is mainly produced in Galicia in rafts, but it is also cultivated in Cataluña. Also it is important to mention that its value is just the 20% of the total. This is a species which production depends on the environmental conditions, suffering big fluctuations into different years.

When talking about marine fish, seabream is the main harvested species in Spain, with 17,331 tonnes in 2012, 11.5% more than 2011. With these figures it is seen the same change of trend than in other Mediterranean areas; after 3 years of falling, there have been a recovery in 2012.

Seabass is the second marine fish cultivated in Spain, with 14,455 tonnes in 2012, which had the opposite trend to seabream, decreasing its production a 10%. However, seabass gets first position in terms of value, with the 22% of the total. Both of these species are concentrated in Mediterranean coast. The Atlantic Bluefin tuna, with only nearly 3,000 tonnes, gets a turnover of 59 million Euros.

Figure 4.25.4 Main species in terms of weight and value in Spanish production: 2012.

Source: EU Member States DCF data submission

In freshwater aquaculture rainbow trout is the main species; in 2012 its production was 16,300 tonnes, a similar figure to 2011, but with a fall of 5% in its value. In the group of molluscs in Spain there is also a traditional ways of aquaculture, like the clams cultivated in the intertidal areas; their production is dominated by Ruditapes philippinarum; these are a kind of aquaculture with a high social value in the areas which it is concentrated.

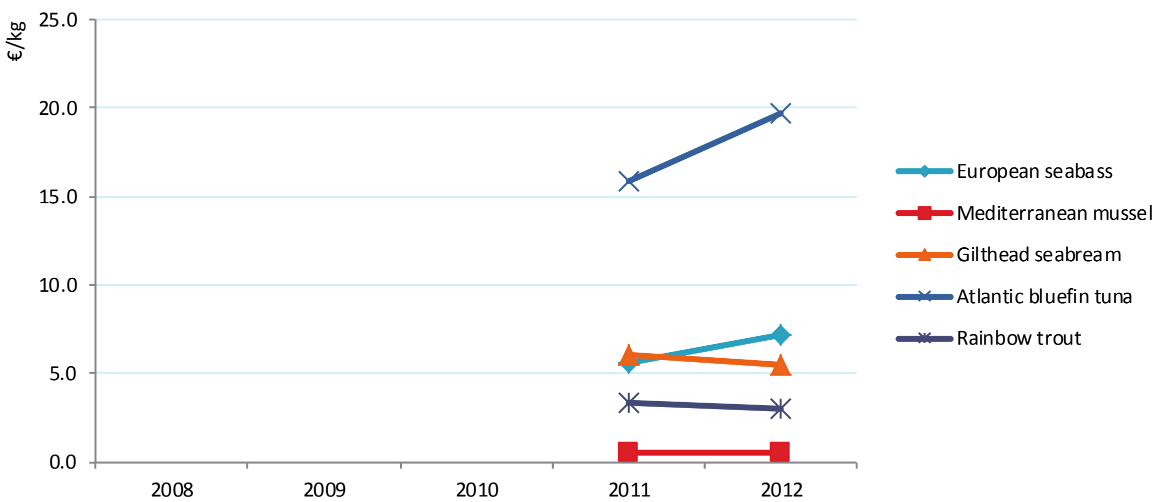


Figure 4.25.5 Average prices for the main species produced in Spain: 2008-2012.

Source: EU Member States DCF data submission

The most relevant segments in the Spanish aquaculture are analyzed below.

Segment 1: Sea bass and sea bream in cages

These species production reaches 29,384 tonnes in 2012, with a drop of 8.7%, comparing with 2011, but at the same time, there is an increase of its value in the same period. These species are cultivated in Mediterranean coast of Spain in warm waters (Andalucía, Murcia and Canary Islands for sea bass and Valencia for sea bream). There are hatcheries and nurseries which cultivate the juveniles, which later will be grown in cages in the sea. Spain produces juveniles, although part of them is imported from other countries.

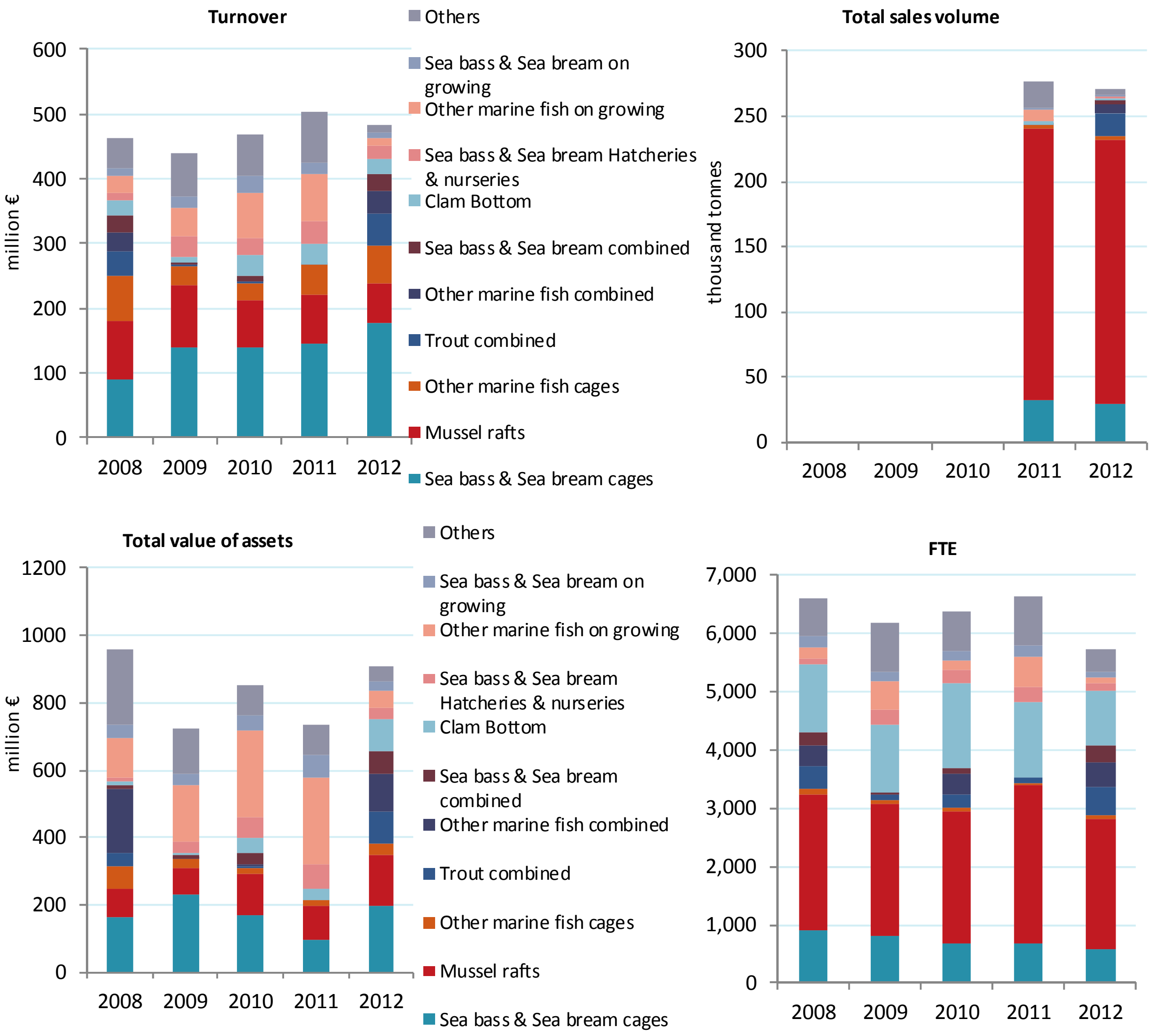


Figure 4.25.6 Structural development of Spanish aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

The number of companies has been suffering a reduction process since 2008, from 59 firms to 33 last year, but the average size of the companies has grown. Also the number of people working in this segment has been reduced, although in more percentage than the FTE, which suggests more stability in the employment.

A part from some production developed in brackish waters in southern Spain, the majority of the domestic sea bass and sea bream production is grown in cages. This segment generated the 42% of the total income of the industry in 2012, what makes sea bream and sea bass the most important species in terms of value. This relevance makes more important the fact that this segment of the industry is the least efficient of the four segments described here. Although the total income grew a 14% between 2011 and 2012 from 165.8 million Euro to 188.9 million Euro, all the other economic indicators show a worsening in the economic situation and in the economic performance during 2012. After two years in which the economic results showed an improvement despite been still negative and generated positive expectations for achieve positive performance in the short time, the new decline in the economic indicators ends with these expectations. During the last decade, there had been a big volatility in sea bream and sea bream markets that led many companies to bankruptcy. Then, the negative evolution of the economic indicators in 2012 seeded new doubts about if the 2012 results were just circumstantial or if they were a real change in the positive trend and the beginning of a new recessionary cycle.

The figure 4.25.7 clearly shows how the total operating cost during 2011 and 2012 were over the total income, what resulted in a negative net profit margin. The particular operational cost structure of the sea bass and sea bream industry helps to explain the negative evolution of the GVA since 2010. Like the other fish farming activities, feed cost is the most important cost, followed by other operational costs not specified and livestock purchases. The feed cost in the sea bass and sea bream segment in Spain grew from the 40% of the total operating cost in 2011 to the 44% of the total in 2012. The increase in feed prices and its relevance in the cost structure of these companies were the main drivers of the negative performance results and the change in the trend of the economic indicators. As an activity intensive in capital, labour costs are less important than in other extensive aquaculture productions as the case of the mussel industry in Spain. Particularly, wages and salaries represent the 10% of the total cost, what implies a reduction respect to 2011, when the labour cost represented the 12% of the total cost.

Segment 2: Mussel in rafts

The mussel industry in Spain, most of it concentrated in Galicia, represented the 75% of the total Spanish aquaculture production in terms of quantities and the 20% of the value in 2012, considering that the average price of this product is significantly lower than the main fish produced in Spain. Being a species which depends on natural conditions, its annual production reflects high fluctuations; in 2012 suffered a decrease of 2% from 2011, but it was still higher than in 2010, when red tides closed the production areas for long periods..

This is the biggest segment in terms of employment, with 2,221 FTE, which in 2012 is in similar levels to 2009 and 2010. It is needed 4 people to reach a full time job, which suggest it is a sector where there are a lot of people working a part of the year; most of them are self-employed workers; so the small familiar units are the base of this segment.

In this context, and as in 2011, the mussel industry was the most profitable of the four segments analysed during 2012. The mussel industry GVA was positive in all the years analysed and the EBIT and net profit have been positive since 2009. Although all the economic indicators have a positive value it is necessary to highlight the negative evolution of all the indicators between 2011 and 2012. The reduction of a 21% in the total income has not its origin this time in production cuts caused by environmental problems, but it comes from a reduction of 23% in the ex-farm prices. It is not easy to find an explanation for this price reduction but probably it was caused by the increase in the amount of mussels supplied to the canned industry where the ex-farm prices obtained by the mussel producers are lower. The economic indicator EBIT and the net profit also had a significant reductions of the 30% between 2011 and 2012.

The operational cost structure of this extensive aquaculture activity really differs from the observed in the other segment analysed. Different from fish farming where feed is the main cost and labour cost is under the 20% of the total cost, in the case of the mussel industry there is no feed cost, but as a low investment capital activity, labour cost is the most relevant operational cost. While the GVA, which does not consider the labour cost, is the 70% of the total income, the EBIT, in which the labour cost is considered, falls to the 26% percent of the total income in 2012. The relevance of labour cost is confirmed in the Figure 4.25.8 in which can be observed that the wages and salaries represented the 18% of the operational cost, but what is more relevant, the imputed value of unpaid labour was the 41% of the total operational cost.

Segment 3: Other marine fish in cages

This segment is difficult to analyze due to the differences between the species considered in it. In this segment it is included mainly the Atlantic Bluefin tuna fattened in cages, with a production of 3.000 tonnes, in Cataluña, Murcia and Andalucía. It employs 169 people, with higher qualification than in other subsectors and a higher employment stability during the year.

Similar to the sea bass and sea bream segment, in the case of fish production in sea cages, the evolution of the total income was positive in the last year analyzed, but the rest of the economic indicators registered a negative evolution. However, different from sea bass and sea bream, the profitability and the economic performance of the species considered here were positive in 2012, mainly due to the high profitability of the Atlantic Bluefin tuna captured based aquaculture. Regarding the cost structure, this segment analyses shows the common fish farming structure in which the main cost are feed, livestock and other operational cost. In 2012 this three factors of cost amount the 79% of the total operational cost.

Table 4.25.4 Economic performance of main Spanish aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Sea bass & Sea bream cages								
Total income	105.4	157.6	159.1	165.8	188.9	100%	14%	29%
Gross Value Added	-13.2	5.5	23.2	15.2	12.2	6%	-20%	59%
Operating cash flow	-32.0	-17.1	3.6	-1.2	-3.6	2%	-206%	69%
Earning before interest and tax	-35.5	-30.7	-7.6	-11.1	-14.2	7%	-28%	33%
Net profit	-29.6	-24.0	-1.5	-5.8	-8.4	4%	-45%	45%
Total sales volume (thousand tonnes)				32.2	29.4		-9%	-9%
Mussel rafts								
Total income	94.0	106.4	83.2	81.6	64.6	100%	-21%	-29%
Gross Value Added	32.4	67.2	46.9	57.8	45.4	70%	-22%	-11%
Operating cash flow	-36.1	45.8	22.4	28.5	18.6	29%	-35%	23%
Earning before interest and tax	-37.1	40.5	15.8	24.2	16.9	26%	-30%	56%
Net profit	-34.2	43.3	18.2	23.8	16.7	26%	-30%	31%
Total sales volume (thousand tonnes)				208.0	202.1		-3%	-3%
Other marine fish cages								
Total income	68.6	29.2	25.3	45.5	59.5	100%	31%	41%
Gross Value Added	28.3	11.0	7.0	22.2	14.4	24%	-35%	-16%
Operating cash flow	23.5	8.5	3.9	17.4	7.8	13%	-55%	-41%
Earning before interest and tax	22.1	7.7	2.9	16.3	6.3	11%	-62%	-49%
Net profit	24.2	7.9	3.7	18.4	10.2	17%	-45%	-25%
Total sales volume (thousand tonnes)				2.9	3.0		4%	4%
Trout combined								
Total income	38.7	2.5	3.2	2.2	50.6	100%	2189%	334%
Gross Value Added	12.6	0.9	0.9	0.9	7.2	14%	694%	89%
Operating cash flow	2.9	0.5	0.3	0.5	-3.5	-7%	-755%	-428%
Earning before interest and tax	2.6	0.3	0.1	0.5	-6.9	-14%		-877%
Net profit	3.3	0.4	0.2	0.5	-6.6	-13%	-1491%	-714%
Total sales volume (thousand tonnes)				0.5	17.7		3237%	

Source: EU Member States DCF data submission

__Segment 4: Trout combined__

This segment represents the freshwater aquaculture in Spain, with the rainbow trout as nearly the only cultivated species. There are establishments dedicated to this specie in nearly all the Spanish regions, hatcheries, nurseries and farms to grow fries. The number of FTE in this sector represents the 9% in Spanish aquaculture. When studying the figures in this segment, the high variations between 2012 and previous years must be interpreted as a change of some companies in different segments, depending on the culture phases.

Figure 4.25.7 Economic performance indicators for the main Spanish segments: 2008-2012.

Source: EU Member States DCF data submission

Regarding the data for 2012, trout production obtained the lowest GVA of the four segments considered in this analysis. The other indicators indicates a negative performance in the production of trout in Spain in 2012, since both, EBIT and net profits were negative at 6.9% and 6.6% respectively. As in the other fish productions considered, the main operational cost is feed that in 2012 achieved the 31% of the total cost production. Compared with the other fish productions the proportion of feed cost is lower in the case of trout, representing the 23% of the total, but the livestock and the labour cost are higher, with the 23% and 19% respectively.

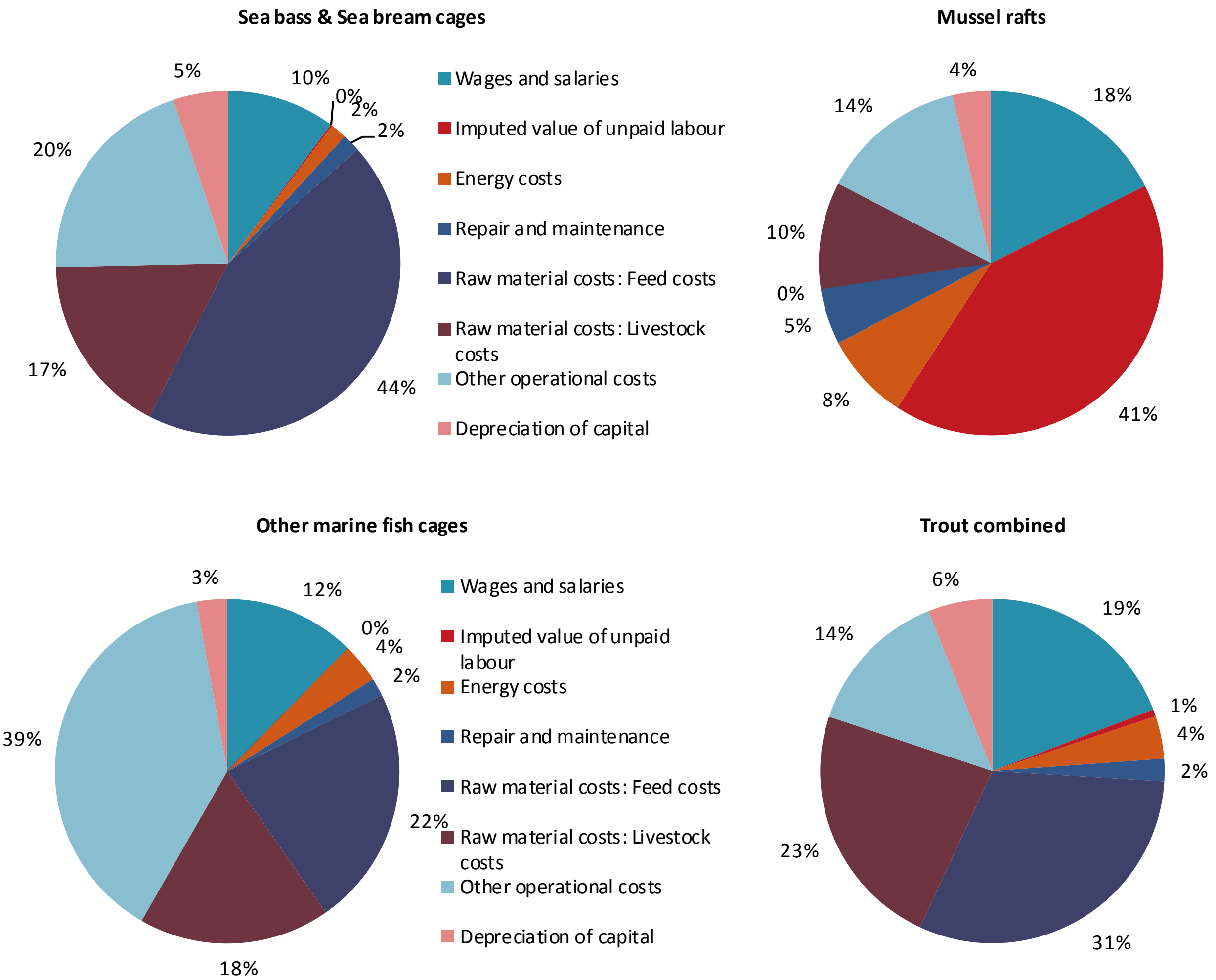


Figure 4.25.8 Cost structure of the main segments in Spain: 2012.

Source: EU Member States DCF data submission

As was noted before, feed prices have followed a positive trend in fish farming during the last years, especially in 2012, what has strongly contributed to the negative economic results obtained in the Spanish aquaculture industry last year. In the case of the livestock price, there was a significant increase in all the segments considered, as can be observed in Figure 4.25.9.

Figure 4.25.9 Feed and livestock prices for the main Spanish segments: 2008-2012.

Source: EU Member States DCF data submission

4.25.6 Trends and triggers

Current production trends and main drivers

The drive in Spanish aquaculture is bases in CFP, in EMFF and in the strategic guidelines publishes by Commission in April 2013, and which have the target to boost the Member States to define their own national targets through their strategic plans. The guidelines go towards four priority areas:

1. Simplification of administrative procedures and reducing the period of authorization of new fish farms.
2. The coordinated spatial planning to overcome the negative effects of the lack of space.
3. Strengthening the competitiveness of EU aquaculture.
4. The promotion of fair competition.

The Spanish multi-year strategic plan for Spanish aquaculture 2014- 2020 highlight important areas for future development and growth of production and technological advancement processes:

1. To simplify administrative procedures and the normative frame for the activity: Spain must try the homogenization of the strategies in its 17 autonomous communities, which at present have different competencies and normative in the activity regulation. Here it must be mentioned the

attention to the potentiality in off-shore aquaculture since the administrative point of view and the conflicts solution in the interaction with other marine users.

2. Increase production, stressing the integrated coastal zone management and the identification of adequate areas for the aquaculture development: It must be highlighted the importance of the strategic plans in aquaculture in order to encourage the investment in new sites with technologies that allow a better use of the space and a better access to the water.

   Location for sites for the freshwater aquaculture development presents now less problems than in past years due to the cessation of activity of a large number of establishments, over all in the last five years. Moreover, the use of Recirculating Aquaculture Systems (RAS) allows to cut off water consumption, and this controlled atmospheres have stimulated the location of new facilities in unconventional areas for certain aquaculture productions.

   An example is a facility sited in Valladolid dedicated to the cultivation of whiteleg shrimp that is far from the sea. The site location decision was based on economic (cheaper land) and logistic (good communications, proximity to major wholesalers and consumer markets) factors and on incentives to innovative investments.

3. Strengthening competitiveness through R & D and training of professionals, ensure technology transfer to the industry and advance in animal welfare, prevention and eradication of diseases.

   In Spain there are very good research aquaculture groups, although their researches must be transferred to industry and productive sector. Examples of these researches are: the Spanish Institute of Oceanography (IEO) is working with the cultivation of hake; they are focused in the two big problems: reproductive dynamic and feed in first stages, with important and positive results. Also in Murcia a group of researches is working to close the cycle of Atlantic Bluefin tuna and in Andalucía there are advances for the integral culture of new species. In relation to the articulation of instruments for the control and prevention of diseases affecting the aquaculture sector, the Institute of Agricultural and Fisheries Research and Training (IFAP) located in Huelva develops investigations about pathological and physiological processes in molluscs and fish. They are aimed at improving animal welfare in fish farms, as well as the development of protocols for the diagnosis and prevention of diseases and pathogens in farming systems. There are also interesting developments for the selection of individuals for resistance to certain pathogens in a given environment, getting longer survival in the animals. For example, in the research center IRTA (Catalonia) is achieved in collaboration with the sector, the production of oyster seeds free of herpes virus in order to have a production of this species which will be adapted to local environmental conditions.

4. Improving the profitability and sustainability of the sector through the diversification of species and improved performance in feed.

   Diversification can satisfy the demand of seafood products that are not always available from fisheries. It also decreases the risk of investing in monocultures and the reliance on market evolution. In that sense it is a tool for profitability. In Spain sole, blackspot sea bream and meagre are the species most exploited in terms of diversification. In the case of sole (*Solea senegalensis*) almost the entire process is controlled, and as for blackspot sea bream are being overcome bottlenecks in reproduction and in obtaining specific feed. Another promising species is wreckfish (*Polyprion americanus)*, which is a high valorized species. This diversification is not only associated with new species, but also with new products, directed to different market niches; for example sturgeon caviar or trout caviar.

   Most of these species share the problems that create bottlenecks in food, especially in the larval stage, and feed conversion factors. Thus efforts should be directed to the search for substitutes for fish meal and oil, more efficient alternative formulations and ingredients, such as fish waste silage and vegetal meals, which reduce some of the costs of the inputs.

5. Ensure the supply to markets and improve the image of aquaculture products.

   To do this there are developing marketing plans to consider the needs and perspectives of market development and promotional campaigns of aquaculture products.

Market structure

Spain is the largest market for seafood in the EU and one of the biggest in the world. Local seafood operators, whether producers or processors, have to face a keen competition and turbulence increased by the end of 2012 with the collapse and bankruptcy of the Spanish multinational Pescanova, which affected the supply and prices of different farmed and wild species. Spanish farmers face competition not only from other aquaculture producers from inside and outside the EU, but also from popular wild species like hake and cod fish whose supply has increased in the last years and the prices fall until reach levels even cheaper than the main farmed white fish species like bass and bream. The rise in the retail price of bass and bream experienced in the previous years may have a negative impact in demand and may cause stagnation of the production in the following years. It is also expected that the supply of turbot will constrain due to potential financial issues in some of the farms owned by Pescanova.

Identification and differentiation of farmed products in the marketplace has improved along the previous years, there are still issues of confusion and mislabelling. Efforts in product differentiation undertaken by producers still don’t reach the marketplace in sufficient amount to have a positive effect of product appraisal and price. Under these conditions price appears as the main competitive tool, and the volumes of supply as the main drivers for price. These conditions put domestic farmers, especially in the finfish segment, vulnerable to the pressure of species with lower market prices.

Issues of special interest

The top production in Spain remains in the same species cultivate during the last years; the high level of diversification initiated ten years ago has been reduced in some of them, which now has the technology, the management knowledge and its market; they have consolidated productions and growth perspectives. Anyway the high diversity of environments in Spain for the aquaculture increases the possibilities for diversification.

The existence of high qualified groups of research in Spain in several fields (new species, feed factor conversion, diseases) and important consolidated fishery sector, which can transfer technology and skilled workers to aquaculture, must be an advantage to boost firms.

Setting up new business will be stimulated with a simplification of administrative procedures, which at present are so complicated than discourage the new investment and with a correct spatial management for the different uses.

Outlook for 2013 and 2014

Spanish aquaculture is suffering a stagnation process, in spite of the increasing demand in seafood products. In marine production, sea bass and sea bream go on been the first productive species. In 2013, sea bream decreases its production, comparing with 2012; although the community of Valencia remains being the leader, its production suffered a significant decrease. However, sea bass production increases slightly with respect to 2012. Other important cultivated fish in Spain, turbot, has less production than in previous years and it is not waited a comeback in a short term. Meagre has an enormous reduction and the expectative is very negative, with a real risk of disappearing from the Spanish aquaculture outlook.

Sole and blackspot bream continue their growth; the first one has an increasing trend, which looks to continue and the second one, with only one company working with it, although it is accepted by the market, it will remain in the same level it is now.

Mussel in Galicia is being severely affected in 2013 and 2014 for the red ties and, although this mollusc is cultivated also in Catalonia, Andalucía, Baleares and Valencian Community, 95% is extracted from the Galician coast. Now it is difficult to do long term prediction. The second mollusk species in Spain is oyster, which has good perspectives for next years, thanks to different researches to prevent high mortalities. The production of these molluscs, whose seeds are mostly imported from other countries, will depend on the support to new hatcheries.

Small and innovating companies exist in the national scene and while they are not important in total volume, they can be significant in local economies; that is the case of an abalone farm, located in Galician coast, with expectative of growing. In freshwater aquaculture, rainbow trout remains a slight recovery in 2013 and probably in 2014, although new regulating measures remain uncertainty.

4.25.7 Data Coverage and Data Quality

Data quality

Spain has two surveys directed to the aquaculture sector. In 1999 the Activity Survey started, in order to get information about the activity of the aquaculture establishments, especially the species production with the different techniques and the employment of the sector; the economic information is collected with the economic survey since 2008.

Both surveys are programmed and developed at the same time, once a year, using the same population to research and with a common field work. The unit used as a population is the establishment for aquaculture. Each survey has its own questionnaire, getting information for different variables, except the value for the production (collected in both questionnaires). In this case, individual answers are checked and if there are inconsistencies, they are researched and the found mistakes are corrected. So the consistency between both surveys is guaranteed.

Data are collected with combined methods; in a part of the population it is used a census and in another part a stratified sampling. The sampling is used in the population of mussel in rafts in Galicia. The segmentation used in Economic Survey uses a typology of aquaculture establishments which is coherent with the established groups in Commission Decision 2010/93/UE.

If an enterprise produces more than one species, it has been allocated to the segment of the species with a higher turnover. When a company owns more than one establishment, it can uses different techniques. In Spain each establishment is the data collection unit, so because of the the data are sent aggregated in enterprises, when there are different techniques, the company is allocated where its turnover is highest again.This can cause a company can changes among different segments in different years.

Data availability

Data for the aquaculture sector is published once a year in Fisheries Statistics in Ministry of Agriculture, Food and Environment`s website at the end of the next year. Data can be consulted in this website in three different ways:

- Using a query builder, so that each user generates its own results

- With predefined tables of establishments, production, employment and food supply.
- Downloading the data base. In this case, queries are performed with Microsoft EXCEL program, by means of pivot tables previously generated by the system; in this case the user can perform a large number of queries.

Confidentiality

Public statistics law forces to protect data`s confidentiality supplied by informants. This law dedicates its chapter III to the statistical confidentiality, saying in any case, statistics cannot disclose personal data. This confidentiality protection forces even not to publish very disaggregated information to avoid identification of the informant. This has been respected in all moment, so the different segments provided in Spain have more than one enterprise.

Differences in DCF data compared with other official data sources

The Spanish data for DCF is in line with both value and production registered in FAO and EUROSTAT, because they come from the same sources. Anyway in previous years Spain sent data to FAO for human consumption (in tonnes) and hatcheries and nursery production of fries and juveniles to restock or to be grown in other establishment in thousands of units. As there were not conversion factors this information was not sent to DCF until 2010. Since that year, volume is sent to DCF summing up those productions in one figure.

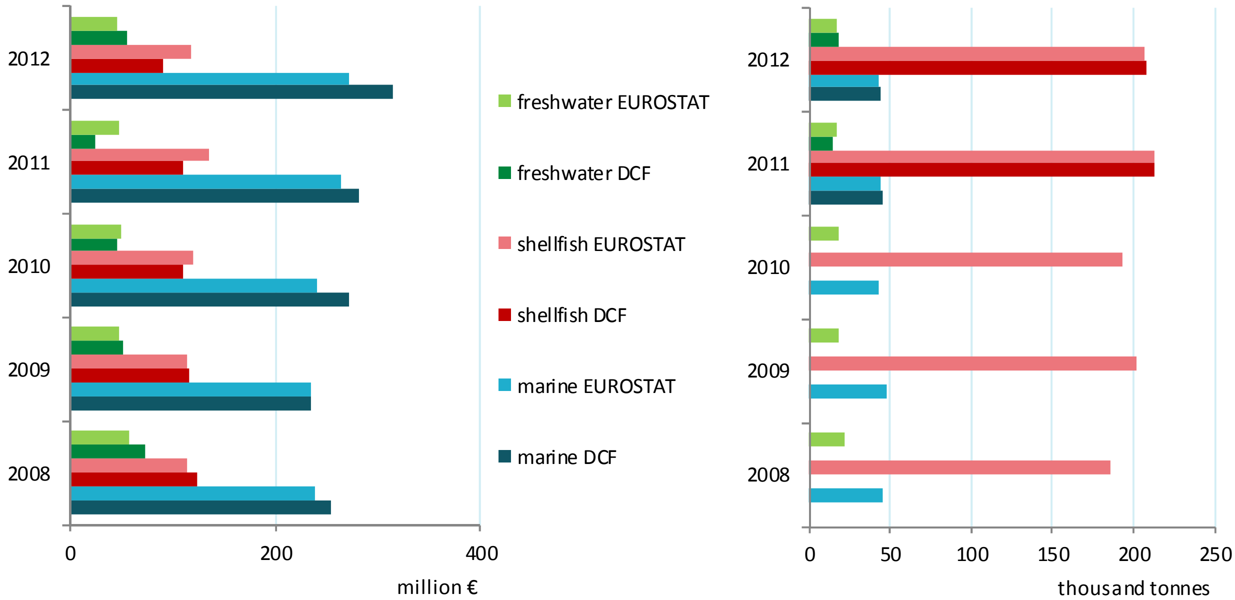


Figure 4.25.10 Comparison of DCF data with EUROSTAT data for Spain: 2008-2012

4.26 SWEDEN

4.26.1 Summary

Production volume and value

Over the years 1998 to 2012 production levels have increased from 5,500 tonnes in 1998 to 14,800 tonnes in 2012 and the value of total production have increased from 14.5 million Euros in 1998 to 49.8 million Euros in 2012. The change in production levels between 2011 and 2012 is an increase of 2 percent, which correspond to a total increase in value of 5 percent.

Overall industry structure and employment

In 2012, the total population of aquaculture farms was around 500, which was distributed on 174 enterprises. The Swedish aquaculture sector is dominated by small enterprises, and in 2012 78 percent of the Swedish enterprises had less than 5 employees.

Main segments

The production in Sweden is divided into four main segments:

- Segment 1: Freshwater fish in cages, Rainbow trout and Arctic char.
- Segment 2: Freshwater fish on growing, Rainbow trout, Arctic char on growing and Rainbow trout combined.
- Segment 3: Trout in cages and on growing Salmon.
- Segment 4: Shellfish, farming techniques long line (mussels) and shellfish farming techniques other (oysters, crayfish), almost entirely consisting marine species.

The most commonly grown fish in Sweden is Rainbow trout (*Oncorhynchus mykiss*) grown in cages for consumption. Species grown in cages are common both in freshwater and in marine waters, although species grown in freshwater are dominating. The average size of a cage is 1,330 m^3. Other production methods, such as ponds and raceways are used mainly for producing fish for stocking.

Current production trends and main drivers (Trends and triggers)

The Swedish aquaculture sector is experiencing an increase in the volume of production. The growth of Swedish aquaculture has been strong in the 2000s, averaging 7.7 percent annually between 2000 and 2012. Exports of fresh, chilled or frozen fish are mainly to other European countries, especially Finland and the Baltic countries. There is also a continuous high demand for fish for stocking related to recreational fishing.

Outlook

The significantly higher net import than net export implies a positive development for the Swedish aquaculture farmer. The aquaculture industry sees a positive future and there are several large applications for expanded and/or new permits for fish production. The difficulties facing the Swedish aquaculture sector are mainly related to regulations and difficulties of implementing new growing techniques at a commercial scale.

4.26.2 Production and sales

The production of Swedish aquaculture in 2012 was 14,800 tonnes of fish, dominated Rainbow trout which represented 84 percent of the total production. The production of Arctic char amounted to 1,849 tonnes, and production of cultivated Blue mussels was 1,308 tonnes. Production volumes for 2012 indicate an increase of 2% compared to 2011. The value of aquaculture production was 49, 8 million Euros in 2012, also indicating an increase with 5 percent compared to 2011 (Table 4.26.1).

Table 4.26.1 Production and sales for Sweden: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***8.9***	***10.4***	***11.7***	***14.5***	***14.8***	*2%*	*30%*
Marine			0.0	0.0	0.0		*0%*
Shellfish		2.1	1.4	1.5	1.3	*-11%*	*-21%*
Freshwater	6.3	8.2	10.3	13.0	13.5	*4%*	*42%*
Hatcheries & nurseries			0.0	0.0	0.0		
Sales value (million €)	***34.5***	***29.4***	***41.2***	***47.5***	***49.8***	*5%*	*31%*
Marine			0.0	0.0	0.0		*0%*
Shellfish		1.1	0.8	1.0	1.0	*4%*	*7%*
Freshwater	27.2	28.3	40.4	46.5	48.7	*5%*	*37%*
Hatcheries & nurseries			0.0	0.0	0.0		

Source: EU Member States DCF data submission

4.26.3 Industry structure and employment

Sweden has favorable natural prerequisites for aquaculture with a large number of freshwater areas and a long coastline. Firms are located in 100 out of Sweden's 290 municipalities and a majority of these are sited in rural areas. Over the last decade, production levels have been steadily increasing while the number of firms, until 2011, has decreased. However, in 2012 the sector shows a change in number of enterprises with an increase of 14 percent. The changes 2011-2012 also show a clustering of smaller and larger to medium size units. The medium size enterprises show a quite drastic increase in number of firms (260 percent), most probably due to increased size of some of the smaller enterprises and large enterprises show a decrease (Table 4.26.2).

Table 4.26.2 Structure of the Swedish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*155*	*192*	*175*	*153*	*174*	*14%*	*3%*
<=5 employees	142	182	162	139	135	-3%	-14%
6-10 employees	9	7	10	10	36	260%	300%
>10 employees	4	3	3	4	3	-25%	-14%
Employment (number)							
Total employees	379	424	399	392	370	-6%	-7%
Male employees	321	367	356	343	317	-8%	-9%
Female employees	58	57	43	49	53	8%	2%
FTE	223	222	230	263	263	0%	12%
Male FTE	199	201	209	235	232	-1%	10%
Female FTE	24	22	21	28	31	12%	31%
Indicators							
FTE per enterprise	1.4	1.2	1.3	1.7	1.5	-12%	7%
Average wage (thousand €)	29.0	24.4	28.6	32.1	33.4	4%	17%
Labour productivity (thousand €)	48.9	39.2	52.1	58.1	45.6	-21%	-8%

Source: EU Member States DCF data submission

In 2012 the Swedish aquaculture sector employed 370 persons, corresponding to 263 FTEs. During the last year, the number of employees decreased by 6 percent, which is a persistent trend in the sector. During the full period the number of employees shows a 7 percent decrease. The sector is characteristically dominated of male employees (both in numbers and FTEs), with only 12 percent female FTEs in 2012. Nevertheless the data show a trend of increasing female employees and female FTEs. In 2008-2012 the development is a 31 percent increase of female FTEs, and an increase of 12 percent between 2011 and 2012. The trend is only minor due to the small number of employees, but the Swedish aquaculture sector seems to have been able to attract more female employees (both in numbers and FTEs) during 2011 and 2012 (Figure 4.26.2). The total labour input 2012 is estimated to 420,000 hours.

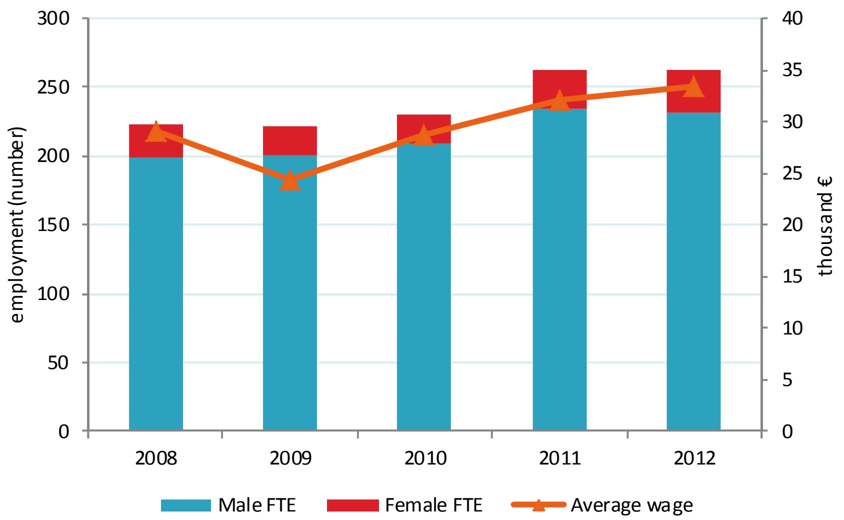


Figure 4.26.1 Employment trends for Sweden: 2008-2012.

Source: EU Member States DCF data submission

The average FTE per enterprise decreased 12 percent from 2011 to 2012, while the average wage decreased by 34 percent, from 50.6 to 33.4 thousand euros, over the same period. The average wage in the sector is, however, consistent during the period 2008 – 2012. The decrease in total income and a sustained FTE in the sector indicate a dropping labour productivity. The productivity 2012 is the lowest since 2009, due to decreasing total income and increasing total operating costs (Figure 4.26.1).

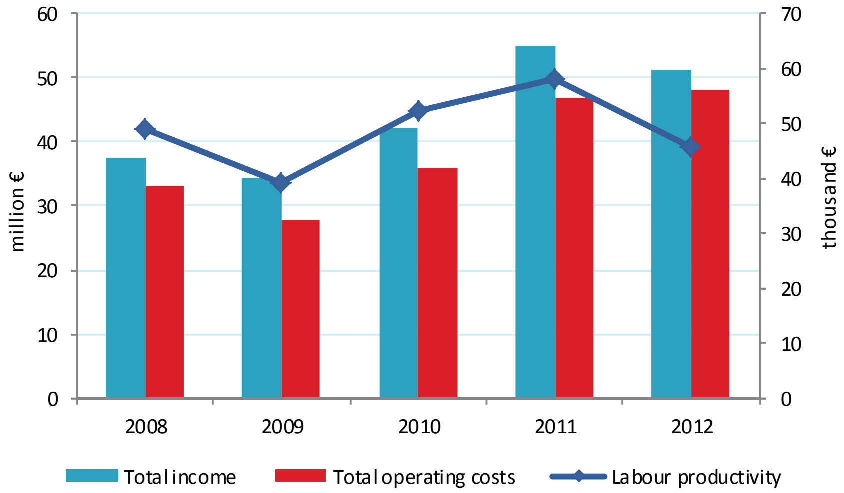


Figure 4.26.2 Income, costs, wages and labour productivity trends for Sweden: 2008-2012.

Source: EU Member States DCF data submission

The number of enterprises has varied during the period, but the average number of FTE per enterprise has been rather constant over the period. During the period in total, the productivity in 2012 has decreased with 8 percent (table 4.26.1), even though the figures show relatively diverse labour productivity during the different years. The exceptional year was 2011, with increasing income and high labour productivity. In 2012, the figures instead show a decreasing trend, despite the fact that the total income still is higher than in 2010. From 2010 to 2011 the labour productivity increased by 11 percent and from 2011 to 2012 the labour productivity decreased 21 percent.

4.26.4 Economic performance

Turnover is the main source of income for firms in the Swedish aquaculture sector. In 2012, the share of total income was 90 percent and has remained at this level over the covered time period. Both subsidies and other income comprise a small share of total income, nevertheless subsidies is an increasing part of the total income. During the period 2009 – 2011 subsidies provided 2 – 3 percent of the total income, in 2012 the subsidies provided for 8 percent. The increasing contribution from subsidies to total income is most probably a coincidal reflection of the amount of subsidies paid to aquaculture farmers from the European Fisheries Fund (EFF) during 2012 (Table 4.26.3). The number of applicants and paid subsidies in the EFF also vary between years and because of long processing times for applications a larger fraction of subsidies has been paid during the most recent years.

The cost structure shows that the main operational expenditures for aquaculture firms are the cost of labour (wages and salaries) and raw material (feed and livestock). Both energy cost and imputed value of unpaid labour makes out a small share of total income, of about 1 and 2 percent respectively (Table 4.26.3).

Table 4.26.3 Economic performance of the Swedish aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	34.5	29.4	41.2	47.5	49.8	*90%*	*5%*	*31%*
Other income	2.9	1.6	0.2	6.1	1.4	*3%*	*-77%*	*-47%*
Subsidies	0.0	0.8	0.8	1.4	4.3	*8%*	*201%*	*454%*
Total income	*37.4*	*31.8*	*42.3*	*55.0*	*55.5*	*100%*	*1%*	*33%*
Expenditures (million €)								
Wages and salaries	6.2	5.2	6.4	8.2	8.5	*15%*	*4%*	*31%*
Imputed value of unpaid labour	0.3	0.2	0.2	0.2	0.3	*1%*	*17%*	*16%*
Energy costs	1.6	1.3	1.3	1.4	1.3	*2%*	*-11%*	*-8%*
Repair and maintenance	1.4	1.2	1.6	2.0	2.1	*4%*	*2%*	*35%*
Raw material: Feed costs	14.4	12.2	17.0	22.6	23.1	*42%*	*2%*	*40%*
Raw material: Livestock costs	4.1	3.4	4.3	5.4	5.7	*10%*	*6%*	*33%*
Other operational costs	5.1	4.3	5.3	6.9	7.1	*13%*	*3%*	*32%*
Total operating costs	*32.9*	*27.7*	*36.0*	*46.7*	*48.0*	*87%*	*3%*	*34%*
Capital Costs (million €)								
Depreciation of capital	1.8	1.8	1.8	2.2	2.6	*5%*	*14%*	*34%*
Financial costs, net	0.7	0.6	0.4	0.8	-0.8	*1%*	*-204%*	*-226%*
Extraordinary costs, net	0.1	0.1	0.1	0.1	0.1	*0%*	*8%*	*28%*
Capital Value (million €)								
Total value of assets	46.5	34.9	48.6	61.5	63.3	*114%*	*3%*	*32%*
Net Investments	4.1	5.0	4.9	2.9	1.0	*2%*	*-67%*	*-78%*
Debt	18.3	17.2	22.5	44.9	41.1	*74%*	*-9%*	*60%*
Input & Production (thousand tonnes)								
Raw material: Feed	14.2	17.6	16.5	15.4	21.5		*39%*	*35%*
Raw material: Livestock	0.9	1.0	1.0	1.7	1.3		*-24%*	*14%*
Performance Indicators(million €)								
Gross Value Added	10.9	8.7	12.0	15.3	12.0	*22%*	*-21%*	*2%*
Operating cash flow	4.4	4.1	6.2	8.2	7.5	*13%*	*-9%*	*30%*
Earning before interest and tax	2.6	2.3	4.4	6.0	4.9	*9%*	*-18%*	*28%*
Net profit	1.9	1.7	4.0	5.3	5.7	*10%*	*9%*	*78%*
Capital productivity (%)	23.5	25.0	24.7	24.8	19.0			
Return on Investment (%)	5.7	6.6	9.1	9.8	7.8			
Future Expectation Indicator (%)	5.0	9.2	6.3	1.1	-2.6			

Source: EU Member States DCF data submission

The expenditures were dominated by cost of feed (42 percent), cost of livestock (10 percent) and cost of wages and salaries (15 percent), in 2012. The expenditures to feed and livestock have been rather constant, whereas the expenditures for wages and salaries have been increasing from 2011 to 2012. The total expenditures make up for 87 percent of the total income (Table 4.26.3).

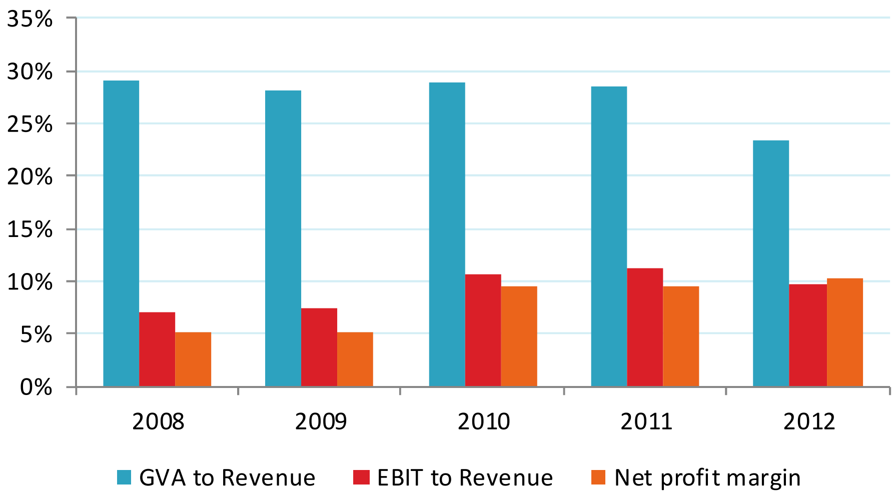


Figure 4.26.3 Economic performance for Sweden: 2008-2012

Source: EU Member States DCF data submission

The gross value added for the sector as a whole decreased by 21 percent 2011 – 2012, EBIT decreased 18 percent, but net profit was positive. All of these parameters are specifically influenced by quite drastic increases in feed and livestock costs and generally influenced by increased total operating costs during 2012. The total value of assets and debts increased by 3 percent and decreased by 9 percent respectively. The net investment continue to show a declining trend, between 2011 and 2012 net investment has decreased by 67 percent (Table 4.26.3, Figure 4.26.3).

4.26.5 Main species produced and economic performance by segment

The production in Sweden can be divided into four main segments. The largest segment in Swedish aquaculture, in terms of both value and volume of production, is freshwater fish grown in cages (Rainbow trout and Arctic char). The second most important segment is freshwater fish on growing (Rainbow trout, Arctic char on growing and Rainbow trout combined). The third segment consists of Trout in cages and on growing Salmon. The forth most important segment is producing shellfish, almost entirely marine species of mussels and oysters. Farming techniques in this latest segment are long line (for mussels) and shellfish farming techniques other (for oysters and crayfish) (Figure 4.26.4).

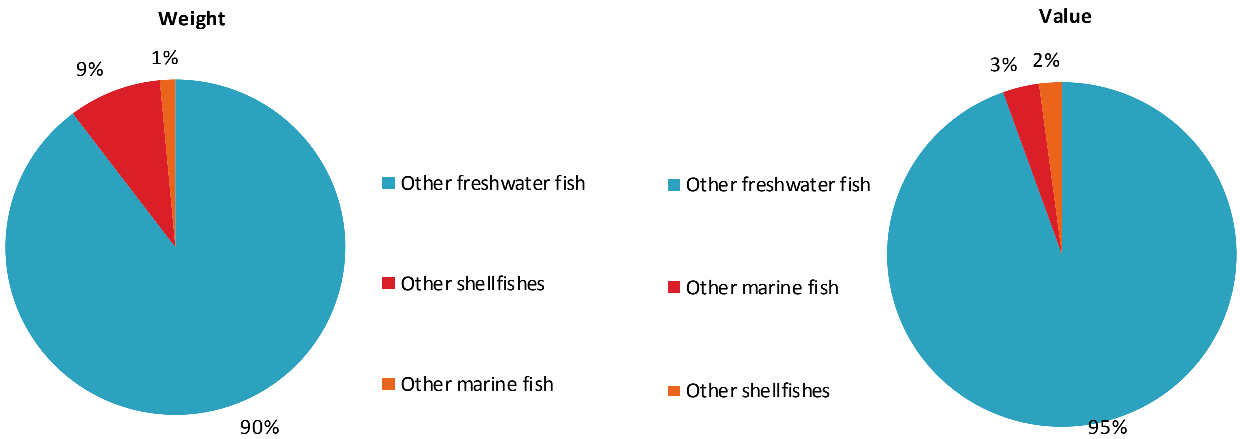


Figure 4.26.4 Main species in terms of weight and value in Sweden production: 2012.

Source: EU Member States DCF data submission

Rainbow trout is the most important species in Sweden and is produced in most geographical regions. Fresh water cages are the main farming technique, with 71 percent of the Rainbow trout farmed in fresh water cages.

In 2012, Swedish aquaculture yielded 13,490 metric tonnes of fish (in fresh weight) of which 12,447 tonnes were produced for human consumption. The dominating species was Rainbow trout, with 84 percent of the total fish production. The production of Arctic char amounted to 1,849 tonnes. Furthermore there were 1,308 tonnes of cultivated blue mussels. The total value of aquaculture production for consumption amounted to 39.1 million Euros, an increase with 1.4 million Euros compared to 2011. Aquaculture farms in freshwater have a huge dominance in Sweden – both in production and value (Figure 4.26.4).

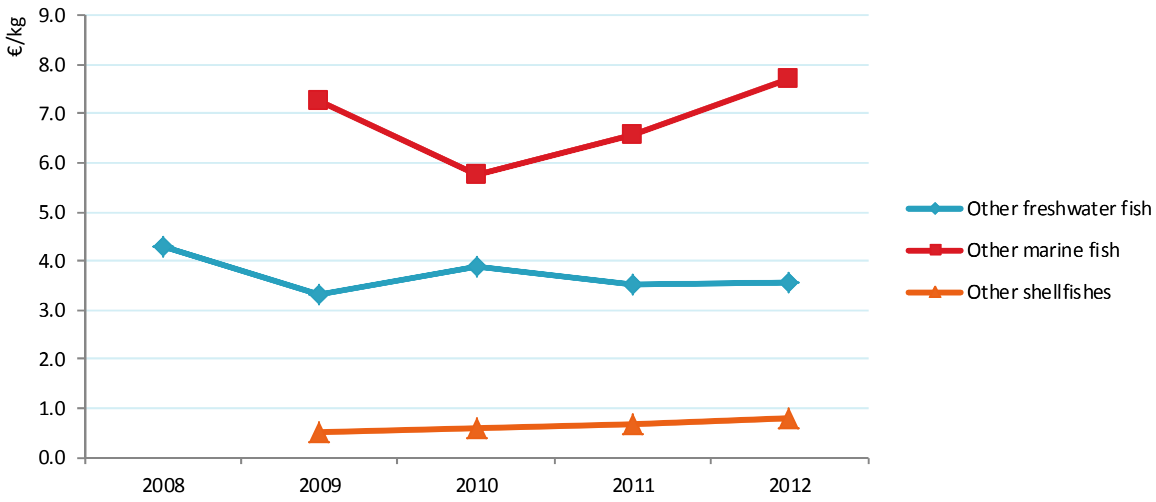


Figure 4.26.5 Average prices for the main species produced in Sweden: 2008-2012.

Source: EU Member States DCF data submission

Large-sized Trout produced in cages in marine waters follow the price of salmon, which has been increasing over the period of 2008 to 2012. The prices of other freshwater fish and other shellfishes have been fairly constant during the last years (Figure 4.26.5).

The most relevant segments in the Swedish aquaculture are analyzed below.

Segment 1: Freshwater fish in cages, Rainbow trout and Arctic char.

In 2012, the segment produced 80 percent (12,447 tonnes) of total aquaculture production in Sweden and its turnover accounted for 95 percent of total turnover. The value and volume of production of this segment has grown constantly over the studied time period 2008-2011 and the figures indicate that the segment was experiencing progress in the economic indicators. However, this segment shows a decline in all economic indicators except from total sales volume. During 2011-2012 total sales volume increased by 3 percent from 12.2 to 12.6 thousand tonnes but for example gross value added decreased from 11.8 to 7.8 million Euros. This development is most probably linked to increases in total operating costs, such as feed and livestock costs.

Segment 2: Freshwater fish on growing, Rainbow trout, Arctic char on growing and Rainbow trout combined.

The second largest segment in terms of production value is freshwater species on growing and the main species grown in this segment are Arctic char and Rainbow trout. In 2012, the segment produced 5 percent of total production and its turnover accounted for 18 percent of total turnover. During 2008-2012 total sales volume has increased from 0.5 thousand tonnes to 0.7 thousand tonnes, indicating that the volume of production has remained fairly stable in this segment at the same time gross value added increased from 2.6 million Euros in 2010 to 3.1 million Euros in 2012.

Segment 3: Trout in cages and on growing Salmon.

The third largest segment in terms of production value is trout on growing. The available data shows no significant changes in terms of volume of production or the values of the economic indicators for this segment. Production volume and gross value added has remained fairly constant over the studied time period with volumes around 0.2 thousand tonnes and gross value added around 0.7 million Euros. Segment 3, Trout in cages and on growing Salmon, shows positive economic indicators.

Segment 4: Shellfish, farming techniques long line (mussels) and shellfish farming techniques other (oysters, crayfish), almost entirely marine species.

The smallest segment consists of firms growing mussels/oysters and firms growing freshwater crayfish. This segment only represents a small share of Sweden's total aquaculture production in terms of value of production. Production volumes in this segment mainly consist of volumes of mussels and oysters (around 99 percent). Although the firms in this segment are very heterogeneous in terms of their structure and average production volumes (crayfish compared to mussels/oysters) they are merged into one segment due to confidentiality reasons. During 2010-2011, performance indicators showed an increase in income, productivity, profitability and also a small increase of production for this segment. The available data for 2011 and 2012 show a different development with increases in several of the economic indicators (operating cash flows, EBIT, net profit) but a decrease in total sales volume and total income.

Figure 4.26.6 shows that the FTE in the Swedish aquaculture sector has remained stable, and the sales volume, the total value of assets and the turnover have increased slightly.

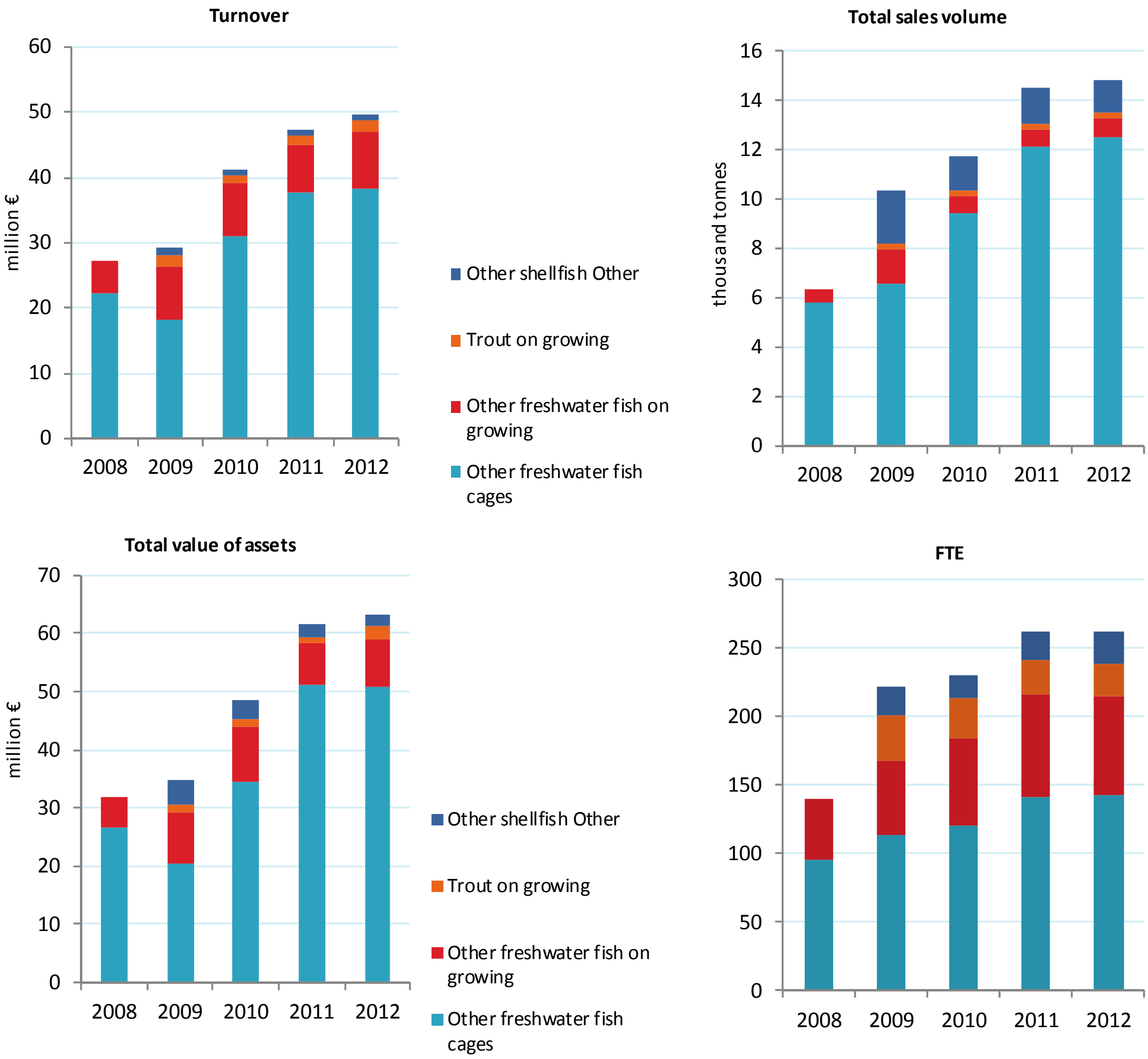


Figure 4.26.6 Structural development of Swedish aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

The economic performance of the four Swedish segments is shown in table 4.26.4. This table depict a positive gross value for all the four segments, though the change between 2011 and 2012 is negative (- 34 percent) for segment 1.

Table 4.26.4 Economic performance of main Swedish aquaculture segments: 2008-2012 (in million €).

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012/11	Development 2012/(2008-11)
Other freshwater fish cages								
Total income	23.1	19.4	31.1	44.0	39.2	100%	-11%	33%
Gross Value Added	5.8	4.6	8.4	11.8	7.8	20%	-34%	2%
Operating cash flow	2.3	1.6	3.8	5.8	3.7	9%	-37%	9%
Earning before interest and tax	1.3	1.0	2.5	4.2	1.7	4%	-59%	-23%
Net profit	1.1	0.6	2.2	3.7	2.4	6%	-34%	28%
Total sales volume (thousand tonnes)	5.8	6.6	9.4	12.2	12.6		3%	48%
Other freshwater fish on growing								
Total income	4.7	8.3	8.5	7.6	9.1	100%	20%	25%
Gross Value Added	1.4	2.9	2.7	2.6	3.1	34%	21%	31%
Operating cash flow	0.5	1.5	1.9	1.3	1.6	18%	30%	28%
Earning before interest and tax	0.2	0.9	1.5	0.8	1.3	14%	61%	49%
Net profit	0.0	0.8	1.4	0.6	1.3	15%	111%	86%
Total sales volume (thousand tonnes)	0.5	1.4	0.7	0.7	0.7		8%	-12%
Trout on growing								
Total income		2.2	1.6	1.5	1.8	100%	19%	3%
Gross Value Added		0.7	0.5	0.4	0.4	24%	4%	-18%
Operating cash flow		0.3	0.3	0.2	0.5	29%	142%	92%
Earning before interest and tax		0.3	0.2	0.2	0.4	25%	164%	101%
Net profit		0.3	0.2	0.2	0.5	26%	187%	116%
Total sales volume (thousand tonnes)		0.3	0.2	0.2	0.2		2%	-7%
Other shellfish Other								
Total income		1.9	1.1	1.9	1.1	100%	-40%	-30%
Gross Value Added		0.6	0.4	0.5	0.7	58%	27%	30%
Operating cash flow		0.7	0.3	1.0	1.6	145%	73%	156%
Earning before interest and tax		0.1	0.2	0.8	1.5	129%	77%	286%
Net profit		0.0	0.2	0.8	1.5	132%	87%	354%
Total sales volume (thousand tonnes)		2.1	1.4	1.5	1.3		-11%	-21%

Source: EU Member States DCF data submission

There are large variations in terms of production levels and the value of various economic indicators across these four segments. Rainbow trout and Arctic char grown in cages is the largest segment in terms of both volume and value of production. The segment stands for around 80 percent of total aquaculture production in Sweden and its turnover accounts for around 75 percent of total turnover. In Table 4.26.4 and Figure 4.26.7 the economic indicators of the four main segments are presented, EBIT is positive in all sectors. Nevertheless, in segment 1, other freshwater fish cages, there has been a decreasing trend compared to 2011 for all indicators except total sales volume. In EBIT there is a drastic reduction (-59 percent).

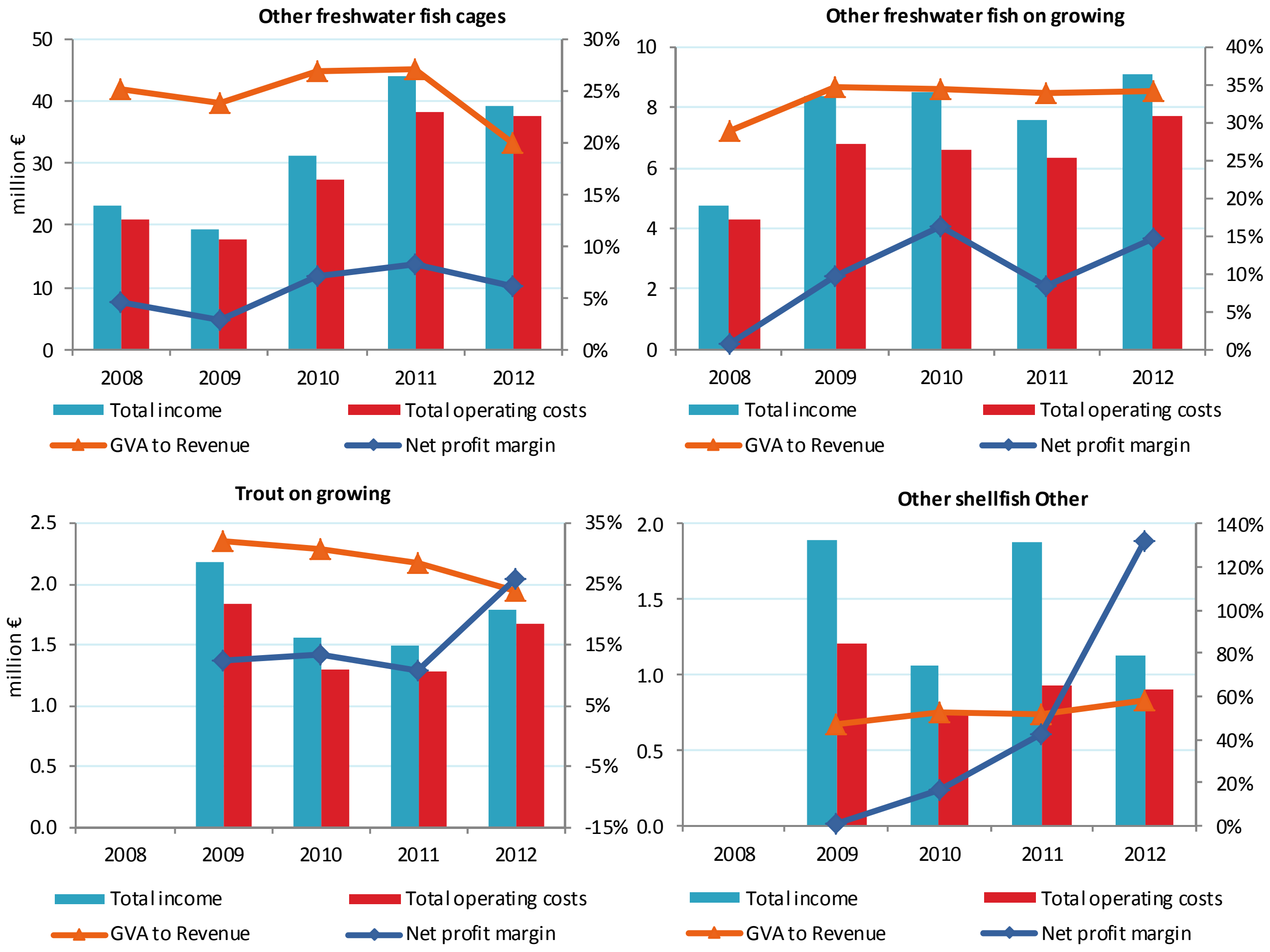


Figure 4.26.7 Economic performance indicators for the main Swedish segments: 2008-2012.

Source: EU Member States DCF data submission

There is a trend of decreasing GVA in all sectors except segment 4, other shellfish other. Nevertheless all segments, except segment 1, show increasing net profit margins. During the period 2008 – 2012, Segment 1 shows an increasing total operating cost. However, the total operating costs have stabilized 2011-2012 but total income decreased, with falling GVA and reduced net profit margins as a result. Total income is decreasing for segment 4, other shellfish other, compared to 2011. The segment shows a periodic variation of income, to some extent corresponding to total sales volume (Figure 4.26.7).

The operational cost structures for the four Swedish segments are presented in Figure 4.26.8.

Segment 1: Freshwater fish in cages, Rainbow trout and Arctic char.

Raw material and livestock costs are traditionally the main cost component with 60 percent of total operating costs. The costs for wages are 16 percent of total operating costs. The energy costs are of minor importance, only 2 percent of total operational costs are due to energy costs, which is one third of the energy costs for the other three segments.

Segment 2: Freshwater fish on growing, Rainbow trout, Arctic char on growing and Rainbow trout combined.

In segment 2, other freshwater fish on growing, the cost components feed and livestock are also the most important of total operational costs, covering 50 percent. Naturally are the costs for livestock larger in on growing farms than in segment 1 and the costs are 18 percent, compared to 10 percent for segment 1, for livestock.

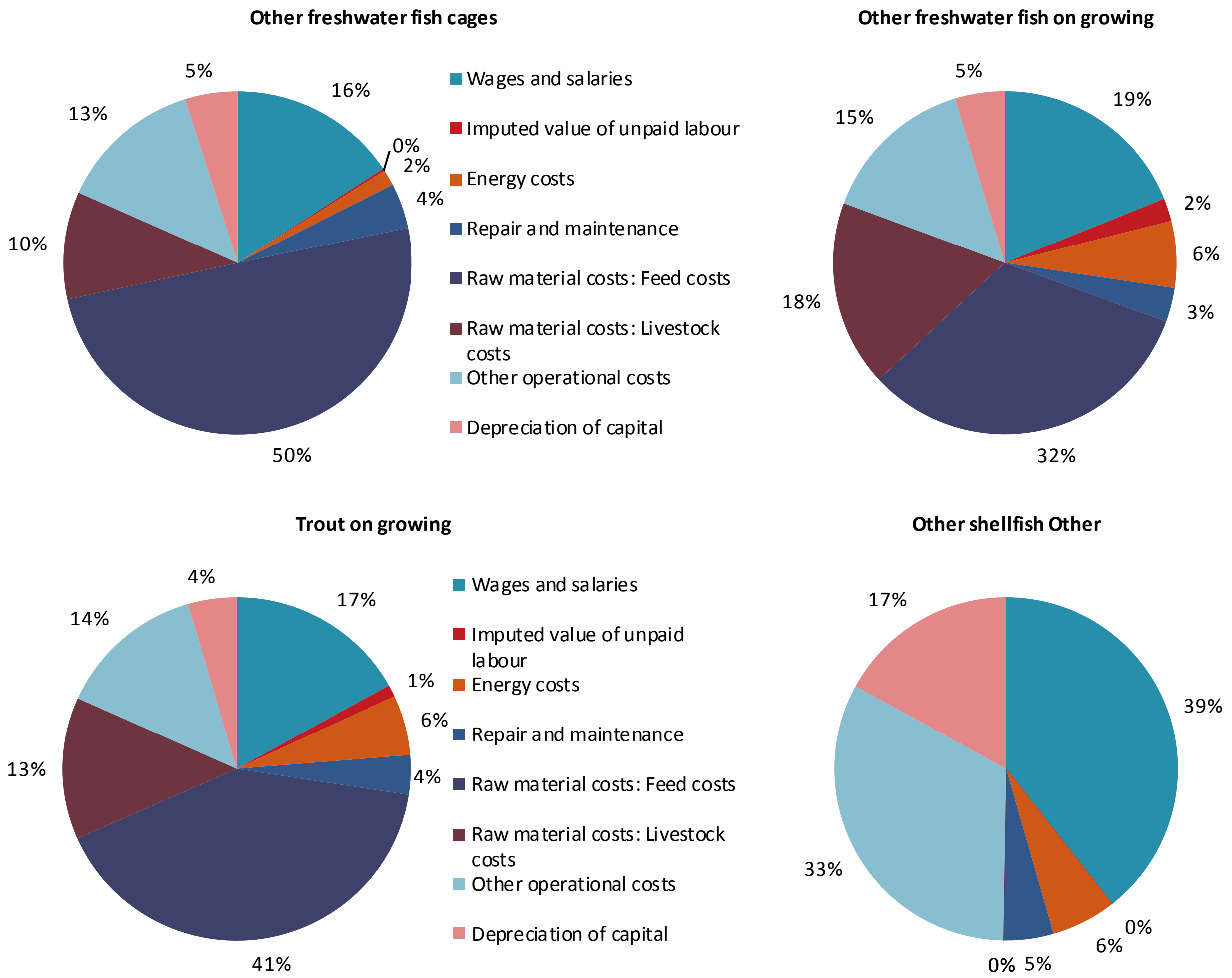


Figure 4.26.8 Cost structure of the main segments in Sweden: 2012.

Source: EU Member States DCF data submission

Segment 3: Trout in cages and on growing Salmon.

In the segment Trout in cages and on growing Salmon, the main cost components are also feed and livestock, which covers 54% of the total operational costs.

Segment 4: Shellfish, farming techniques long line (mussels) and shellfish farming techniques other (oysters, crayfish), almost entirely marine species.

The segment shellfish, farming techniques long line (mussels) and shellfish farming techniques other (oysters, crayfish), has a totally different cost structure because the production costs do not include the cost of feed and livestock. The most important cost items are repair and maintenance of the production system (lines and boats) and the labour costs for repair, maintenance and harvesting. The segment also has had a larger operational cost in depreciation of capital compared to the other three segments due to natural conditions in the segment.

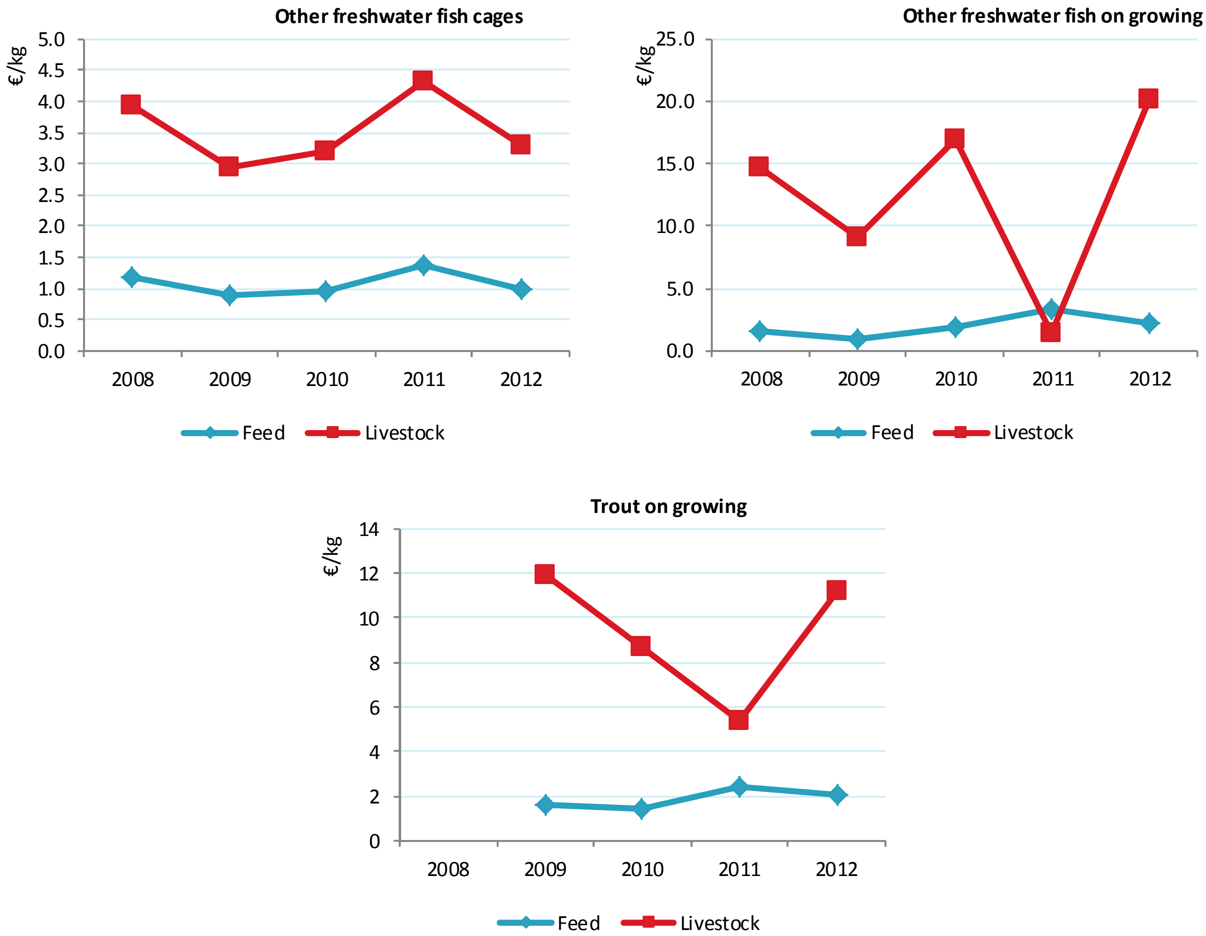


Figure 4.26.9 Feed and livestock prices for the main Swedish segments: 2008-2012.

Source: EU Member States DCF data submission

4.26.6 Trends and triggers

Market structure, current production trends and main drivers

The Swedish aquaculture sector is experiencing an increase in volume of production. Over the last decades production levels have increased from 5,500 tonnes (1998) to 14,800 tonnes (2012). One explanation for the observed growth in productions is likely related to structural changes in the aquaculture sector, where firms merge into larger units to exploit economies of scale. Data since 1998 show that the number of firms is decreasing, at the same time average production volumes have been steadily increasing.

However, explanations are also found in the high market demand for Rainbow trout and Arctic char, which are the main species and stands for over 80% of total aquaculture production in Sweden. The Swedish aquaculture sector almost entirely consists of freshwater fish grown in cages, on growing or combined.

The growth of Swedish aquaculture has been strong in the 2000s, averaging 7.7 percent annually between 2000 and 2012. The increase is due to the startup of what today are the largest food fish producers and a number of firms who already have relatively high production. Virtually all of the increase relates to food fish production in northern Sweden.

Issues of special interest

There have also been incentives at the national level to increase the knowledge about the needs for sustainable aquaculture production and ways to promote it., According to regulations of the European Maritime and Fisheries Fund 2014-2020 (EMFF), member states are obliged to develop a national aquaculture strategy in order to increase the state of knowledge about aquaculture and address future needs in order to achieve sustainable production and more efficient policies. The Swedish Board of Agriculture, managing authority of the EMFF, developed a national strategy document (Svenskt vattenbruk - en grön näring på blå åkrar, in Swedish) with the objective to identify how the Swedish aquaculture sector can grow in the direction of economic and environmental sustainability to 2020, with the main challenge of combining economic, ecologic and social cohesion. Among other things, the strategy identified the importance of cooperation among different actors in the industry and the need of spatial planning and development of new production techniques. The national strategy for Swedish aquaculture constitutes the main foundation for constructing a national action plan for sustainable development of Swedish aquaculture.

Outlook for 2013 and 2014

Sweden's net imports of fish, crustaceans and molluscs were significantly higher than the production in 2012. Swedish aquaculture could gain a larger share of the domestic market, where demand for cultivated fish products is high.

The aquaculture sector has quite a positive future and there are several large (1000 tonnes) applications for expanded and/or new permits for fish production which are pending at various county boards in northern Sweden. There are also some planned major investments in mussel farming on the west coast of Sweden.

Another factor that is expected to have a positive impact on future production levels is the increased focus on aquaculture policy schemes in the new European Maritime and Fisheries Fund (EMFF). A clear aim of the reformed fund is to develop European aquaculture to achieve sustainable growth in production volumes, improved competitiveness and profitability. Even though it is still unclear what kinds of financial support the national operational programmes will include in different MS, there will most likely be a larger focus on increasing aquaculture productions volumes. The Swedish operational programme will give priority to measures increasing profitability, new sustainable production techniques that reduce the environmental impact and support measures for preventing damage caused by wild predators.

Turning to the difficulties facing the Swedish aquaculture sector, these are mainly related to regulations and difficulties of implementing new production techniques at a commercial scale. There is an ambition to increase marine aquaculture production using sustainable production techniques, however, most of this work is still on project levels and has not reached commercial scales. The production of marine shellfish products is currently small in relation to freshwater production, although Sweden has significant production of organic mussels (KRAV, ASC).

Even though aquaculture in Sweden has a strong potential for further development of sustainable production techniques the organic aquaculture sector still has some obstacles and problems to overcome in order to expand production volumes and scaling up commercial levels (mostly concerning fish production). There are also examples of new species or new cultivation techniques that are under development (i.e. fish species like tilapia, zander and cod) and ongoing research on developments in the feed market (i.e. new production techniques, fodder development, reducing nitrogen emissions and phosphorus emissions, however, not yet at a commercial level.

Some of the main issues affecting the economic performance of the sector and the development of new growing techniques are related to difficulties in the implementation of new techniques and stringent regulations (e.g. development of organic and certified aquaculture), which have often pointed out as significant obstacles of growth in production volumes.

An analysis of the impact of administrative burdens and governance has been made, and it has been pointed out as high, but little has been done to address the matter. The development of spatial planning has, in large, not been put in place in Sweden. The European Maritime and Fisheries Fund and various schemes designed to meet future demand is expected to play a significant role in the development of the Swedish aquaculture sector.

4.26.7 Data Coverage and Data Quality

Since 2011, the Swedish Board of Agriculture is responsible for compiling and reporting statistics on the aquaculture sector for the reported period together with the Swedish Agency for Marine Water Management. The Swedish Board of Agriculture in cooperation with Statistics Sweden conducted two questionnaires and a tax declaration survey for each year. Data is collected from both income tax declarations, administrative records and two questionnaires (Q1 and Q2), sent to all aquaculture farmers (Q1) and all aquaculture firms that have aquaculture as their main activity (Q2). In order to identify the segments, companies using more than one farming technique or growing more than one species, all production, incomes and costs were transferred to the main technique and main species based on turnover.

The questionnaire (Q1) is sent out to all aquaculture farm units and farm units are clustered into enterprises. For each enterprise, the value of sales from Q1 is compared to income as reported in the income tax declarations. Enterprises that have aquaculture as their main activity more than 50% (income from tax declarations/sales value from Q1) are considered to have their primary activity in aquaculture. These enterprises represents the population for questionnaire Q2 (the cost allocation key survey), derived from income tax declarations combined with Q2, for all aquaculture activity in Sweden. By comparing the value of sales from Q1, which covers all aquaculture activity in Sweden, with income in tax declarations for the enterprises with aquaculture as their primary activity we obtain a figure, used to scale-up relevant variables. Using this method, variables can be assumed representative of all aquaculture activity in Sweden and comprise the same allocation between variables as for enterprises with aquaculture as their primary activity.

The primarily objective of the second questionnaire (Q2) is to create a cost allocation key for costs that are not specified in income tax declarations. For the years 2008-2010, the sample for the second questionnaire (Q2) was a non-probability sample based on a priori information that came from questionnaire Q1 and income tax declarations, as described above.

As a result, it could not be planned before the income tax declarations and the results of the first questionnaire (Q1, covering every farming unit) were compiled. Based on the results of the census data, Statistics Sweden selected a representative number of enterprises from each segment (clustered sample) for the second questionnaire (Q2). In order to ensure representativeness in terms of corporate size, structure and farming technique, Statistics Sweden decided on the appropriate sampling method and sample size for Q2. The survey (Q2) was undertaken in 2008 and the cost allocation key was reused for 2009-2012. The population represents all active aquaculture enterprises in 2008 that have aquaculture as their primary activity and the sample for the questionnaire (Q2) represents 46 of these enterprises. The survey had a response rate of 65 per cent.

Data availability

Data for the aquaculture sector is published once a year, in August the same year as the census.

Confidentiality

The 4 segments that are surveyed in Sweden are presented in 4.26.5. To avoid problems with confidentiality, segments should in general include more than 10 enterprises. Due to confidentiality problems, several segments are aggregated. Secrecy on values for segments implies that 1.2. 2.3 and 2.4 are aggregated into 2.2. 5.3 are aggregated into 5.2. and 7.1 is aggregated into 10.4.

Differences in DCF data compared with other official data sources

Since data on aquaculture production is reported from the Swedish official statistics to Eurostat, there should be minor deviations in the production volumes as reported by Eurostat. Furthermore, since FAO, EUROSTAT data and DCF report data on production based on first sales the definition should not be an issue. However, as shown in Figure 4.26.10, Swedish DCF is not identical to Eurostat and FAO data. These disparities are likely a result of differences in the reference population. Disparities may also arise due to updates in the data mainly due to changes in the number of active enterprises.

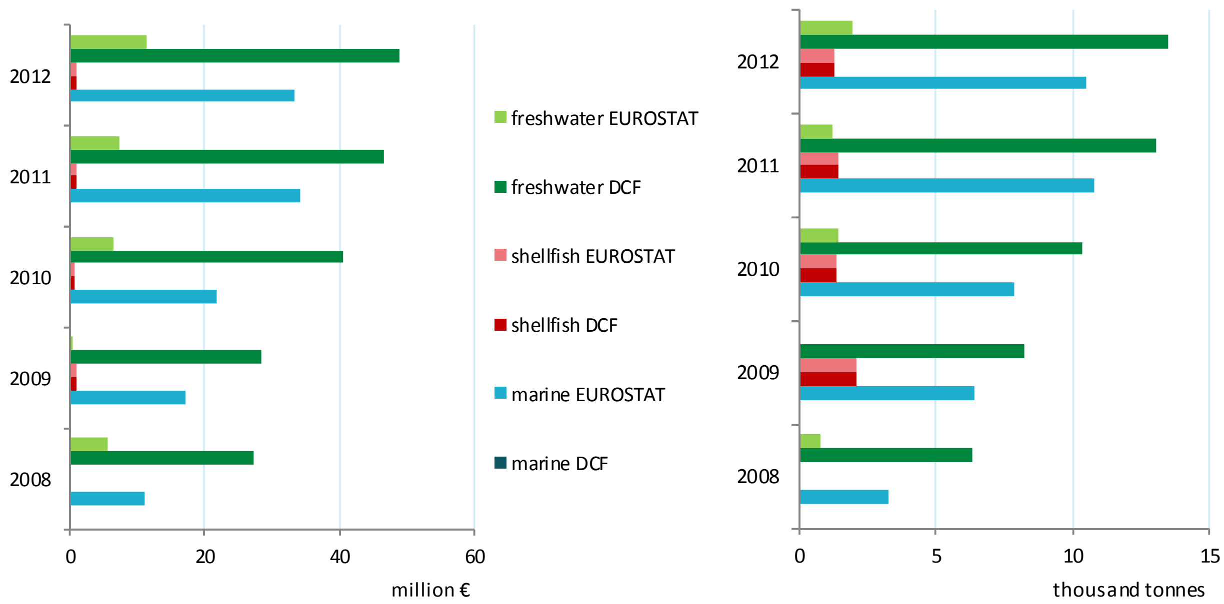


Figure 4.26.10 Comparison of DCF data with EUROSTAT data for Swedish: 2008-2012

4.27 UNITED KINGDOM

4.27.1 Summary

Production volume and value

In 2012 total reported UK aquaculture production was 210,000 tonnes, a 5% annual increase from 2011. Estimated total value was €796 million, representing an 11% annual increase and a 26% increase over the 5 years from 2008.

Overall industry structure and employment

In 2012, around 640 authorised aquaculture enterprises operated in the UK. The industry was very diverse producing a wide variety of finfish and shellfish species, for direct consumption, restocking fisheries, and the ornamental (pet) trade. UK aquaculture was dominated by small enterprises – 89% had less than 5 employees, and only 4% employed more than 10 staff.

Main segments

Recorded UK aquaculture production tonnage and estimated value was largely attributable to three main segments: Atlantic salmon, mussels and rainbow trout.

- Salmon dominated production tonnage (79%) and value (87%). The salmon segment combined hatcheries and nurseries for the freshwater stages with seawater net-pen production for ongrowing to harvest.
- Mussels was the second most important segment by tonnage (13%), but due to a lower unit value, was third by value (5% of total). In the UK mussels were grown on the sea-bed and suspended systems.
- Although the volume of trout produced (7% of total) was lower than that of mussels, the trout sector had a slightly higher value (5% of total). Rainbow trout (harvested from both freshwater and marine systems) dominated the segment, but production of brown/sea trout, Arctic charr and brook trout continued. Trout were grown for table consumption and restocking angling waters.

Current production trends and main drivers (Trends and triggers)

Salmon production tonnage increased by 3% from 2011, continuing the trend from 2008. The Scottish Government supports the salmon sector's aspirational targets for sustainable growth. No clear trends were apparent for other sectors.

Outlook

Salmon production in the UK can be expected to continue to grow, which will increase the volume and value of UK aquaculture production.

4.27.2 Production and sales

UK aquaculture in 2012 (reported production and estimated value) is summarised in Table 4.27.1. Total production increased 5% by tonnage and 11% by value.

Table 4.27.1 Production and sales for UK: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Sales weight (thousand tonnes)	***179.8***	***196.6***	***201.4***	***199.0***	***209.5***	*5%*	*8%*
Marine	130.8	145.2	155.2	158.9	166.4	*5%*	*13%*
Shellfish	35.5	35.6	31.5	27.1	27.4	*1%*	*-16%*
Freshwater	13.5	15.8	14.6	13.0	15.8	*21%*	*11%*
Hatcheries & nurseries							
Sales value (million €)	***677.2***	***540.8***	***590.8***	***714.0***	***795.8***	*11%*	*26%*
Marine	558.2	467.3	519.2	681.1	698.1	*2%*	*25%*
Shellfish	66.4	30.1	26.1	22.0	46.2	*110%*	*28%*
Freshwater	52.6	43.4	45.4	37.1	51.5	*39%*	*15%*
Hatcheries & nurseries							

Source: EU Member States DCF data submission

The DCF database requires submission of data by species categories and production system; these are then summarised within the four prescribed sectors in Table 4.27.1. With respect to UK aquaculture, these represent:

- Marine (finfish): salmon, sea-bass, other marine finfish (i.e. halibut)
- Shellfish: mussels, oysters (European flat oyster and Pacific cupped oyster), clams (Japanese carpet shell, northern quahog), and other shellfish (queen scallop, great Atlantic scallop).
- Freshwater: trout (all irrespective of production in freshwater or seawater: rainbow trout, sea/brown trout, Arctic char, brook trout), carp (common carp, Crucian carp) and other freshwater fish (Nile tilapia, barbel, roach, tench, freshwater bream, orfe, European perch, chub, rudd, European eel)
- Hatcheries & nurseries: these are not reported separately for the UK, because enterprises involved in this category typically also engage in production to harvest.

In 2012 the marine sector dominated UK production which was largely attributable to salmon.

4.27.3 Industry structure and employment

Summary data on employment within businesses is presented in Table 4.27.2.

In 2012, the majority of UK aquaculture businesses (89%) were small employing ≤ 5 staff. The total number of full-time and part-time employees was calculated at 3231, estimated to equate to 2705 full time equivalents (FTEs). The majority of employees were male. It is not possible to comment on temporal trends in employment due to inconsistencies in methodology between years (2008-2010 being estimates); the apparent stability between the independently collated 2011 and 2012 total employee and FTE data does however provide reassurance on the validity of recent estimates.

Table 4.27.2 Structure of the UK aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	Change 2012/11	Development 2012/(2008-11)
Structure (number)							
Total enterprises	*531*	*442*	*428*	*575*	*641*	*11%*	*30%*
<=5 employees	431	322	321	498	568	*14%*	*44%*
6-10 employees	55	70	63	43	47	*10%*	*-18%*
>10 employees	45	50	44	34	26	*-24%*	*-40%*
Employment (number)							
Total employees	6,000	5,000	4,000	3,064	3,231	*5%*	*-28%*
Male employees	6,000	5,000	4,000	2,654	2,750	*4%*	*-38%*
Female employees	0	0	0	410	481	*17%*	*369%*
FTE	6,000	5,000	4,000	2,671	2,705	*1%*	*-39%*
Male FTE	6,000	5,000	4,000	2,316	2,345	*1%*	*-46%*
Female FTE	0	0	0	354	359	*1%*	*305%*
Indicators							
FTE per enterprise	11.3	11.3	9.4	4.7	4.2	*-9%*	*-54%*
Average wage (thousand €)	11.3	11.6	18.3	23.3	38.6	*66%*	*139%*
Labour productivity (thousand €)	37.9	41.8	31.2	67.4	85.6	*27%*	*92%*

Source: EU Member States DCF data submission

The indictors for Average wage and Labour productivity for 2012 are derived from questionable survey data and do not merit consideration.

4.27.4 Economic performance

Estimated total income and operational costs both increased by 12% between 2011 and 2012. Income from turnover (=sale of fish) from the farms contributed virtually all of total income.

Due to concerns about data quality and inconsistencies in methodology over time, scrutiny of other financial indicators is not considered worthwhile.

Table 4.27.3 Economic performance of the UK aquaculture sector: 2008-2012.

Variable	2008	2009	2010	2011	2012	% of total income	Change 2012-11	Development 2012/(2008-11)
Income (million €)								
Turnover	677.2	540.8	590.8	714.0	795.8	*100%*	*11%*	*26%*
Other income	0.0	0.0	0.0	0.0	1.7	*0%*		
Subsidies	0.0	0.0	0.0	1.0	0.1	*0%*	*-90%*	*-59%*
Total income	*677.2*	*540.8*	*590.8*	*715.0*	*797.7*	*100%*	*12%*	*26%*
Expenditures (million €)								
Wages and salaries	68.0	58.0	73.0	62.1	60.4	*8%*	*-3%*	*-8%*
Imputed value of unpaid labour	0.0			0.1	44.0	*6%*		
Energy costs				19.1	7.6	*1%*	*-60%*	
Repair and maintenance				17.3	28.1	*4%*	*62%*	
Raw material: Feed costs				311.0	247.6	*31%*	*-20%*	
Raw material: Livestock costs				73.7	25.3	*3%*	*-66%*	
Other operational costs	450.0	332.0	466.0	113.0	257.5	*32%*	*128%*	*-24%*
Total operating costs	*518.0*	*390.0*	*539.0*	*596.3*	*670.4*	*84%*	*12%*	*31%*
Capital Costs (million €)								
Depreciation of capital				47.0	36.4	*5%*	*-23%*	
Financial costs, net				58.0	13.4	*2%*	*-77%*	
Extraordinary costs, net				0.3	0.4	*0%*	*59%*	
Capital Value (million €)								
Total value of assets	286.0	182.0	255.0	550.0	578.9	*73%*	*5%*	*82%*
Net Investments				35.0	120.9	*15%*	*245%*	
Debt				167.0	90.9	*11%*	*-46%*	
Input & Production (thousand tonnes)								
Raw material: Feed				420.0	436.3		*4%*	
Raw material: Livestock				3,500.0	94.7		*-97%*	
Performance Indicators(million €)								
Gross Value Added	227.2	208.8	124.8	179.9	231.5	*29%*	*29%*	*25%*
Operating cash flow	159.2	150.8	51.8	118.7	127.3	*16%*	*7%*	*6%*
Earning before interest and tax				71.7	90.9	*11%*	*27%*	
Net profit				13.7	77.5	*10%*	*466%*	
Capital productivity (%)	79.4	114.7	48.9	32.7	40.0			
Return on Investment (%)				13.0	15.7			
Future Expectation Indicator (%)				-2.2	14.6			

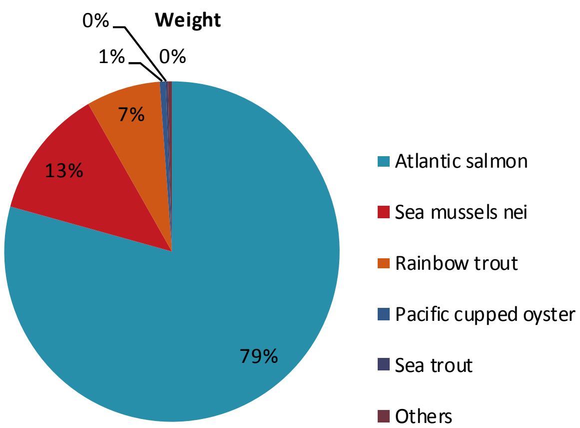
Source: EU Member States DCF data submission

4.27.5 Main species produced and economic performance by segment

The UK's aquaculture industry ranks as one of the largest in the EU and is also one of the most diverse, covering nine segments: Salmon (62 enterprises), Trout (193 enterprises), Sea-bass and Sea-bream (1 enterprise), Carp (84 enterprises), Other freshwater fish (50 enterprises), Other marine fish (7 enterprises), Mussels (124 enterprises), Oysters (103 enterprises), Other shellfish (17 enterprises). Clams are also harvested by enterprises focussed on other species segments. These sectors produced finfish and shellfish for the table (i.e. human consumption), release into angling waters, release for conservation purposes, and for the ornamental (pet) trade. Nevertheless, recorded UK aquaculture production tonnage and estimated value in 2012 continued to be attributable largely to only three segments: Atlantic salmon, mussels and trout which are discussed in more detail below. The other UK aquaculture sectors were minor in comparison, contributing ≤1% to total tonnage and value, i.e.:

- Oyster: 1317 tonnes valued at €7.6M
- Carp: 265 tonnes valued at €4.3M
- Other freshwater fish: 138 tonnes valued at €1.4M
- Seabass: 190 tonnes valued at €1.1M
- Other marine fish: 73 tonnes valued at €0.5M
- Other freshwater fish: 138 tonnes valued at €1.4M
- Other shellfish: 7.4 tonnes valued at €0.1M
- Clams: 14 tonnes valued at €0.05M

Although relatively minor in comparison to the larger segments, these minor segments encompassed over 250 enterprises, provided employment for 750 staff and were valued at €16.5 M. Production of carp, other freshwater fish and salmonids for restocking helps to support the UK's angling industry with an estimated value similar to that of the UK's whole aquaculture industry.



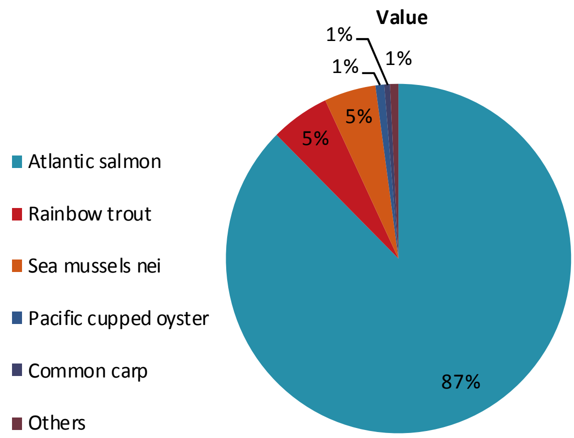


Figure 4.27.1 Main species in terms of weight and value in UK production: 2012.

Source: EU Member States DCF data submission

Estimated prices over time for the five most important species in the UK are illustrated below; this figure demonstrates the low unit price of mussels relative to other shellfish (oyster) and finfish. Prominent changes over time (e.g. for common carp) are attributed to errors in estimation rather than representing real changes in market price. The price of €16/Kg (not €3-4/Kg) is real and reflects the value of carp for stocking angling fisheries, rather than for the table. It should also be noted that values are collated in GBP and converted to € (using the annual average rate); values may therefore fluctuate as a consequence of exchange rate movements, with limited relevance to the UK aquaculture sector.

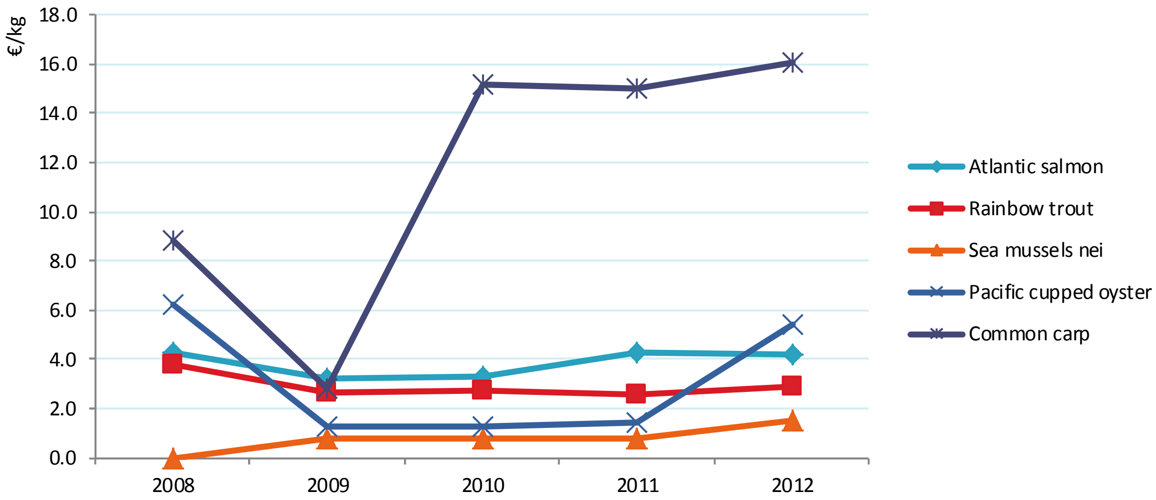


Figure 4.27.2 Average prices for the main species produced in UK: 2008-2012.

Source: EU Member States DCF data submission

Segment 1: Salmon combined

All UK production within the salmon segment was attributed to the combined category (rather than separated into hatcheries and nurseries, ongrowing, and cages) because enterprises are often vertically integrated, operating across categories within the production cycle and to ensure consistency between years. This sector therefore represents freshwater tanks (hatcheries and nurseries), freshwater net-pens (nurseries), seawater tanks (broodstock/harvest) and seawater net-pens (for ongrowing to harvest).

Salmon combined dominated UK aquaculture production tonnage (166,093 tonnes; 79% of total) and value (€696.5 M; 87% of total). The bulk of salmon production is located in Scotland. A number of non-commercial sites are also included in the data, where fish are produced for release in ecological enhancement schemes.

Segment 2: Mussel other

Mussel aquaculture in the UK uses a variety of systems (rafts, long lines, on bottom, and off-bottom on tressels). Due to difficulties in separating production systems (seed may be moved between system types) and to ensure consistency between years, all production within the mussel segment was categorised as “mussel other”.

Mussel other was the second most important segment by tonnage (26,021 tonnes; 13% of total) but, due to a relatively low unit value, was third by value (€38.5M; 5% of total).

Segment 3: Trout combined

All UK trout production was attributed to the combined category (rather than separated into hatcheries and nurseries, ongrowing, and cages) because enterprises often operate across categories.

Although the volume of trout produced (15,415 tonnes; 7% of total) was lower than that of mussels, the trout sector had a higher value (€45.8M; 5% of total). Rainbow trout (harvested from both freshwater and marine systems) dominated the segment, but production of brown/sea trout, Arctic charr and brook trout continued. Trout were grown for table consumption and restocking angling waters. Although production of portion size trout from freshwater systems dominated production, production of large trout in net-pens doubled from 2011.

The relative size (turnover and production tonnage) of the UK aquaculture sectors are graphically illustrated below and highlight:

- the dominance of salmon and its role in determining inter-annual variation in aquaculture totals;
- the contributions from trout and mussels;
- the minor contribution from all other segments at a UK level.

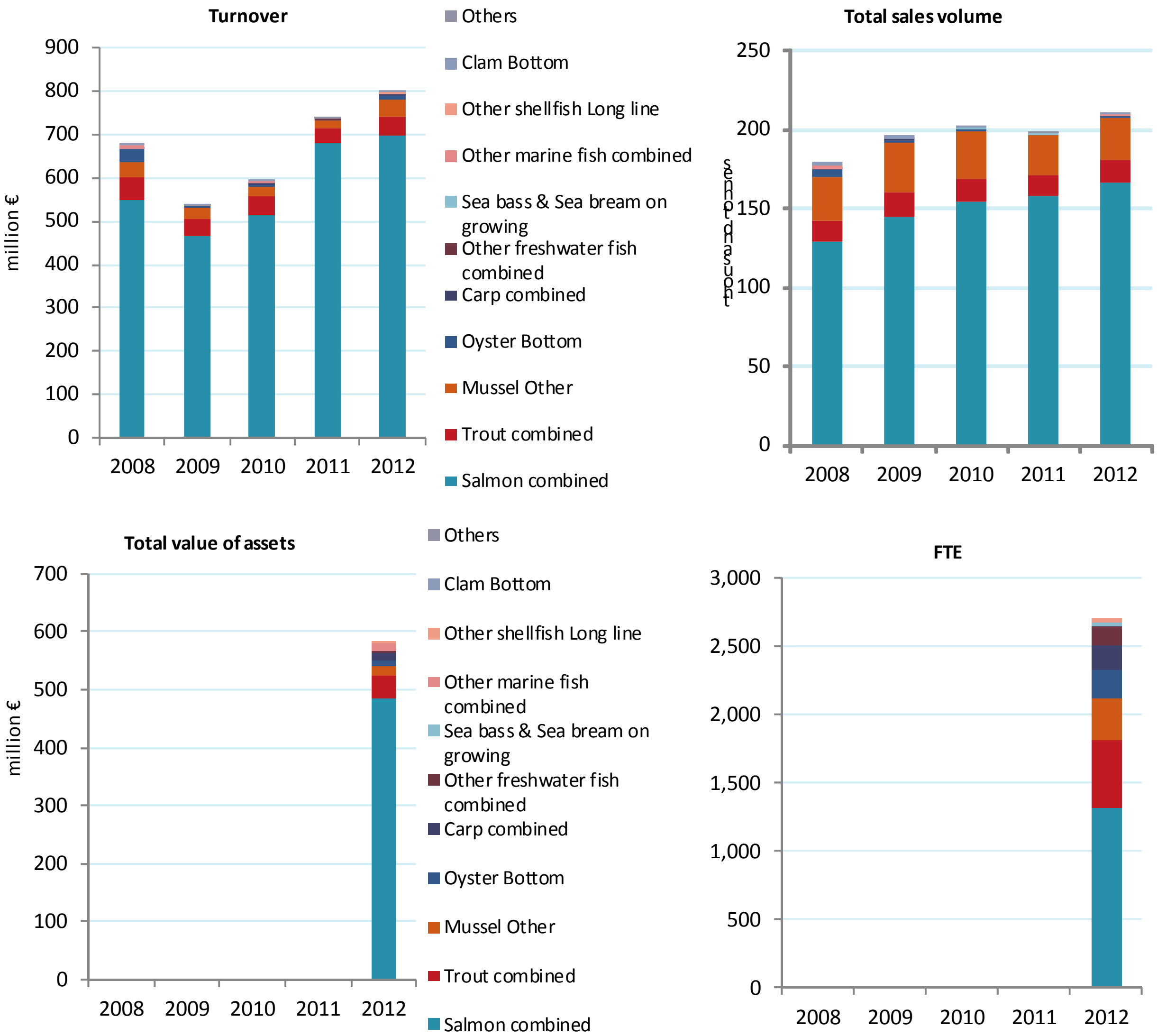


Figure 4.27.3 Structural development of UK aquaculture sector: 2008-2012.

Source: EU Member States DCF data submission

4.27.6 Trends and triggers

Current production trends and main drivers

UK aquaculture production is dominated by salmon production which is focussed in Scotland in over 350 sites. Although these represent different enterprises, most are ultimately owned by fewer than ten large multinational companies. The UK is the largest producer of salmon in the EU, and third largest globally behind Norway and Chile. UK salmon production has increased for the fourth successive year which is likely to be attributable to a variety of industry, policy and market factors:

- Consolidation to fewer larger companies operating more efficiently in fewer (but larger) sites enabling increasing productivity per employee
- Support from the Scottish Government which recognises the segment as helping to sustain economic growth in the rural and coastal communities. It therefore has a policy to promote the development of sustainable aquaculture
- An increase in overall production capacity, i.e. total volume of marine net-pens
- Improved survival from egg to smolt and increased smolt production from freshwater
- A mature market: Salmon is Scotland's most valuable food export and farmed salmon is well accepted by domestic consumers being the most popular fresh fish with UK consumers. Salmon is classed as an oily fish and is therefore recommended as part of a healthy diet by public health authorities.
- Reduced production in Chile due to disease.

Salmon farming continues to mature and technological improvements (e.g. handling and transport systems, feeds, vaccines) enable more efficient production in larger systems, improved survival and growth. The multinational nature of salmon farming enables the transfer of developments between countries.

Challenges for the salmon industry remain:

- Environmental pressures. Concerns continue to be expressed that salmon farming may have negative impacts on wild salmonid stocks, in particular escapees reducing fitness through genetic introgression, and transmission of sea-lice from farmed stocks compromising the survival of wild smolts. Publication of data on escapes and lice counts is being introduced to aid transparency, and schemes are being developed to reduce escapes (through containment standards) and potential pathogen interactions (through siting and area management agreements for disease).
- Disease pressures: New diseases continue to emerge, for example Amoebic Gill Disease (AGD), and existing pathogen problems can escalate e.g. due to resistance to chemotherapeutants developing (e.g. sea lice). Disease compromises production (growth and survival) and controls add additional costs (e.g. freshwater bathing for AGD). The industry has begun re-examining the use of cleaner fish (wrasse specie and lump-suckers) as a biological control agents for sea-lice.
- Site availability: There is a perception that the availability of additional near-shore sheltered sites may limit expansion of sea-cage capacity, and the industry is gradually moving to more exposed offshore sites using larger and more robust systems.

Production from the UK trout and mussel segments remained static in 2012. There was a notable increase in production of large rainbow trout from seawater which may overlap with the market for salmon. A significant development in long-line production of mussels is also planned.

Market structure

UK aquaculture businesses generally operate independently, although some shellfish producers may form co-operatives.

The three main segments each have a separate trade body (producer organisation) which represents their interests on political, regulatory, media and technical issues.

- the Scottish Salmon Producers Organisation (SSPO) encompasses 80% of the tonnage of Scottish salmon production. Membership comprises fish farming companies involved in the freshwater and marine stages of salmon production.

- The British Trout Association represents 80% of UK trout production, and members include trout farmers and feed suppliers.
- The Shellfish Association of Great Britain whose members include shellfish farmers, fishermen, fishermen's Associations, processors, commercial traders and retail companies.

There are also a number of smaller regional/sector trade bodies in the UK (e.g. Association of Scottish Shellfish Growers, Welsh Aquaculture Producers' Association, British Marine Finfish Association, Scottish Shellfish Marketing Group, Shetland Aquaculture).

A number of production standards operate in UK aquaculture (e.g. the Code of Good Practice for Scottish FinFish Aquaculture, Label Rouge, RSPCA Freedom Food, Quality Trout UK). In addition, most retailers have Codes of Practice and/or standards. Interest in organic aquaculture remains limited within the UK – there were no organic trout farms and only 3% of salmon production was certified as organic, with no indication of increasing uptake.

Issues of special interest

Issues of relevance to UK aquaculture in 2012 included:

- Investment in large scale recirculation farms for production of salmon smolt, reducing dependence on freshwater availability and the vagaries of climate;
- Emergence of AGD as an important disease issue in seawater salmon;
- Development of interest in farming cleaner fish (wrasse, lumpsucker) for control of sea-lice in marine salmon farms.
- The UK's Farm Animal Welfare Committee initiated two consultations on welfare of fish a) on farms and b) at slaughter reflecting continued (but decreased) attention.

Outlook for 2013 and 2014

UK aquaculture production can be expected to increase. The Scottish Government supports its aquaculture industry's aim to increase by 2020 salmon production by 28% (from 164,380 tonnes to 210,000 tonnes) and shellfish (mainly mussel) production by 107% (from 6277 tonnes to 13,000 tonnes).

4.27.7 Data Coverage and Data Quality

Data quality

Under aquatic animal health regulations, all aquaculture production businesses (APBs) are required to be authorised by the regional competent authorities for fish and shellfish health. There are three separate bodies covering England and Wales, Scotland, and Northern Ireland, which have a full overview of farm sites and businesses. All APBs are included in an annual census which collects information on species, production volumes, systems and employment; completion rates approach 100%. Census data was provided direct from the administrations in England and Wales and Northern Ireland, and extracted from summary publications for Scotland. Census totals for the three regions were summed to provide UK totals. **Total Sales (Tonne) were therefore fully recorded in 2012 and can be considered precise.**

Typical farm gate prices (GBP) were based on estimates by experts and producer organisations. Turnover (i.e. sales) was estimated as volume x estimated farm gate price. All GBP values were converted to € values using a 2012 conversion. **Turnovers are therefore estimates and can be considered as good.**

Statistics on employment were partially recorded within the censuses:

- Numbers of full-time and part-time employees in Scotland and Northern Ireland, and additional data on numbers of male and female employees and full-time equivalent of part-time employees in England and Wales. **The total number of employees were fully recorded and can be considered exact. Data on numbers of enterprises (wrt number of employees) can be considered fully recorded and precise.**
- Numbers of male and female employees were only recorded for England and Wales, and shellfish businesses in Scotland. The proportion for England and Wales was used to estimate the gender split in Scotland and Northern Ireland. **The numbers of male and female employees were therefore estimates which can be considered good.**
- Direct data on total FTE was only collected for England and Wales. For Scotland and Northern Ireland, an FTE of 0.45 was assumed for all part-time staff. **Total FTE are therefore estimates which can be considered good.**
- Census data on male and female staff was only collected for England and Wales, but not attributed to full or part-time staff: where enterprises employed female staff these were preferentially attributed to part-time staff if present (an assumption based upon expert opinion), to enable calculation of male and female FTEs for each enterprise. The proportions of male and female FTE in the total FTE for England and Wales was applied to the total FTEs for Scotland and Northern Ireland. **Male FTE and female FTE are therefore estimates which can be considered good.**

All other data was collected by a questionnaire survey (probability sample survey approach) conducted by a consultancy firm:

- A database was produced of all UK aquaculture enterprises (n=641) from data supplied by the regional competent authorities
- Every enterprise was contacted by e-mail or post and provided with a questionnaire
- Non-respondents were followed up by telephone and email contact
- 88 responses were received, equating to a 14% response rate.
- Of the questionnaires completed, response rates for individual questions varied between 27% and 100% (median 54%).
- The responses were divided into segments (salmon, trout, mussel, etc). The proportion of responses in each sector varied between 0 and 19%. However, response rate appeared non-random, with selection apparently biased towards smaller businesses.
- Values for most variables (Subsidies, Other income, Imputed value of unpaid labour, Energy costs, Raw material costs: Livestock costs, Raw material costs: Feed costs, Repair and maintenance, Other operational costs, Depreciation of capital, Financial costs, net, Extraordinary costs, net, Total value of assets, Net Investments, Debt, Raw material volume: Livestock, Raw material volume: Feed) were estimated by extrapolation (based upon the proportion the respondent businesses represented of total production volume). Due to the large degree of extrapolation and potential bias, **these estimates are considered weak.**
- From FTE and salary responses, pooled average salaries was calculated for i) finfish enterprise employees (n= 32) and ii) shellfish enterprise employees (n=25). Wages and salaries were then estimated for each segment from the FTE. **The Wages and salaries estimates are therefore considered fair.**
- Total income was calculated from the sum of Total sales volume, Subsidies and Other income. **The Total income estimate is therefore considered good.**

The census methodology used to provide certain DCF data for 2008-2011 remained the same in 2012, enabling direct comparisons and providing confidence in the data. However, a new survey methodology was introduced to provide data for the Expenditures, Capital Costs, Capital Values, Inputs and production, and Performance indicators (Table 4.27.3). This methodology needs to be improved to provide more reliable estimates in future.

Data availability

Data for the aquaculture sector is published once a year in an aggregated form. Scottish aquaculture statistics are available from www.scotland.gov.uk/Topics/marine/science/Publications/FRS-Reports/FRS-Surveys, and the collated UK statistics from www.cefas.defra.gov.uk/publications-and-data.aspx.

Confidentiality

The segments reported on in the UK generally include more than 5 enterprises. The exception is the single sea-bass enterprise which has received significant grant funding and is considered a unique pilot recirculation farm.

Differences in DCF data compared with other official data sources

The volume and value data submitted to DCF should correspond exactly with that submitted to FAO and EUROSTAT as it derives from the same census. However, slight differences occur because:

- data is combined differently, e.g. within Eurostat rainbow trout and brown/sea trout production is allotted to freshwater and seawater production, but DCF submission requires all trout to be combined and is consequently reported under freshwater.
- DCF data production volumes and values combines data on harvest production with hatchery and nursery production, whereas these are reported separately in Eurostat.

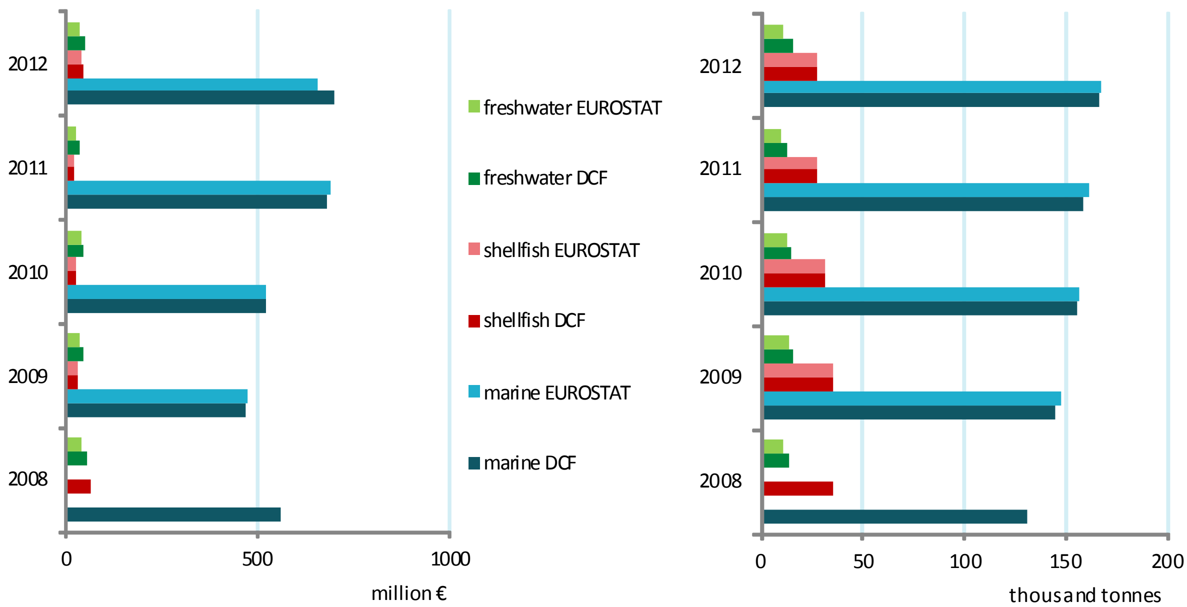


Figure 4.27.4 Comparison of DCF data with EUROSTAT data for UK: 2008-2012

5 SPECIAL TOPIC: AREAS FOR GROWTH IN THE EU AQUACULTURE SECTOR.

5.1 EU Overview

5.1.1 Introduction

Aquaculture production can be defined as the human cultivation (farming) of aquatic organisms such as fish, shellfish and plants in marine, brackish or freshwater. Aquaculture can be distinguished from other aquatic production by the degree of human intervention and control. The production process is determined by biological, technical, economic and environmental factors, which, to a large extent, are under human control.

Worldwide, the production of aquaculture products increased rapidly from about 3 million tonnes in 1970 to 90 million tonnes in 2012 and is the fastest growing animal food producing sector in the world. The success of the sector is mainly due to a high degree of technical innovation going from relatively extensive to more intensive production. Human intervention during different stages of production, such as breeding, feeding, growing, transport and marketing has been significant. The sector is still relatively young and has the potential for further growth and development (Asche and Bjørndal 2011).

Even though the aquaculture sector, on a global level, has experienced high growth rates, development has been unevenly distributed. China is the world's largest producer of aquaculture products and accounts for more than half of the total finfish production. Production in China increased by an average of 8% p.a., in the period 1990-2012. The leading salmon producing countries, Chile and Norway, together grew by 14% p.a., whereas Vietnam, which produces pangasius, grew by 17% p.a. during 1990-2012. In contrast, the average growth in aquaculture production in the OECD countries excluding Chile and Norway is just below 5% p.a. over the same period. In most EU countries aquaculture production has been stagnating or decreasing.

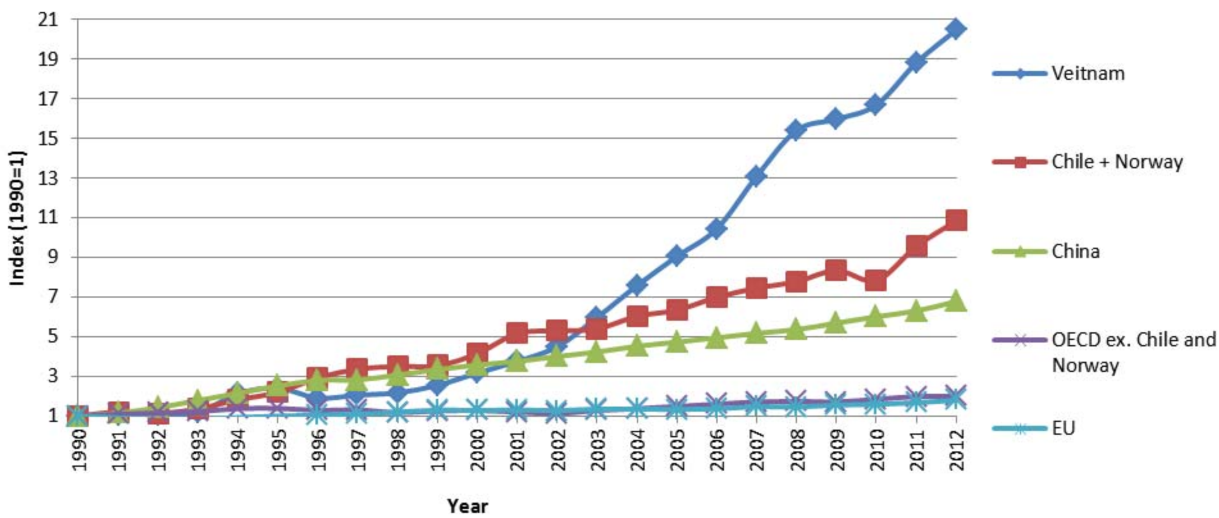


Figure 5.1: Growth in aquaculture production in selected countries 1990-2012 (1990=1).

Source: FAO - Fisheries and Aquaculture Information and Statistics Service - 02/09/2014.

Furthermore, in Figure 5.2 the relative importance of the EU aquaculture sector is shown compared to the total world production. The relative importance of the EU aquaculture sector has been declining despite the fact that the volume and value in absolute terms has been increasing. In other words, even though EU aquaculture has expanded, production in other regions of the world has increased even faster. Over the period 1990-2012, EU production has decreased from 6% to 2% of global volume and from 9% to 3% of global value.

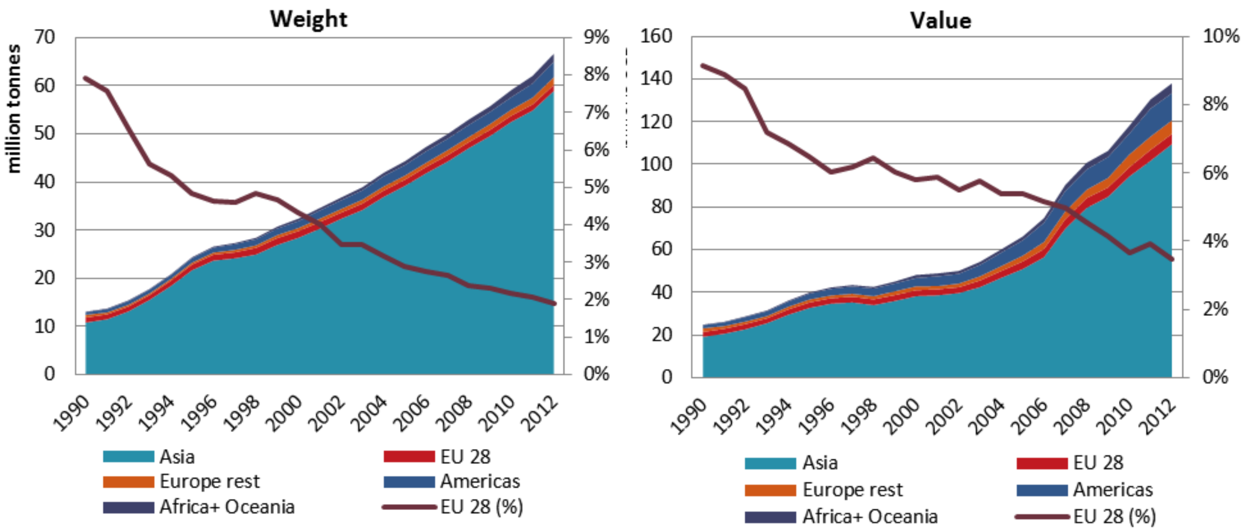


Figure 5.2: World aquaculture production by continent and EU share (volume and value): 1990-2012

Source: FAO - Fisheries and Aquaculture Information and Statistics Service - 02/09/2014.

Globally, the demand for fish is expected to increase due to a growing population, increasing income and increased preferences for health attributes. The growing demand is expected to be met from increase aquaculture production, while supply from capture fisheries is expected to remain at the present level into the foreseeable future.

In many EU countries, strict environmental regulation, bureaucracy (European Commission 2009, OECD 2010) and the widespread use of command and control instruments (OECD 2011) to manage negative environmental externalities may explain the lack of growth. Management with command and control instruments can lead to a sub-optimally low level of aquaculture activity, because they usually do not ensure that the most efficient producers are those that produce, they are inflexible and do not incentivize producers to adapt and develop new technology (Hanley *et al.* 2007). If regulation in the EU has led to a sub-optimally low level of aquaculture activity, the removal of this barrier could provide the opportunity for sustainable growth. Hence, the “optimal pollution level” needs to be identified and enforced and proper management instruments are necessary to ensure cost minimization, efficiency and flexibility. Implementing incentive-based regulation on output, such as individual transferable quotas or taxes, can induce economically optimal management and thereby sustainable growth. Once a regulatory regime is changed, sustainable growth can be achieved until the new regulation is fully implemented and an economically optimal situation is reached. Subsequent sustainable growth is not possible without increasing productivity or introducing new technology to the sector.

However, the removal of the regulatory barrier could also decrease aquaculture production if the sector currently has a sub-optimally high level of activity, or if other sectors which compete for the right to pollute are more efficient than the aquaculture producers. Allowing producers to pollute could create a level of output above the social optimum. Hence removing barriers and increasing production is not necessarily beneficial – it depends on the effect of the barrier on the private costs of the polluter.

5.2 Regulation of externalities

Industrial activity is often associated with the production of harmful by-products (negative externalities) that are discharged into the environment. If the cost of these negative externalities is not internalized by the producers, because markets are not well-functioning or do not exist, public regulation is needed to ensure economic efficiency to avoid them becoming a social cost. The rationale behind this is that the cost of polluting the environment for the individual agent or firm is often less than it is for society as a whole. Therefore, the individual agent or firm tends to pollute more than is optimal for society (Pigou 1920, Coase 1960, MCann et al, 2005). In special cases, private agents can reach an optimal solution without public interference. This requires that an externality has a well-defined property right and that trade in the externality is possible without transaction cost (Coase 1960).

A problem related to the regulation of environmental externalities is that if the regulatory instrument used is not designed to handle the externality properly, it can induce sub-optimality. Sub-optimal economic regulation of an externality can induce welfare losses. Changing a sub-optimal to an optimal regulation can encourage sustainable growth and it is therefore important to identify what regulatory measures can provide an economically optimal regulation. Figure 5.3 shows the position of a private producer. It is assumed that the production of one unit of output is related to a fixed amount of pollution, which is not accounted for in the market price. This is illustrated by the line Marginal Damage (MD). A private producer will produce until its Marginal Benefit (MB) is equal to its Marginal Private Cost (MPC) at point Q_1, because the marginal damage is not taken into account. The total cost of the firm's output for society is the Marginal Social Cost (MSC), which is the vertical summation of marginal private cost and marginal damage. The efficient level of output when the price of marginal damage is taken into account is Q*, which is lower than Q_1. This result indicates that an economically optimal pollution level exists where the level of pollution is above zero. Government can then use different regulatory measures to ensure that the negative externality is internalized in the private producer's production decision.

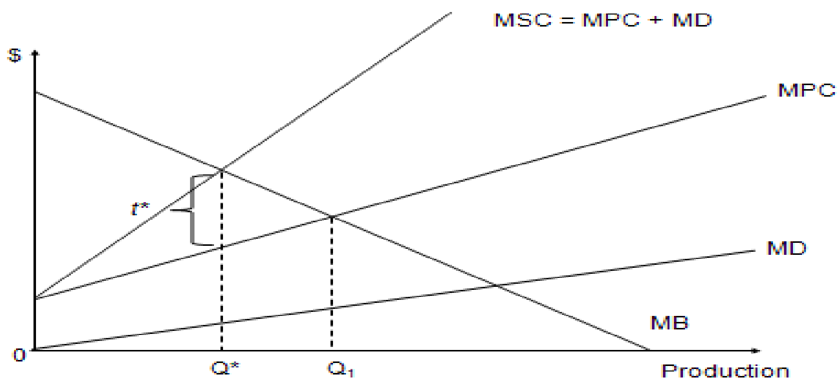


Figure 5.3: Efficient level of output

Source: (Pigou 1920, Hanley et al. 2007).

In many cases, there will be more than one externality present, so that if only one is regulated, it could influence the others. To ensure economically optimal regulation, all externalities must be addressed simultaneously and all polluters must be included. This will secure a sustainable utilization of the environmental resources at a given level of pollution.

Positive Externalities

Externalities may not always be negative in their impact. Shellfish and sea weed farming can act to purify water by filtering out pollutants and add oxygen to the water and the grounds.

In feeding, oysters filter between 200 and 450 liters of water a day. Mussels and other filter feeders act in the same way. In doing so, they improve water quality and clarity. This raises the possibility of developing aquaculture in conjunction with farming for human consumption or simply as a means of water purification (Lindahl 2008; Connecticut Department of Agriculture 2014).

When filter feeders are grown only for water purification, the product is normally reserved for use as agricultural fertilizer or animal feed. This has been the approach in Sweden, where the method has been tested, in order to protect the human-consumption industry from negative consumer perceptions of shellfish that have been used to clean polluted water. Otherwise nitrogen and other pollutants, which remain in the shellfish meat, must be removed after harvest if they are to be suitable for human consumption.

When this is combined with the improved stability of sediments, shellfish farms can be seen to improve the habitat for juvenile fish and if the beds are large enough assist in protecting against coastal erosion.

Apart from the farms dedicated to water filtration, the ”by-products” of others in the form of improved water, habitats, and coastal stability may be seen as positive externalities enjoyed as a result of the initial production. As such they have a value, adding to the value to society as a whole of the aquacultural activity.

5.2.1 Command and Control regulation

The customary approach to handle externality problems which affect the environment is through command- and control-based regulations (Hanley *et al.* 2007). An example of a command and control system is a technological standard, which enforces the use of a particular technology for pollution reduction in certain industries. A technological standard leaves no room for the development of new more cost efficient technologies and is, therefore, not cost effective. Another example is a performance standard, which sets an emission maximum limit for each individual polluter. A performance standard offers some flexibility in meeting the pollution goals, and if all polluters are identical, it can ensure economic efficiency. However, this is unlikely, and a performance standard is, therefore, usually not cost effective.

Command and control regulations primarily focus on preventing environmental pollution by stating how a firm should manage pollution directly or indirectly during the production process. In general, such approaches depend on a detailed regulation and control program. Command and control regulations are characterized by limited flexibility to achieve a goal of a certain level of pollution or a certain amount of pollution reduction (Hanley *et al.* 2007).

If a management system is to be economically optimal, it is insufficient that it can ensure a given environmental standard as it also needs to ensure that the production is as efficient as possible within the limits of environmental sustainability. Furthermore, the regulation should be as flexible as possible to adjust to changes which affect the behaviour of the pollutant and the regulatory framework to ensure optimality over time.

Command and control instruments are intended to achieve a cost effective solution. However, this requires detailed information about the compliance costs of each firm and that a different standard is set for each pollution source. It is unlikely that this information will be available to regulators at a reasonable cost. In contrast, economic incentive-based instruments facilitate a cost effective allocation without the government needing such detailed information. Incentive-based instruments such as transferable quotas, taxes and subsidies for pollution prevention can, if used properly, secure economically optimal management.

5.2.2 Economic incentive based regulation

An incentive is a factor that motivates people or firms towards a particular course of action, or counts as a reason for preferring one choice over the alternatives. Economic incentive-based regulatory instruments use economic means, directly or indirectly, to motivate polluters to reduce environmental pollution or the risks imposed by their production process (Hahn and Stavins 1991). These instruments typically provide financial rewards for reducing pollution, and impose costs on various types of pollution. According to economic theory, incentive-based instruments, such as pollution charges and tradable permits, are more cost effective than traditional forms of command and control regulation (Hanley *et al.* 2007). Finally, incentive-based regulation can encourage innovation and technological change in the management of pollution (Jaffe and Starvin, 1995).

Incentive-based regulation such as taxes, subsidies and transferable quotas can provide polluters with economic incentives to reduce pollution to a given level, and secure an efficient allocation of production between producers. This depends heavily on the regulatory authority setting the correct levels of taxes etc. to achieve the economic optimum.

Taxes or emission fees on pollution can ensure economic efficiency (Pigou 1920), where the most efficient producers will be those who produce. This requires that the tax rate is determined correctly, which means that all polluters face the same tax per unit of pollution. Furthermore, the tax should be equal to the marginal damage which results from the efficient level of pollution. Figure 5.3 shows the optimal tax t^* on production, in the special case where the production of one output is related to a fixed amount of pollution, the tax on pollution will be equivalent to t^*. A tax on pollution raises the private producer's marginal cost and, therefore, the producer will reduce pollution accordingly. If one producer is more efficient than the others in terms of reducing the cost of pollution, the producer will have a competitive advantage and the opportunity to outcompete less efficient producers.

Government grants or subsidies for pollution reduction can also provide economic efficiency (Pigou 1920). If the subsidy is determined correctly, private producers will receive exactly the same amount of compensation for reducing pollution by one unit, which is equal to t^* in Figure 5.3, if the production of one output is related to a fixed amount of pollution. The argument for the private producer to reduce his pollution is that the marginal cost will exceed marginal benefit in situations where pollution surpasses the desired level, because the payment of subsidies is reduced.

Tax on pollution and compensation for pollution reduction thus provides the same economic result, but the distributional implications are different. Using a tax, the government will receive tax revenue, whereas polluters will receive a payment which is equal to the tax revenue when subsidies for pollution reduction are used. However, there are political difficulties in subsidizing polluters to reduce production.

According to Crocker (1966), Dales (1968) and Montgomery (1972), tradable pollution permits can ensure an economically optimal solution at the least cost. A system of tradable quotas under an overall pollution restriction is known as a cap-and-trade system. The system achieves an optimal solution because the individual polluters will trade their quotas until they face the same marginal cost of increasing pollution by one unit under a given pollution restriction, which is equal to t^* in Figure 5.3. If one producer is more efficient than the others in terms of reducing pollution, the producer could either produce more, or sell parts of the quota, which will give him a competitive advantage over the less efficient producers. This will ensure that the most efficient producers are those who produce. An advantage of the use of tradable quotas is that it requires minimal information, as one only need determine a total quota which is then allocated among polluters. However, determining the “optimal” amount of pollution for quota trading, as well as for taxes and subsidies, is the difficult part (Hanley *et al.* 2007).

The distributional implications of tradable quotas will depend on how the permits are allocated initially, but the initial distribution of quotas has no effect on the final optimal outcome. The pollution permits could either be handed over to the producers who are engaged in polluting activities (grandfathering), or they could be sold at an auction to the polluter with the highest willingness to pay. If government chooses to use grandfathering, the generation which receives the initial pollution rights will receive the value of the pollution rights, whereas the next generation of polluters will have to pay to be able to pollute. If the government instead uses an auction to sell the initial pollution permits, the government would receive the initial value of the pollution rights for the benefit of society as a whole, whereas the polluters would have to pay to be able to pollute. Though the latter would appear to be clearly preferable, when the system has been introduced in wild fisheries, allocation rather than auction has frequently been preferred as an incentive to the industry to accept imposition of the constraints.

If there is uncertainty about the cost of pollution reduction, the choice of the optimal regulatory instrument must be considered carefully. If the marginal social benefit of reducing pollution is inelastic, the cap and trade system is preferred to emissions fees, whereas the opposite is the case if the marginal social benefit of reducing pollution is elastic. Furthermore, tradable emission rights are preferable when the emission under consideration has no local impact (uniform mixed pollution). If local concentration is important (non-uniform pollution), tradable ambient permit systems are theoretically preferable (Atkinson & Tietenberg 1987, Tietenberg 1995, Stavins 1995, Ermoliev *et al.* 2000, Straeten *et al.* 2011).

5.2.3 Evaluation of regulatory systems

To evaluate regulatory systems or instruments, the following four criteria can be used.

The environmental effectiveness of a system depends on its success in achieving the regulator’s objective. An example could be the aim of reducing nitrogen pollution to a certain level. The effectiveness of a system is often case- or context-specific. The choice of system can depend on the risks associated with an increase in pollution, or if the objective is to control the costs of pollution.

The economic efficiency of a system depends on achieving the aims of the regulator at the lowest possible cost. In theory, incentive-based systems are more cost-efficient than command and control systems (Hanley *et al.* 2007). For both types of system, it is necessary to consider the cost of control and enforcement. The use of emission charges requires information about the discharged pollution and the value of the damage to be able to set appropriate charges, whereas the use of a tradable permit system requires that the emissions from producers are in accordance with the producer's permit and that a well-functioning market for permits is established. Furthermore, transaction costs also have to be accounted for when using a tradable permits system. If transaction costs are high, they can potentially be a barrier to trade and the potential cost-saving will not be realized (Stavins, 1995).

The flexibility (adjustment to prices, new technology and other externality-induced changes) of a system depends on its ability to adapt to changes in markets and technology and in social, political and environmental conditions. In cases where fixed rates of pollution are used, price changes can be problematic if the system is not designed to deal with this automatically. In this case, tradable permits are more flexible because the transactions of permits between producers are market-based.

The distributional implications of a system depend on how the system influences the distribution of costs and benefits among the members of society. Regulators need to identify the winners and losers from a certain regulatory measure. In the end, whether losers should be compensated and winners should pay is a political question.

It is important to choose a proper regulatory instrument that induces optimal management and satisfies the criteria listed above, so that the regulation does not become a barrier to growth.

5.3 Administrative and Regulatory barriers

There can be many reasons for the absence of sustainable growth in EU countries and many barriers exist. In the following, the most important administrative and regulatory barriers that have been recognized and accepted for affecting growth in the EU are listed.

5.3.1 Licenses

One of the recognized constraints identified is the lack of new licenses issued. In the primary aquaculture sector there have been very few authorizations of licenses being issued over the past decades. This is a major problem, because the facilities used for aquaculture production today are more or less fully exploited, which means that production cannot increase without more licenses. The available information suggests that in some Member States authorization procedures for new aquaculture farms and for renewal of existing permits or licenses can take up to 2-3 years or more to complete.

In comparison, the average time for completing the authorization procedure for aquaculture farms in Norway is about 6 months after the introduction of the "single contact point" approach. The aquaculture sector is a sector with high risk (Asche & Bjørndal 2011). The long inception time for new or renewal of aquaculture production permits and licenses creates even more uncertainty, which makes the sector less attractive to investors.

5.3.2 Spatial planning

Spatial planning in aquaculture production is important, because the aquaculture sector competes with other industries for space on land and at sea. Furthermore, the location is important for reducing the local environmental effects, such as organic material, nitrogen and phosphorus and for limiting the risk of transmitting diseases to other farms and to wild fish stocks.

At the moment, the handling of spatial issues is decentralized to municipalities in Denmark and Norway, regions in Germany and most other EU countries (OECD 2011). The problem with decentralized planning is that the location of a farm can be suboptimal, which can adversely affect other farms or industries located in other municipalities, regions and states. Furthermore, when the issue of spatial planning is addressed, it usually only considers one kind of industry, or a limited number of stakeholders. This way of handling spatial planning is not optimal. Optimal spatial planning has to address all stakeholders which are affected by the externality at the same time, because they influence each other.

In the future, new data systems such as GIS and remote sensing technologies could be important tools for optimal spatial planning. Taking into account the distribution of organic waste and spreading of diseases using data on local currents and environmental carrying capacity to find the optimal location of farms.

At the moment the issue of space is perceived as a hindering factor for the expansion of both the marine and fresh water aquaculture sector. Looking at the surface and coastline occupation by marine aquaculture sites is rather limited and the availability of space along the coastline in absolute terms seems to be more than adequate to accommodate an expansion or diversification of the marine aquaculture sector. The findings from the spatial analysis of existing sites show that the problem may rather be that there is a need to identify the most suitable sites through an integrated marine spatial plan. This is particularly important for relatively small and new industries like the aquaculture sector, which struggles in competing with larger and more established economic activities in the coastal areas. Land-based aquaculture is in many cases competing with the much larger agriculture sector not only for space, but also for the rights to discharge nitrogen, phosphorus and organic material to the water environment.

Member States often weigh other activities higher than aquaculture production because it has been economically rather insignificant and had a rather bad reputation for impacting the surrounding environment negatively. On top of that a more and more complex environmental legislation protecting the water environment make the effort of promoting aquaculture production even less attractive. In the end this negative perception and the lack of political determination to promote a higher aquaculture production by increasing the availability of suited aquaculture production sites and licenses are resulting in a stagnation of the sector, because the potential growth cannot be realized.

5.3.3 Use of Water resources

The use of water resources especially inland fresh and groundwater is also an important issue. Fresh water is often a scarce resource and there is competition to use this for human consumption, animals or irrigation of crops etc.

Competition for water usage has been an issue for aquaculture production in special in those areas where other industries using water resources are already established. Conflicts with the tourism industry in the Mediterranean, and with agriculture, wild fishery and aquatic sports in other regions, have been reported for several state members. Lobbying local authorities is easier for already existing industries than for newcomers, resulting in delays or even rejection of licenses.

New regulations focused on preventing inland water depletion in the Southern EU countries by limiting the amount of allowed water use. These regulations have imposed constrains for freshwater aquaculture production which not only has a barrier for increase the activity but also imposes decreases in many cases.

5.3.4 Multi-Level Governance

One of the bottlenecks for growth in the aquaculture sector is the multi-level governance which has resulted in a burdensome bureaucracy. Aquaculture is a relative small sector in many countries and the decision making process is split both horizontally and vertically in a multiple decision-making process. This creates problems in terms of having experts dealing with aquaculture authorization on all levels, such as handling of different permits and licenses. Experts are needed at all levels because the legislation is very complex involving the use of land, water, issues of food security and pollution. This involves many different governmental institutions when a license is to be issued. An introduction of a “single contact system” where the applicant only has to be in contact with one authority could be a solution to handle some of the problems described above.

The vast majority of EU aquaculture producers are SMEs and many are family-owned micro enterprises. DCF data suggests that microenterprises represent around 90 % of all aquaculture enterprises in the EU and to them a key to growth and development is a reduction of administrative burdens, costs and uncertainties related to the approval of production licenses. The relative weight of these costs compared to turnover and number of employees can be up to ten times higher for SMEs than for large companies.

High costs and lead time can hinder the development of an economic sector, and play an important role in determining the overall competitiveness of a given sector. At the moment, there is only a limited amount of information available on the delays and costs connected to the development of a new aquaculture farm or renewal and rebuilding of existing farms. There is a growing need to identify where bottlenecks are and what factors have the highest impact in terms of administrative burden.

Furthermore, the diverging interpretations and applications of legislation between member states make investments in aquaculture more uncertain. If the investment in new technology can only be used in one country this limits the possible gains from an investment and can limit the available capital for aquaculture investment in the EU. This also limits the possible spill-over effects from technological innovation between the countries in the EU.

5.3.5 Competition at fish markets

Competition at fish markets from improved fisheries management is important because the world market for fish is a highly competitive and global market (Nielsen, M et al. 2014). Over the past twenty years, the supply from capture fisheries has stagnated, while the supply from aquaculture has increased. Looking at this trend, one would expect that increased supply and market share would originate from aquaculture. However, as fisheries management improves (Homans and Wilen 1997, Wilen 2000), the competition from capture fisheries may be an important factor which limits growth potential in aquaculture in the long run. Today, 32% of global fish stocks are overexploited, depleted or recovering (FAO 2010). At the same time, the United Nations Environmental Program (2010) estimates that an overcapacity of 80-180% exists in global fisheries. Hence, many fish stocks are exploited above the maximum sustainable and the economic yield. The improved fisheries management of these stocks can increase supply. In addition, reduced global overcapacity reduces the cost of fishing and thereby prices on the competitive world market.

Increased competition from increased supply and reduced prices can be a barrier to growth for some aquaculture species. The barrier is considered relevant in market segments where the capture fisheries supply a large part of the market, and where the fish produced are substitutes. The issue is considered especially relevant for infant aquaculture industries, which are not well established and for which the cost of developing new specialized production technology is still high. Even though improved fisheries management can affect aquaculture growth potential in some specific segments, the overall growth potential is still considered to be favorable for the aquaculture sector (Asche and Bjørndal, 2011).

The aquaculture sector has the competitive advantage that the sector has a higher degree of control over the production process (Ache, Guttormsen and Nielsen 2013) and can deliver at the right time, the right amount in the right quality.

Retail concentration in the food value chain has become a worldwide trend including the emerging economies in developing countries (Digal, 2011). A large portion of food retail sales, including fishery and aquaculture products, in many countries are under control of a few retail firms (Reardon et al, 2010). The increase in market share has been carried out at the cost of the traditional and independent grocery stores, which have dramatically decrease their contribution into the total food supply for final consumers (Jaffry et al, 2003).

The ability of exerting market power, whether horizontal or vertical, by these concentrated retailers has been a matter of concern for the authorities (Asche et al, 2011). Since positive benefits of economies of scale may dissipate in a perfect competitive scenario, large retailers may like to operate in an oligopolistic scenario, by exerting horizontal market power against other retailers (Cotterill & Samson, 2002). The same could be expected vertically, with retailers acting vertically on wholesalers and processors. Asymmetric price transmission at the retail level and backward has been reported in different product categories in the food and seafood markets, however not always indicating backward market power exerted by retailers (Asche et al, 2011; Digal, 2011; Fofana & Jaffry, 2008).

5.4 Focus on technical externalities affecting growth

In this chapter the most important externalities in aquaculture production are listed and related to the different kind of aquaculture production.

5.4.1 Externalities in aquaculture

Aquaculture production, in most cases, interacts with the surrounding aquatic environment and is dependent on good environmental conditions. The problem in aquaculture, in terms of externalities, is that more intensive production can adversely affect the surrounding environment and wildlife.

The discussion about the local environmental impact of aquaculture started many years ago and can be traced in Denmark, for example, as far back as the 1930s. It was related to the establishment of new farms up-stream of already existing farms (Hessel 1993), and their potential negative effects such as diseases and reduced water quality. On a global level, the issue received incipient negative attention during the 1980s and 1990s as the farming of shrimp and salmon became more intensive. In particular, Shrimp farmers' detrimental effects on mangrove forests, the salinization of farmland and eutrophication received negative attention in the media. In relation to salmon and trout farming, the negative externalities which have received the most attention are the use of chemicals and antibiotics, the escape of fish, the transmission of diseases to wild fish and other farms, eutrophication due to organic waste and nitrogen and phosphorus pollution.

The negative externalities can be divided into two types depending on the effect the externality has on the producer who inflicts the damage. If a negative externality, in any way, affects the productivity and profitability of the farm, the farmer has an incentive to reduce the negative effects that "feedback" to the farm. On the other hand, if the negative effects do not negatively influence farm profitability and private agents cannot reach an agreement (Coase 1960), government regulation can force farmers to include the negative externalities in their production decisions.

5.4.2 Organic material, nitrogen and phosphorus

An important externality in aquaculture production is the discharge of organic material, nitrogen and phosphorus. The undesired discharge comes primarily from fish faeces and feed that is not utilized by the fish. This over-fertilization of rivers and coastal inlets can lead to algal blooms and eutrophication, which can reduce the populations of the affected wildlife. When the organic material decomposes, it can also produce toxins such as ammonia. For sea cage farms, the reduced level of oxygen can influence production and profitability because it increases the risk of diseases and toxins, which influences the farmer's production decisions. In the case of land-based farms, producers depend on the quality of the water which flows in and out of the farm. However, waste-water which is discharged into rivers does not influence productivity and has no feedback effect on production (Nielsen 2011). If a farmer has two or more farms located downstream from each other, he may consider the influence of the discharged externalities on the next farm.

Today, the regulation of organic material, nitrogen and phosphorus is handled by command and control regulation in many countries, such as feed quotas, production limitations, farm size, and aquaculture extension moratoriums. This way of handling the externalities is not optimal, because it does not ensure that the most efficient producers are those who continuously produce. Furthermore, the systems are often inflexible and are not necessarily changed when the addressed externality has been reduced. Another problem is that the externality is not directly regulated, which can lead to inefficiency because the regulatory constraints used may address the problem inappropriately. This is a general problem either because an actual measurement of the externalities often does not exist or is too expensive to obtain. If the regulatory issue is not addressed properly, it can cause a barrier to growth (Nielsen 2012; Nielsen, R et al. 2014).

An optimal regulation should address the actual externality directly thereby providing producers with an incentive to optimize production under the given environmental constraint. Incentive-based regulation, such as transferable pollution quotas, could provide the producers with an incentive to reduce the externality, either through changing production or adapting new technology. Furthermore, the regulation will secure that the most efficient producers are those who produce, while flexibility is ensured through the market allocation of quotas. Changing the existing regulatory framework could lead to an optimal situation, thereby inducing sustainable growth (Nielsen 2012; Nielsen, R et al. 2014).

One important issue concerning regulation of organic wastes, nitrogen and phosphorus, regardless of the location of the farm i.e. located on land or at sea, is the carrying capacity of the surrounding environment. The intensity of the damages could be very different since the carrying capacity of different places varies significantly. For example, rivers and fjords could be more prone to eutrophication.

The current technological advancement makes it possible to measure and monitor organic wastes, nitrogen and phosphorus from land based farms. On the other hand, it is a lot more difficult to do so in the sea-based farms. The measurement and monitoring issues have a vital effect for the choice of regulation mechanisms. For example, command and control regulation/standards will be generally appropriate for regulation of organic wastes on the sea-based farms whereas in the land-based farms economic instruments will be more efficient (since monitoring and measurement are possible).

5.4.3 Escape of farmed fish and genetic pollution

The problem with escaped fish from aquaculture farms is that they can have a negative impact on wild stocks, because the escaped fish compete with the wild stocks for feed and breeding grounds, while the mix of genes between farmed and wild fish may adversely influence the wild stock's ability to survive.

The escape of fish from sea cage farming is caused by damage to growing facilities due to bad weather conditions such as storms or accidents related to work at the production site, e.g. damage to nets from ship propellers. The way to handle the escape of fish is to develop more robust growing facilities which can handle storms, etc. However, accidents related to work at the production site are more difficult to prevent.

The optimal way to handle the escapes is to let the producers pay for the damage inflicted. The producers could pay fishermen to catch the escaped fish, but this is rather difficult and expensive in praxis. A future possible way of handling the escapes, in relation to the mixing of genes between wild and farmed fish, could be to genetically modify a fish so that it is unable to breed.

The problem of escapees is mostly related to sea-based farms, whereas the probability of escapes from the more confined land-based farms is less. Thus, higher standards might be might be needed on the sea-based regulation especially in upgrading the cage/pen system.

5.4.4 Diseases, antibiotics and chemicals

In intensive animal production, such as pigs, chickens or fish, animals are raised in a controlled environment with high density to reduce cost. The high density increases the risk of diseases, which is often solved with the use of antibiotics and chemicals. Chemicals can also be used to improve the conditions at the production site, and to clean growing facilities. The problem is that the use of antibiotics can lead to antibiotic resistance while chemicals can be harmful to humans, animals and the surrounding environment.

The existing governmental regulation is based on command and control regulation which sets limits for the use of antibiotics and chemicals. A more optimal regulation would be to provide the farmers with an incentive to shift to other more environmentally friendly measures to prevent diseases. The relocation of farms to more suitable production sites and more research to develop new vaccines could be an alternative. An example of a more environmentally friendly way of handling a parasite problem in sea cage farming is to introduce another species of fish (Ballan wrasse) to the sea cages, which eats the sea lice off the salmon. This has, to some extent, reduced the problem of sea lice in Norwegian salmon farming.

Once again, the most efficient regulatory means to control diseases, antibiotics and chemical are different depending on the production system such as traditional fresh water farms, closed recirculation farm or sea cages.

5.4.5 Feed dependency - "The fishmeal trap"

The "fishmeal trap" is a barrier which is specific to aquaculture production. The barrier has been named the "fishmeal trap" because one of the most important ingredients in aquaculture feed is fishmeal. The concept of the fishmeal trap is that when no more fishmeal is available, growth in the aquaculture sector will cease. Furthermore, Guttormsen (2002) showed that feed is the most important input in intensive aquaculture production and that the substitution possibilities between feed and other inputs are almost non-existent. In the 1970s, the use of fishmeal and oil in aquaculture was insignificant, but in 2009, the aquaculture industry consumed 63% of the fishmeal and 81% of the fish oil produced (IFFO 2011).

Despite these difficulties, the aquaculture sector is still growing. The reason is that the aquaculture feed-industry managed to substitute at least some of the fishmeal and oil with vegetable protein and oil, such as soya, when the fishmeal resources were becoming more limited and prices were increasing (Asche and Tveterås, 2004; Kristofferson and Anderson 2006; Asche, Oglend and Tveterås, 2013). If it is possible to substitute fishmeal and oil with other ingredients, the fishmeal trap will not be a barrier to growth.

On the other hand, fish oil contains the important omega 3 acids, which are valuable health attributes, especially in carnivorous species such as salmon and trout. If the content of fish oil becomes more limited, so will the positive health attributes. A way to solve this issue in the future could be to develop genetically-modified omega 3 acids from vegetables. So far, this issue has not been solved and the fishmeal trap may, therefore, be a technical barrier to future growth in the aquaculture sector.

5.4.6 Domestication of new species

Research in aquaculture species, technology, feed, vaccines and markets positively affect the whole aquaculture sector by increasing the knowledge and knowhow in the sector and increasing the possibilities of exploiting new markets.

However, one should be aware that searching for new products is a very costly and time-consuming activity. The whole process of understanding and experimenting with breeding and on-growing can be extremely complex. Creating new production environments which replicate those in the wild and which provide the product being farmed with the correct nutrients, water temperatures and salinity is labour intensive and therefore expensive.

Even when the product can be produced successfully by farming it has to be marketed and that may mean creating new markets, or expanding or conquering from others the existing ones. Taking this into account the possibility of expanding existing markets and production of already understood species should not be overlooked. It may be economically more efficient to increase exploitation of existing knowledge than to struggle to find new products. In other words, expansion of the aquaculture industry may be better achieved by persuading consumers to purchase more of what they are already familiar with than by trying to persuade them to diversify into species that are new to them.

The potential of new species for aquaculture is being considered as a tool for improving market returns. However, the experience with the introduction of new species in the aquaculture industry reveals that it is not an easy goal, requesting long periods of research and important investments in developing new technologies, products and markets. Besides these technical difficulties there is the risk of product cannibalization, and the possibility that these new species may grow at the cost of already existing aquaculture industries.

Despite different estimation methodologies can be used, success of these potential new species is very uncertain and predictions based in marketing research and forecasting may be biased since consumers' are unable to provide an accurate assessment of a non-existing product. In the majority of cases with farmed fish species consumers may be using the wild equivalent as reference for their assessments, which may distort estimations of market prices (Fernandez Polanco & Luna, 2012).

Several new species have been introduced in the EU markets in the last decades, including imported tropical species. While some species like pangasius have achieved relevant market shares at the cost of other white fish fillets, the most appreciated and consumed species like cod, hake and salmon remain at almost the same levels since the beginning of the new centuries or have even increase production and sales. In other segments, more traditional species are being replaced by cheaper substitutes of the same group whether locally produced like Manila clam (Ruditapes philipunarum) or imported from outside the EU like tropical crustaceans such as Vanamey and tiger shrimp. Beside these examples, most of new seafood species introduced or developed in the EU markets remain as niche markets and their growth is constrained by the lack of economies of scale.

Scale is an important factor in facilitating aquaculture growth. Large volumes of production provide incentives for companies producing inputs for aquaculture such as feed and harvesting technology. Such involvement from providers is indeed a booster for the activity. Suppliers of aquaculture inputs may not be much interested in developing products for new species until these reach a minimum volume (Tveteras & Heshmati, 2002). This fact may result in an important limitation for growth and mass market success if new species remain focused on niche markets.

In the UK attempts have been made to farm cod. These took place in a Scottish loch and were backed by a major multiple store. However, as the North Sea cod stock has begun to recover and with plentiful supplies of North Sea haddock available, the price has fallen and what was at best a marginal enterprise has become unprofitable. A potentially beneficial positive externality arising from cod farming was the idea of rotating the crop with salmon as a means of reducing disease in both species. It seems likely nevertheless that at some stage in the future a return will be made to cod farming given that the physical problem of production has been conquered. It is a matter of lowering costs, which is to be expected with larger scale production, and possibly increasing demand as the world seeks to feed its expanding population.

In Denmark, there have been several attempts to introduce new species, but only one species remain, pike perch, at a relative small and lucrative market. The general conclusion that have been drawn in Denmark is that it is more valuable to improve production systems, breeding, feed and other inputs for species that are already in the market. The main focus and support is therefore directed to the main species already produced, which in the Danish case is trout.

5.5 Summary on externalities affecting growth

A majority of the experts present at the EWG 14-10 identified environmental regulations, difficulties in the licenses process due to multilevel governance and competition for space both on land and in the costal zones as the most important areas to be addressed to increase growth in the EU aquaculture sector.

New environmental regulations implemented in the member states appear as a threat to aquaculture producers, as the design of these policies and regulations aims at targeting other sectors than aquaculture. These policies and regulations do not take into account the special conditions and requirements of the aquaculture industry. This tends to cause additional administrative burdens and problems to the industry, which may require un-proportionally large additional investment in order to accommodate to these new requirements.

New licenses are vital to secure future growth. In most member states, the number of available licenses is found to be too small to sustain growth. One of the main reasons seems to be the requirements and complex bureaucracy, along with the number of different bodies involved, which causes delays and uncertainty in the licenses issuing process. This is especially true for countries with decentralized governments, such as Germany and Spain, where the number of local, regional and national bodies in charge of the concession of the licenses and control of the activities is large and even with overlapped functions.

Access to space and use of water resources are also a common issue in the majority of the countries. Competition for access to water resources across different industries limit the availability of suited aquaculture production sites and the issue of spatial planning is considering as one of the most important issues for achieving the goal of future growth in the aquaculture sector.

In shellfish farming a special issue for achieving growth is the availability of seeds, which seems to be the most important constraint to future growth in the EU shellfish industry. Furthermore, issues of diseases is also an import constrain for this segment in relation to future growth.

Improved public perception of aquaculture products is still an issue, which is pointed out by several countries. The negative public perception can limit the ability for increasing markets shares and improve market returns for aquaculture producers.

Regional issues

In relation to the issues descript by the experts there seems to be some issues that are more important in some region than others:

In the North European countries, the focus on environmental regulation for the in land farms, has advanced the introduction of more and more sophisticated RAS technology. However, to insure future growth the development of the RAS technology most continue. Furthermore, the prices of building the new systems must be lowered to become an economically attractive investment.

In the Mediterranean area a special issue is the lack of available credit due to financial crisis. This seems an issue shared by all the Southern European countries.

5.5.1 Technical externalities identified by the EWG experts

Technical barriers, economic or other, can be the binding factors for industry growth and when they are removed the sector will have the opportunity to expand. However, the presence of technical barriers may not necessarily be a limiting factor in the development of an industry. If the entrepreneurs are unable to exploit the advances that removal of barriers provides the industry, the removal may simply prove unproductive. In other words, the removal of barriers should be focused on areas were the industry will have a competitive advantage to other producers and the skills and knowledge to exploit the new opportunities. Furthermore, the development should go hand in hand with the expansion of the existing and new markets.

Organic material, nitrogen and phosphorus

All countries report that environmental concerns are slowing or frustrating development. The scientific basis for the concerns is not always clear and often rest on speculation rather than evidence. By failing to exploit existing knowledge and skills to the utmost and by imposing costs and delays which may be unnecessary EU entrepreneurs are put at a disadvantage to their competitors elsewhere. Several countries mention that in order to deal with environmental legislation, RAS system or recirculation techniques are a way to go forward.

Escape of farmed fish and genetic pollution

While there is some evidence that miscegenation has occurred in wild fish stocks as a result of inter-breeding with escaped stock (Skaala et al. 2006; Bouret et al. 2011), there is little evidence that this will be harmful either to the species or to mankind and the EWG experts did not consider that it represents a barrier to expansion of the aquaculture sector.

Diseases, antibiotics and chemicals

Research is required on existing species to prevent diseases. This seems especially needed in the shellfish sector. In France there has been serious disruption in the hatcheries to production of Pacific oysters. However the risk is not confined to shellfish. There is a need for research into prevention and the wider impact of prevention methods. However, not all disease risks can be anticipated and rapid scientific and veterinary response to new and unforeseen outbreaks continues to be a necessity.

The intensive nature of production means that disease is a serious risk in all segments of the aquaculture sector. Attempts to control it have led to the use of antibiotics and concerns about the effect on human health. However, the effect of the use of antibiotics and chemical on the environment and humans are not well identified and need further scientific assessment.

Feed dependency - "The fishmeal trap"

Aquaculture, and salmon and trout farming in particular, has long depended on fish meal and fish oil as feed. Recent shortages of supply have led to price increases which in turn have led to some alternatives being discovered, assisted by improvements brought about by selective breeding. The discards ban in the new Common Fisheries Policy may lead to the availability of increased quantities of fish for reduction. However, it is anticipate that the effect will be short-run. Feed shortages will develop as aquaculture spreads and the opportunity to improve feeding and feed conversion rates should not be missed. Thus research, exploring alternatives to existing feed, and to improve the feed conversion rate, through intensive breeding programs is essential to overcoming this significant barrier to development. It will help maintain the industry's competitive advantage.

Domestication of new species

There is more focus on dealing with issues concerning already existing species and not that much on new species. This serves to use current knowledge and skills which is not yet fully exploited. The short run potential of new species for contributing to growth is very limited because of the long period required to study their breeding and growth needs and a lack of knowledge of their vulnerability to disease or environmental factors such as water temperature changes.

Exploitation of positive externalities

In general, there is little understanding of these. This can be seen as a barrier to development because a counter-balance to negative perceptions is being omitted from planning decisions. While they do not represent a barrier to development of the industry, absence of awareness may be. Experiments in Sweden and carbon-reduction successes in Italy point to the potential, but as with the introduction of new species, comprehensive understanding will take time to emerge.

5.5.2 Future outlook for growth (2013-2014)

Reviewing the answers from the EWG expert, the general impression is that the technical innovations introduced to manage or overcome the technical externalities in the European countries only will have a slightly positive effect on future growth, in the short run (2013-2014). A few countries have positive expectation do to the changes in legislation and the issuing of new licenses, which is expected to affect production volume.

A majority of the expert still point out that the administrative issues are far more important to solve than the technical ones. From an economic perspective technical barriers will be solved if there is an economic incentive to do so. However, administrative barriers like the lack of licenses and multilevel governments are not solved this way and create a lot more uncertainty to the sector than technical issues.

It still seems that providing better framework condition for the aquaculture industry is by far the most important issue to solve to lay the foundation for future growth in the European aquaculture sector.

5.5.3 National overview

Each national expert present at the EWG 14-10 meeting, including some experts by correspondents, were asked to answer the following questions in relation to technical barriers affection growth in their country.

- Most important areas to be addressed for production growth (Regulatory/Technical)
  - Pin-point was is the most important issues for your country in relation to the above mentioned points
- New developments in terms of production technology and regulatory measures.
  - Describe if there is any new developments in terms of new technology addressing the above issues (and others) and if there is new regulatory measures being implemented or about to be implemented in the near future?
- Future outlook for growth (2013-2014)
  - What is the results/implication of implementing of such new technologies or legislation/regulatory measures for the future growth in the aquaculture sector?

In the following each countries experts reply is added:

5.5.3.1 *BULGARIA*

Most important areas to be addressed for production growth (Regulatory/Technical)

- Easy access to funding from the European Fisheries Fund for potential aquaculture producers.
- Reducing the administrative burden.
- Most important issue for Bulgaria is providing a national co-financing for the implementation of projects for construction of new aquaculture farms.

New developments in terms of production technology and regulatory measures

The new production technologies, such as recirculation system for production just beginning to be used in aquaculture farms in Bulgaria.

Future outlook for growth (2013-2014)

Growth prospect is limited because the demand for production in the country is low. On the other hand, exports hampered by an unattractive exchange rate of the euro/Japanese yen last years. There is no motivation on the producers side to export the production to China or other country with demand potential.

5.5.3.2 *CROATIA*

Most important areas to be addressed for production growth (Regulatory/Technical)

- Further growth of the sector based on the „*ecosystem approach*“.Investments in new technologies that will allow sustainable growth in line with high environmental, social and economic standards.
- Coastal zone management – improvement in local planning and determination of aquaculture zones with establishment of control mechanisms.
- Improvement of national perception of aquaculture products and increase of national consumption. One of the actions to achieve this should be species diversification.
- Increase of Bluefin tuna quota – according to available data tuna farming is one of the main aquaculture products in Croatia. Since there is large economical interest, and available area rescores, it would be in Croatian interest to increase quota.

New developments in terms of production technology and regulatory measures.

- New regulatory measures have been adopted in line with EU regulations that should make easier to get necessary licenses for start of new aquaculture production.
- Opening of EU market for aquaculture products – by the 1. July 2013 there were import restrictions for Croatian aquaculture products in the EU countries.

Future outlook for growth (2013-2014)

- It can be expected that new political, business and social environment, with expansion of market, will result in increase of production, area under aquaculture and quality of products.

5.5.3.3 ***DENMARK***

Most important areas to be addressed for production growth (Regulatory/Technical)

The most important technical barrier for production growth in Denmark is the discharges of nitrogen and phosphorus, because the aquaculture sector competes with the high intensive agriculture sector of the rights to discharge these pollutants into the water environment. Furthermore, the lack of new licenses being issued multilevel governance and environmental concerns of the above mentioned externalities are the most important areas to be addressed to increase production growth.

New developments in terms of production technology and regulatory measures.

The introduction of model farms in Denmark has driven a huge technical development aiming at reducing the environmental impact from the farms per kilo of fish produced. The goal has been to increase the production volume keeping the environmental impact on the present level, which means that the output of nitrogen, phosphorus and organic material is reduced per kilo of fish produced. Model farms use recirculating techniques to reduce the use of water. The new technical development has succeeded in terms of increased environmental efficiency as well as increasing the economic efficiency taken advantage of economies of scale. The products produced in the intensive farms are aimed for the low end of the market receiving relative low prices per kilo.

On the other hand, the organic sector in Denmark is also increasing but as a much slower rate in terms of production volume. Organic farms are most often more extensive and the environmental impact in terms of nitrogen, phosphorus tends to be higher per kilo of fish produced. However, as the production is lees intensive the point source pollution and the use of chemical and antibiotics tends to be lower. The products produced in these farms are aim for the high end of the market and are more differentiated than from the large scale producers. However, the market for these products also tends to be much smaller.

The latest new farms in Denmark are closed recirculating system, where there is no environmental impact from the farms to the surrounding environment. These systems provide an alternative to the existing farms as the environment is not affected, however this type of farms are very expensive to build and are therefore (at the moment) only used for high value species such as pike perch and organic salmon. These systems might be able to takeover more the production of more species if the cost of building such system can be reduced considerably.

In Denmark, the main focus is aim at improving and optimizing the production and market for rainbow trout as this is the most important species in terms of production volume and value and the one species where the Danish producers have the highest expertise in terms of breeding, feeding, production systems and markets.

In 2012, a new regulation based on individual quotas on nitrogen instead of a feed quota system was implemented in Denmark. The legislation is still under revision and has been revised during 2013-14. The reason is that the changed regulation from 2012 still focuses on regulating some input and how the farmers should produce, instead of focusing on the environmental impact of the farms. Another problem is that the bureaucracy is staggering when the farmers are applying for a transfer from the old to the new system. This means that farmers at the moment have to wait 3 to 5 years on getting a new permit.

There has been a new development on the license policy on sea cage farming. At the moment one new sea cage farm has been licensed under the condition that the output of nitrogen and phosphorus from the farm is removed by using mussels and seaweed. Application for 12 more farms has been handed in, but at the moment they are not approved. In order to get these new licenses it is debated at this moment if these farms also have to compensate the output of nitrogen and phosphorus by producing mussels and seaweed. At the moment it is a considerable extra cost to the farmers if they have to compensate the outlets with mussels and seaweed, because the value of the mussel and seaweed production does not cover the costs at the moment.

Future outlook for growth (2013-2014)

The new legislation has just been implemented and the impact from this change is not expected to be seen before 2015. However, the trend of increasing production in model and recirculating farm and decrease production in traditional farms are believed to continue.

The effect of the new sea cage farm (or farms) are expected to increase production starting from 2015 depending on under which condition these licenses are issued.

The possible licenses of new sea cage farms will have effect from 2015 if they are approved, but if they have to compensate for the discharges of nitrogen and phosphorus it will take at least a couple of years (2017) to reach the full production volume.

5.5.3.4 ***ESTONIA***

Most important areas to be addressed for production growth (Regulatory/Technical)

- Strengthen the competitiveness through targeting investments to the technologies and solutions that improve the efficiency and quality of production;
- The use of domestic market advantage;
- Aquaculture business collaboration and strategic partnership;
- Development of higher value-added and differentiated products;
- Cultivation of species which are suitable for Estonian natural conditions and have high foreign demand;
- Development of supportive business environment for the promotion of aquaculture;
- Specific knowledge and skills acquisition.

New developments in terms of production technology and regulatory measures.

- The completion of aquaculture development strategy for the next seven years (2014-2020) in 2013. The preparation of the strategy was initiated by the Estonian Fish Farmers Association and it supported through the European Fisheries Fund.

Future outlook for growth (2013-2014)

- Preliminary data show that production volumes of the Estonian trout producers are recovering. In addition to operating fish farms the production from the new farms, which have been created with support from the European Fisheries Fund, is expected.

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5.5.3.5 *FRANCE*

Most important areas to be addressed for production growth (Regulatory/Technical)

The increase of the production remains a substantial objective for the coming years: the improvement of the productivity of the traditional sites of breeding, the use of new areas, located rather at opened sea, could allow an increase of the oyster and mussel production in the next years.

An improvement of the present production of shellfish needs that the disease situation for oysters since 2008 must be properly assessed and lead to increase the resistance of oysters to such conditions.

The development of freshwater aquaculture in France is hindered by strong regulatory constraints and a rather negative image on the part of the society.

The health aspects are crucial for the future of fish farming. Regulatory and health governance are being reviewed, in consultation with the profession. Maintenance of the qualification and the protection of the areas free of disease (IHN, VHS) are very important issues to take into account in order to guarantee safety animal health aquaculture farms.

New developments in terms of production technology and regulatory measures.

Recirculating aquaculture systems are not very developed. Only a few aquaculture businesses operate in recirculated or closed circuits and the demonstration of an economically bearable production cost remains to be done for this production system. This type of aquaculture could be a trail to ensure that aquaculture operations are less constrained by the difficulties of access to the sites or by health and environmental regulations (better waste management and recovery of effluents, simplified formalities for introduction of exotic species, reduction of pharmaceutical treatments and securing of livestock from pathogens; production of fingerlings in a bio secure system), but there is, on the other hand, specific constraints (on good animal welfare, on obtaining labels, bio or other, etc.), and the energy cost. With the current production volumes and expenditures of recirculating aquaculture systems the production will need to be concentrated in the more valuable species.

In terms of technological development, advanced research on the food are required. Reflections are pushed on the sustainability of the food fish in general, highlighting the need to maintain a wide range of raw materials first in order to have more room for maneuver according to conditions (availability of raw materials, social acceptability...). Certain raw materials will be interesting but must be the subject of further research/studies because there are technical limitations (algae by examples) or regulatory (flour of insects).

For oyster production, genetic selection will be continued to increase the resistance of animals to diseases. The selected strains will produce genitors to improve the quality of the wild population or be produced in hatcheries for better resisting spat for shellfish farmers.

Future outlook for growth (2013-2014)

Most of the improvements mentioned in the previous paragraph need some more studies to evaluate their feasibility and degree of efficiency on technical and economic aspects.

5.5.3.6 ***FINLAND***

Most important areas to be addressed for production growth (Regulatory/Technical)

- The Finnish aquaculture sector has been strongly affected by the environmental permit policy. Almost all aquaculture producers need to have an environmental permit in order to operate in the sector. The Finnish environmental policy has been inhibiting the intensifying of the Finnish aquaculture production and consequently the sector has not been able to benefit from the economies of scale.
- The aquaculture sector has been increasingly concentrated in the recent years. The ten biggest companies in the sector in terms of turnover made up 64% of the total revenues in 2012.

New developments in terms of production technology and regulatory measures.

- Most recent investments have been made into re-circulating aquaculture systems. However, the production capacity potential of re-circulating aquaculture systems has not yet been fully fulfilled and there is an on-going process of research and development of new aquaculture techniques for Northern environments and testing for new species.
- Finland has a national spatial planning program of aquaculture which takes into account the different uses of marine areas in order to direct the aquaculture production into areas where it is suitable for both the environment and the aquaculture industry. Transferring marine aquaculture production in big production units further to the open sea has potential for increasing the aquaculture production.

Future outlook for growth (2013-2014)

- The Re-circulating systems have a great potential as the nutrient load can be easily managed while it is possible to maintain optimal culturing conditions all year round. However, high production costs as well as risks related to introducing new technologies impose challenges for this technology.
- National spatial planning programs are expected to improve the operating conditions of the industry.
- The administration of national environmental control system is being developed and reorganized in order to make the system more predictable and to attract more investments in the sector. This could reduce the amount of aquaculture producers moving to abroad.

5.5.3.7 *GERMANY*

Most important areas to be addressed for production growth (Regulatory/Technical)

- Strict application of EU Water Framework Directive makes it more or less impossible to run a recirculation farm.
- Regulatory measures and license restrictions for the blue mussel sector hinder production growth. But of course, seed fall is still the most important factor for the production. But it was forbidden to import seed mussels from e.g. Ireland by court. This is an important obstacle for the producer.
- There are different regulatory bodies involved for the allowance of an aquaculture farm. Also different legal regulations and laws apply. It is very hard for the possible farmer but also for administrative bodies to oversee the applicable regulations. A single regulatory framework should be developed in order to give a secure basis for administrative decisions as for business foundations.

New developments in terms of production technology and regulatory measures.

- One German state (Mecklenburg-Vorpommerania) has set priority areas for aquaculture farms, which are well accepted by the sector.
- There is a tendency to have aquaculture facilities together with biogas-facilities in order to get higher prices for the products from biogas-facilities. The by-product heat is used for temperating the water in the aquaculture facility.

Future outlook for growth (2013-2014)

- Foundation of new aquaculture facilities is not very likely due to the effort necessary to overcome regulatory problems.

5.5.3.8 *GREECE*

Most important areas to be addressed for production growth (Regulatory/Technical)

Freshwater and shellfish expansion is mainly restricted by the unavailability of suitable space in Greece. Marine aquaculture has the potential to grow farther in the Greece due to the availability of suitable space and skilled labour. In the short run, expansion is mainly limited by the slowly growing demand in the market and the absence of credit in the Greek economy.

New developments in terms of production technology and regulatory measures.

The institutional framework for aquaculture development may be considered complete nowadays in Greece. Environmental concerns and spatial planning are now addressed in the national low. A new licensing scheme allowing for new farms came into force since 2009 and a new law regarding the administration of aquaculture came into force in August 2014.

A small number of pilot innovative projects for aquaculture were accepted for EFF funding during 2014. Projects like genetic selection of breeders are expected to shorten the production cycle and reduce the costs of seabream and seabass aquaculture in the long run. Other innovative projects are aiming to improve the quality to mussel production and also to use of Greek fisheries discards for fishmeal and fish oil production as raw material for aquaculture.

Future outlook for growth (2013-2014)

The new institutional framework for aquaculture in Greece is expected to alleviate any barriers to entry for newcomers and aid further growth in the sector.

Technological innovation is expected to reduce production costs allowing for further growth of the demand in the market. The new European Maritime and Fisheries Fund, if targeted in innovation rather than to traditional capital investment, are expected to considerably contribute to the expansion of the sector.

5.5.3.9 *IRELAND*

Most important areas to be addressed for production growth (Regulatory/Technical)

- Approximately 80 % of all current aquaculture licenced sites occur within or adjacent to Natura 2000 (SACs) areas. The application process for new licenced sites and for renewals of existing sites is cumbersome, taking up to a period of years to complete in some cases, within these areas. For some cultures, a pre-screening and main application process is required. Several agencies and two government departments share responsibility. Investment scheme uptake, is only possible for companies with up to date licences. The licences of many operators, tied up in the bottlenecked application process, are out of date and therefore ineligible for state investment.
- The occurrence of disease/parasite induced mortalities in juvenile stock, hamper production volumes of the salmon, oyster and clam segments. Seed supply is the single biggest issue affecting bottom mussels and scallops and to a lesser extent gigas oysters. In the case of the latter, seed supply almost exclusively must come from abroad, thereby opening channels for the importation of disease. Water quality deterioration in some bays and issues of who is responsible for safeguarding quality, are of serious concern to shellfish producers generally. Product supply disruption from red tide induced Bay closures and a weak Market demand, product quality difficulties related to harvest methods and production costs had curtailed the production volume and value of the rope mussel segment.

New developments in terms of production technology and regulatory measures.

- The Irish Sea Fishery Board (BIM) has launched a 5 year strategy; 2013 to 2017 to deliver Irish Seafood sales of € 1 billion and 1200 new jobs across the combined seafood sectors by the end of

2017.This will involve focus on the following key areas: Expansion of the raw material base by 45000 tonnes, optimisation of added value to produce, Enhancement of industry's structures, Source new financial and strategic partners, Improve the skills of personnel in all Seafood sectors, Enhancement of the sustainability of Irish seafoods. From the perspective of the aquaculture sector, this will require a major initiative to improve the licencing process. BIM is awaiting the outcome of its application to obtain an offshore salmon production licence. If successful the licenced site would be tendered out to a company prepared to operate under specific conditions of sustainability, environmental protection and of maximum socio-economic gain. Other offshore sites are being studied for their potential for salmon growing as the move offshore is seen as the best way to develop and increase 'organic' production. Another proposal aimed at inshore sites, is for the state itself to draw up suitable production areas for appropriate assessment, as part of a spatial planning process and present prospective applicants with a choice of sites to apply for, where some of the process and paperwork has been completed for them.

- In the period; 2013 to 2014, production volume was not expected to increase significantly. Increasing the value of production was made to be therefore the immediate focus. This is being done by:
- direct assistance with and subsidising training in business management, product branding, certification and other product defining strategies, To provide a Business Planning Service to maximise independently accredited aquaculture producers to maximise their return from the market place through more efficient management of the supply chain and integration of services offered by other State bodies , establishing the economic and technical feasibility of new sites and species; to assist measures for the improvement of environmental sustainability, fish health and welfare and product quality; to promote occupational health and safety and skills and to harmonise aquaculture into coastal and rural communities. In the case of the latter, the aquaculture agency is collaborating with those in the food and tourism sectors to expose, brand and include aquaculture production units as part of tourist or leisure trail packages. The aim is to both expand into new, high end markets, increase product value through direct selling and to promote the perception of these products as a healthy and pleasurable experience. Due to the fall of consumption in Europe, producers are being assisted in expanding into the high end markets opening up in the far east. Products are promoted as coming from uniquely healthy, oceanic environments

Future outlook for growth (2013-2014)

- There has been a consolidation and reorganisation of businesses and in the ownership and management of production units over the 2013 to 2014 period. Foreign investment is occurring through local partnerships and stand alone enterprises in the oyster sector.
- There are individual companies in all sub sectors who have successfully branded their produce, whether in fresh form or value added products as unique to the Bays they were produced in or to the companies that grow the product. These companies have moved to sell directly into the consumer market and away to simply selling indistinguishable bulk product to a middleman. They, particularly the oyster producers, are succeeding in expanding into the high end of far eastern markets. Certification and branding is seen by a growing number Irish producers as necessary to make their produce stand out in an increasingly competitive market. In the primary aquaculture production sector, Bottom mussels are being MSC certified currently while Rope mussels and Salmon have been or are in the process of being organically certified. Both MSC and organic certification is set to increase as a proportion of overall aquaculture production. The application to expand salmon production offshore is still ongoing.
- Advances have been made in tetraploid oyster stock and in hatchery production of bivalves principally oysters and of Seaweeds also. Several hatcheries are expected to be up and producing in

2014 which will offer a disease free alternative seed supply to some bivalve shellfish producers while helping to greatly expand the still tiny but potentially significant seaweed sector.

- Both overall production volume and value has declined in 2013 and is not expected to increase significantly in 2014. Opposition to the applications for salmon production sites, offshore or not, has delayed and could possibly prevent expansion in the sector in the near future. 34,666 Tonnes worth €118 million in value was produced overall in 2013. 267 business entities employed 1805 (FTE 931.5) in total. While a rise in employment numbers was observed in 2013, due to casual labour required for native oyster capture, the quality of employment decreased as can be seen in the 2013 FTE of 931.5, down 41.2. Oyster and seaweed production continue to expand in 2013, offsetting the overall downward trend while the aforementioned stocking issues continue to curtail salmon and bottom mussel production.

5.5.3.10 *ITALY*

Most important areas to be addressed for production growth (Regulatory/Technical)

Use of water: in Italy the aquaculture is subject to market crisis as well as negative externalities, which must be mediated through good governance. Environmental pressures and impacts of human activities can have a negative influence on aquaculture. Furthermore, the lack of inter-sectorial integration (i.e. planning and implementation) has often led to competition and conflicts over marine spaces and uses among the different subjects involved within the relevant coastal zone. This aspect is linked to the general national approach, according to the aquaculture is not recognized as a user of water resources on an equal basis with other sectors such as fisheries, tourism, industry, etc.. It is therefore essential to start up a process leading to equality of aquaculture compared to other economic potential competitors, giving the fund the opportunity to access to resources, both as regards the use of the inland waters of the sea water / brackish water.

Regulatory constrains: Bureaucratic and administrative aspects that slow down the issuance of new permits and licenses for new plants in the sea. According to COM(2013)229 final, into EU MS the procedures are extremely time-consuming, costly, complex, uncertain, and the validity period is often too short. In Italy there are all of those "inefficiencies". The simplification of the administrative-bureaucratic aspects is strategic for over 90% of aquaculture farms that are SMEs. These companies bear the costs pro rata basis up to 10 times higher than for large enterprises.

The most relevant weakness affecting the growth of national aquaculture are:

- High feed and energy costs
- Low technological innovation for offshore aquaculture
- Development of slow breeding programs / genetic approach
- Poor availability of vaccines and medicines

For the clams and mussel sector the situation of a future development depends on the rules that will govern the concessions and royalties. For the moment, the old rules are valid (have been extended) until 2020. Currently companies must renew the lease every four years, this clearly creates high variability in operating costs. The sector may have an interest in new structures only if Italy is adapting to the norms (law) of other European countries, such as France and Spain, where the concessions and especially the listing of the fees are validity for 30 years.

New developments in terms of production technology and regulatory measures.

The general warming of the waters of the Mediterranean could increase the occurrence of diseases, have negative effects on growth and reproductive cycle of temperature-sensitive species, influence the development of phytoplankton, both in terms of quantity and quality, with a direct impact on the shellfish industry. Into the shellfish aquaculture the water acidification could lead to a slowdown in the process of CO_2 fixation in the shells of shellfish, making them more vulnerable to the processes currently in place.

Uncertain of costs of concession: cost of the concession are strongly different for producers, according to their different legal entity (enterprise): the cooperatives pay an average of 0.004 Euro / sqm while the companies or corporations pay an average of 1 Euro / sqm. If one considers that a system of mussels on average spreads for over 1,000,000 sqm, this will consequently result in substantial differences generated by the legal form of the company (4,000 Euros in cooperative case rather than 1,000,000 Euros in the other case).

Future outlook for growth (2013-2014)

cross-cutting aspect that worries the entire national aquaculture sector is linked to climate change and the costs of environmental externalities. If the current trend continues in the coming years, the consequences will be able to change the current structure of national production and require resources to upgrade their production processes, structures, livestock, and most importantly, implement research programs are able to give answers to new requirements.

Appearance and strategic relationships with environmental externalities:

- Low integration of aquaculture activities in the integrated management of the coastal zone and continuously increase of environmental requirements for companies
- Technological constrains: development of mussels farm is related to the use/ substitution or not of polypropylene socks (long mesh sleeves)- that represent, inter alia, environmental problem-
- The shellfish aquaculture is the only form that does not release pollutants into breeding, but removes them from their production environment. According to a study presented at the GFCM (Izmir December 13th, 2013), the shellfish performs an environmental service. To reinforce this aspect, in Italy has been awarded the first certificate of carbon credits for the CO_2 uptake in the shells of mussels during the production process.

Market competition of aquaculture products: marketing strategy is deemed necessary to address price stability and the exploitation of existing and emerging niche markets. A further weakness that affects the future growth is the lack of diversification of production combined with the lack of technological innovation. If these weaknesses are related to the market's ability to absorb the supply of aquaculture, highlights another weakness due to poor enhancement of logistics facilities on the ground and the almost total absence of producer organizations (PO) as well as the lack of interest in producing specific market studies. Aquaculture farmers' organizations could play a crucial role in supporting any of such marketing strategies.

New "niche" (Quota) market: organic aquaculture: in Italy there is some greys aspects related to the different sectors:

- For organic freshwater fry, being the non-native farmed species and hybrids.
- For the organic marine, the problem is rather the supply market demand

- For mussels, the problem is the distance between the long line: the farms are close together so the current legislation does not consider them organic.

5.5.3.11 ***LATVIA***

Most important areas to be addressed for production growth (Regulatory/Technical)

The aquaculture enterprises mainly concentrated in the regions of Kurzeme and Vidzeme. A considerable number of agricultural holdings have commenced their business in aquaculture in addition to their business activity. In comparison to neighbouring countries, Latvia does not have so good climatic conditions for production of aquaculture products, because it is too warm conditions for the fish of cold waters and too cold - for the fish of warm waters.

New developments in terms of production technology and regulatory measures

The National Fish resources restocking program supports fish and crayfish restocking in public waters. In Gauja, Venta, Daugava rivers and also in the small rivers it is planned to restocked about 5,7 million of fish larvae, juveniles and smolts during the period 2014-2016. There are 5 State-owned Fish Hatcheries – Tome, Dole, Karli, Brasla, Pelci designated for breeding of salmon and sea trout smolts, pike, pike- perch, river lamprey larvae and juveniles. The program is established in order to ensure the fish fry compensatory releases to lower the damage to fish resources caused by Hydropower Stations as well as to restore damages and losses facilitated by different human activities in public water bodies. Every year they restock up to 20 million fish larvae, juveniles and smolts in public waters.

Future outlook for growth (2013-2014)

There were 145 registered aquaculture enterprises in 2013 but only 67 of them were economically active and farmed market size fish for sale or produced young fish for restocking and on growing. Total number of ponds registered for aquaculture and its area were 728 ponds and 5380 ha respectively in 2013. There were 1277 pools with the volume of 17143 m3 and 43 recirculation systems with the volume of 3879 m3 used for aquaculture production in 2013. The Latvian aquaculture sector produced 644 tonnes in 2013. The volume of production has increase by 10 % from 2012 to 2013. The main species produced by the Latvian aquaculture sector was carp representing 84 % in weight. The specific weight of the total number of persons employed in aquaculture was 355 employees in 2013. The aquaculture mostly employs men and women aged 20-55.

5.5.3.12 ***LITHUANIA***

Most important areas to be addressed for production growth (Regulatory/Technical)

- To receive a higher added value from aquaculture production, development of fish processing units at aquaculture enterprise level is needed. This would increase of raw material demand from aquaculture.
- Development of RAS for intensive aquaculture production with integrated filtering systems to ensure environmental requirements is one of priority in national strategy of Lithuanian aquaculture sector.
- Improve aquaculture technologies with the more efficient use of feeds and application of biotechnologies for new varieties.

New developments in terms of production technology and regulatory measures

- Further support development of carp pond infrastructure for growing higher valued species in the extensive growth sustainable aquaculture.
- For simplifying administrating process for aquaculture business, implementation of information system with “single window” concept which integrates all necessary information and documents for starting aquaculture is foreseen.
- New study program regarding aquaculture were approved and started in 2014 for preparation of qualified aquaculture specialists which will bring opportunity to integrate new technologies implementation into aquaculture sector.
- New projects for evaluating possibility to use Lithuanian Baltic Sea coastline for aquaculture, using new technologies is foreseen.
- To develop RAS systems in the regions with limited water resources for aquaculture.

Future outlook for growth (2013-2014)

- Fish processing at aquaculture enterprise level could increase added value for production which is grown extensively and ensuring sustainability.
- Simplifying administrating process will encourage establishment of new aquaculture units.
- New aquaculture feed technologies could reduce costs and increase production efficiency with reduced effluence of waste materials.
- RAS systems could provide new species into market, and create jobs in fishery sector where water resources are limited and ensuring environmental requirements.
- Modernisation of pond infrastructure reduce costs of production and enables to grow higher valued species, which currently results in the increased production value at national level.

5.5.3.13 *MALTA*

Most important areas to be addressed for production growth (Regulatory/Technical)

Space availability (offshore, coastal and on land) is a strong limiting factor for Maltese aquaculture development. Development of new facilities is limited by regulations in relation to the use of areas in competition with other activities, such as fisheries, swimming zones in beaches, tourism-related developments such as hotels, off-shore oil rigs and environmental regulations such as those for specially protected areas. Moreover, possibility of adverse environmental impact on the coast and offshore due to aquaculture activities is possible and is thus is monitored and regulated.

Aquaculture in Malta is focused on the rearing of fish in cages and there is the need of the development of hatcheries and nurseries.

The largest production and income from Aquaculture in Malta is derived from the Bluefin tuna aquaculture. Bluefin tuna are caught from the wild and then are transported to cages for fattening. Being caught from the wild, the production strongly depends on the restricted quota allocated to Malta.

New developments in terms of production technology and regulatory measures

Several regulatory measures are in place nowadays in Malta. Licensing of aquaculture farms / developments are under the responsibility of the Ministry for Sustainable Development, the Environment and Climate Change (MSDEC). All operating farms are also subject to environmental monitoring.

A National Aquaculture Strategy for the Maltese Islands has been put in place and will extend from 2014-2025. It aims to enhance aquaculture growth in a sustainable manner and has made several targets. Exercises to finally adopt this strategy were carried out and were funded through the European Fisheries Fund (EFF).

Future outlook for growth (2013-2014)

This National Aquaculture Strategy for Malta has laid out a long term path towards clarity for growth and investment in aquaculture. It aims to reach the production target of 5,000 tons in addition to the tuna penning production until 2020, it is expected that the industry will have up to 1,185 full time equivalent direct and indirect jobs with a Gross value Added of €70 million to the Maltese economy. Through this strategy, the Government plans to develop the sector by encouraging species diversification with increased research and development. This will include the construction of a commercial scale marine hatchery that will meet the needs of the Maltese industry, and the identification of designated marine search areas.

5.5.3.14 *NETHERLANDS*

Most important areas to be addressed for production growth (Regulatory/Technical)

The most important issue for Dutch aquaculture sector concerns the mussel sector: the supply of mussel spat is limiting total production. Due to ecological considerations, the collection of mussel spat from the Wadden Sea by bottom trawling is restricted. In 2011, this has had strong effects on total production of mussels, as no alternative sources for mussel spat were available.

Aquaculture of freshwater fish faces heavy competition from imported fish. Due to high energy and feed costs, the Dutch aquaculture sector has difficulties to compete. Apart from the costs, it is noteworthy that the sector does not have access to the main retail channels for fish: supermarkets. Various reasons could explain this. The fish produced might not cater to the preferences of Dutch consumer. Total production volume is not enough to secure constant supply at the levels required by major supermarket chains.

New developments in terms of production technology and regulatory measures

The mussel sector is developing mussel spat collection systems, using longlines, that can be employed in Wadden Sea and North Sea. There is yearly variation in the amount of mussel spat collection systems used (dependent on expected market demand) and the yield per system. Permits restrict the area to be used for mussel spat collection. Both in 2012 and 2013, the permitted area was not totally used. The costs of offshore mussel spat collection are an issue of concern.

There is increasing interest in the combination with offshore wind parks. This could solve potential problems in spatial planning (due to heavy use of the North Sea) and bring some synergies in terms of operating costs. Current regulation does not allow multi-use. Wind park operators are reluctant to allow other users within the wind parks, due to risks involved.

Regarding freshwater fish, there are some experiment with new species and systems combining production of algae, fish and/or shellfish. Some private initiatives seek to produce new species (e.g sturgeon for caviar production). It is to see if these initiatives can significantly impact Dutch aquaculture sector.

Future outlook for growth (2013-2014)

Total mussel production depends of the capacity to collect mussel spat. The further development of mussel spat collecting systems can contribute to increased production levels.

Experiments and initiatives in freshwater aquaculture can contribute to diversification of production and growth of the sector. However, it is too early to draw firm conclusions here, also given the current trend of decline.

5.5.3.15 *POLAND*

Most important areas to be addressed for production growth (Regulatory/Technical)

In 2012 the production growth investments in aquaculture are supported by the European Fisheries Fund under the Operational Programme "Sustainable Development of the Fisheries Sector and Coastal Fishing Areas 2007-2013". The limit of funds for support investments in aquaculture (measure 2.1 under the Operational Programme "Sustainable Development of the Fisheries Sector and Coastal Fishing Areas 2007-2013) is 50.2 million Euro.

New developments in terms of production technology and regulatory measures

The majority of operations implemented under measure 2.1 consist in development and modernization of the aquaculture production facilities, investment in aquaculture diversification towards prospective or new species and in development of sustainable aquaculture.

Future outlook for growth (2013-2014)

In September 2012, the largest and most modern fish farm in Poland in a closed circuit water system was opened in the village of Bońki near Płońsk. The target production is expected to reach 1.3 thousand tonnes, mainly including new thermophilic species, such as tilapia. The project was financed with the participation of the European Fisheries Fund (EFF).

5.5.3.16 *PORTUGAL*

Most important areas to be addressed for production growth (Regulatory/Technical)

Administrative costs and the execution time determine to a large extent the overall level of competitiveness and development of an economic sector. Currently, there is little information about the periods and the costs linked to the granting of a licence for a new aquaculture farm and the Commission is not aware of any comprehensive analysis of the main bottlenecks. The aquaculture strategic plan is being developed by the national authorities in order to reduce the impacts of administrative burdens to allow enterprises to obtain new licenses in a shorter period of time and identify new zones suitable for aquaculture production facilities.

The strategic plan for the Portuguese Aquaculture takes as a reference the following orientations:

• The national strategy for the sea 2013-2020 (ENM 2013-2020) approved by Council of Ministers resolution No. 122014 of 12 February;

• The strategy for the sustainable development of European aquaculture, object of communication from the European Commission to the European Parliament and the European Council, which aimed to raise awareness of decision-makers and the public to the importance of aquaculture in the European Union (EU).

The national strategy for the sea 2013-2020 takes on the Ocean as a vector of development based, among other aspects, on the exploitation of living marine resources in order to, among other objectives, strengthen the economic potential of the sea, increase the contribution to the gross domestic Product and strengthen the national scientific and technological capacity.

The plan of action that brings into executing this strategy adopts as its objective in the field of aquaculture "the promotion of this activity in line with consumption growth...", in particular with a view to balance and alignment of production with consumer needs.

The second orientation results from the European Union's concerns with the growing differential between the high consumption of seafood products and the insufficient volume of Community production, this differential that has come to be filled by imports from third countries.

This community concern came to be reflected in the preparation of the strategy and this regulation provides that Member States are to draw up a multi-annual national strategic plan for the development of aquaculture in its territory.

The adoption of this plan is a prerequisite to the approval of the operational programmer (op) with funding from FEAMP for the period 2014-2020 programming and should be submitted to the European Commission, at the latest, on the date of submission of the new PO.

It´s important to said that Portugal developed a Plan of maritime spatial planning (POEM). The implementation of this plan will help reduce uncertainties, facilitate investment and speed up the development of industries such as aquaculture or the production of offshore renewable energy. The lack of space, often cited as an obstacle to the expansion of marine aquaculture in the EU can be overcome with the identification of the most suitable sites for aquaculture as the current occupation of space by aquaculture activities, in and on coast, appears to be limited. In this plan, areas with better suitability for aquaculture development in offshore were identified and conditions for their installation were set. Plans for the estuarine spatial planning are currently under development. These plans will identify the most appropriate areas for aquaculture of brackish water and will contribute to the increase in production and, at the same time, will improve the protection of the landscape, habitats and biodiversity. The main constraints associated with the type of semi-intensive system are the competition for land use with tourism and other activities, legal limitations in protected wetland areas and the higher production costs compared to intensive farming systems.

To promote the growth of the aquaculture production in Portugal, a procedure was developed for two areas (APA – Aquaculture Production Area) in the open ocean, coastal and territorial waters elsewhere on mainland. The procedure also defines the general conditions to be observed by the respective installation and allow the holders to obtain the exploration license. The procedure was based on information collected on a pilot area of aquaculture production since 2008 in Armona (Algarve – Portugal).

Harvested experience of implementation of pilot area, it is considered If the conditions are to create new specific areas intended for aquaculture production, with recourse to legal instruments in force and to establish conditions to boost and encourage economic activities in the maritime area.

Thus, it is creating a news APA’s in the Centre and South of the country, the results of which will constitute an important factor for the sustainable development of region and country.

The APA’s collects environmental conditions for the installation of marine cultures of bivalve mollusc, as well as the necessary conditions of operability, as there are in the vicinity, infrastructure support port activity.

New developments in terms of production technology and regulatory measures

In this context, and taking into account the national strategy for the sea, as well as the European Commission's strategic guidelines, the development of aquaculture in Portugal will have as reference the following principles:

- Sustainable exploration of resources using appropriate practices for the preservation of the environment;
- The use of natural resources, in particular the spaces in open waters with aquaculture and reutilization of inactive areas in estuaries and other wetlands;
- The institutional involvement, particularly in terms of the mobilization of administrative structures, existing resources within the framework of research and development, as well as incentives to private investment;
- The strengthening of consumer confidence based on quality and food safety of aquaculture products;
- Maintenance and development of employment and quality of life.

Through the European Fisheries Fund we support many projects that presents development in terms of technology (for example anti-fouling products) , innovation in food terms using different production systems to determine the value-added potential, use new species like mullet, meagre, sole and cuttlefish, and improved consumer to acceptance the aquaculture products show the sensory and nutritional quality.

We privilege projects contribute to the increase in production, particularly the diversification. Using species which can expand the market and to establish an alternative to wild species whose stocks showed a decline.

Developed also the research on efflorescence of toxic algae, this is, indeed, one of the largest threats to the future of shellfish farming in Europe.

The interventions needed in terms of regulatory measures to reach the strategic objective for the aquaculture sector in Portugal are grouped in three axes, each with specific objectives and corresponding actions for projects to implement:

- Simplify administrative procedures with a view to reducing the administrative procedures required and deadlines for obtaining licenses, making the process less difficult for the investor;

- Facilitate access to space and water that aims to identify water resources with greatest potential for aquaculture and which have lower environmental impacts, ensuring compatibility with other uses of those resources;
- Strengthen the competitiveness of aquaculture and promote a level playing field for EU operators, aiming to increase, diversify and enhance national aquaculture production.

Future outlook for growth (2013-2014)

The Portuguese producers expect an improvement in the situation for 2013 and 2014 by comparison with 2011. For that contributes the implementation of the maritime spatial plan (POEM), which will help to reduce uncertainties regarding licensing, facilitate investment and speed up the development of industries.

The strategic objective for the sustainable development of aquaculture in Portugal approach to adopt to find solutions that, articulated and integrated manner, overcoming the main constraints which affect the national aquaculture sector, going against what it calls with the new financial instrument for the common fisheries policy (CFP), the European Fund for Maritime Affairs and fisheries (EFMAF), which, within the timeframe of 2014-2020, will support the development of an intelligent and ecological aquaculture, which is competitive, able to compete globally and to provide EU consumers safe products of high nutritional value.

So the national strategic objective for the period 2014-2020 aims to:

Increase and diversify national aquaculture products offer, based on principles of sustainability, quality and food safety, to satisfy consumer needs and contributing to local development and to promote employment.

Considering the effort already under way with a view to maritime spatial planning, in particular with the creation of areas of aquaculture production, aquaculture presents a strong growth potential in the coming years, especially with regard to the exploration of new areas on the open sea. Perspective, as quantified goal for 2014-2020 time horizon, reach, at the end of this period, a production capacity of 45,000 tons.

For this significant increase contributes to identification and provision on the Atlantic coast of the continent of aquaculture production areas, namely:

- The aquaculture production of Armona area intended for the cultivation of fish and shellfish, bounded in 2008 and with establishments already installed or in installation phase;

- Aquaculture production of the two new areas destined for setup of bivalve farming establishments created in 2014;

- The rehabilitation of areas of aquaculture production in estuary zones and other wetlands, as a result of the improvement of water quality and reuse of inactive establishments.

This objective requires strong annual growth rates of fish production capacity of shellfish and marine waters (between 15 to 20 annual average) regarding the current situation.

It is not intended that aquaculture is a replacement for fisheries, but that constitutes a response the new needs of the market. The development of this sector should be based on requirements of quality, diversity and respect for the environment. Is satisfying these conditions that the aquaculture will be an added value both for the sector and for regions where develops, as for European consumers.

5.5.3.17 *ROMANIA*

Most important areas to be addressed for production growth (Regulatory/Technical)

- The land based fresh aquaculture production is still inconsistent on production level over the years and a high dependency on the direct consumption market – fresh fish - and less connectivity with the local processing industry; the marine aquaculture is under developed;
- Generally the fresh water and marine aquaculture producers are facing the huge competition of the imported products, mainly due to the super market chains policy;
- The development of marine aquaculture in Black Sea is still pending on the hydro-wheatear conditions specific for this area, namely strong storms appearing in short period of time, even hours, with high waves, the configuration of the shore – law altitude, and very cool weather starting with November and finishing late in spring, with freezing temperatures, even for the salted water of the sea;
- The access to the fresh water resources is dependent on the prices should be paid for using it; too restrictive access conditions to the shore on marine locations to develop mussels, oysters or turbot farms at sea littoral;
- The environmental issues are more restrictive considering the requests on the residual “products” could influence the environment, especially the water used and released, even the technique method is basically an extensive one with feed stock deriving from the use of agriculture raw materials such as: sun-flower meal, corn etc. and not so much chemical components;
- Mainly the ponds and lakes for aquaculture use are located in natural and not isolated locations (e.g. on river course, near to human localities) and the environmental accidents are causing some times big losses;
- A protecting policy of ichtyofague birds is too restrictive and means of protection the own production are limited according to the environmental legislation;
- Finally the week policy dedicated for aquaculture sustainable development of the governmental authority responsible for fishery and aquaculture.

New developments in terms of production technology and regulatory measures.

- To expand the production further the industry needs new licenses, modernizing the existent farms, and training of the staff, new technologies to be applied;
- The few farms for sturgeon and turbot production are a good example for new potential investors;
- The EMFF accession must be less bureaucratic that it was up to now;
- Related to that the new strategy followed by real measures supporting the investors and less bureaucracy implementing those measures;
- The market demand based on changing of food habitudes of consumers is a good opportunity to diversify then production, mainly for marine species; and the real need for Romania economy to reduce the imported quantities of fish and fish products;
- A better organization of the aquaculture producers in professional associations and campaigns promoting the fish and fish product consumption will deter the development of the production.

Future outlook for growth (2013-2014)

- Generally, the development of production diversification stimulating the expanding demand on the market is the first opportunity that for sure will deter the increasing of production;
- The actual production level itself, comparing with the potential of the total water surface for aquaculture of Romania will deter an normal, natural increase of production, that will be significant in the next 2/3 years;

5.5.3.18 *SLOVENIA*

Most important areas to be addressed for production growth (Regulatory/Technical)

- Spatial planning - Future development of Slovenian mariculture is strongly conditioned by the small size of the Slovenian Sea. In 2007, three larger areas were designated for marine aquaculture in Slovenian territorial waters that were subsequently separated into 22 plots, for which concessions were granted for the use of marine water in 2009. It is expected that these plots will not be able to expand, due to the use of Slovenian territorial waters for other purposes.
- Damage on shellfish farms caused by wild fish, especially by sea bream.
- Simplified administrative procedures for obtaining licenses for aquaculture activities – especially freshwater aquaculture.

New developments in terms of production technology and regulatory measures.

- Improved comprehensive marketing approach, which results in higher selling prices and thus the higher turnover.
- Introduction of new technologies, especially recirculating systems, in freshwater aquaculture.
- The production of fish feed from ingredients that will replace the freshly caught fish.

Future outlook for growth (2013-2014)

- All Slovenian maritime fish and shellfish farms currently operating with about 50% capacity. In the future, because of the spatial planning, we can expect increasing production to maximum capacity and then stagnation of Slovenian marine aquaculture.
- Because of the good quality and quantity of inland water, Slovenia has a good chance to increase freshwater aquaculture, particularly salmonidae rearing such as rainbow trout, Huchen (Hucho hucho) and brown trout.

5.5.3.19 *SPAIN*

Most important areas to be addressed for production growth (Regulatory/Technical)

- The Spanish aquaculture sector is strongly affected by the competition in the uses of maritime spaces. Development of new facilities is limited by regulations about the use of areas in competition with other activities, such as fisheries, tourism, etc, and other environmental regulation about specially protected areas.
- Different administrative procedures in the autonomous communities suppose a limit to the competitiveness.

New developments in terms of production technology and regulatory measures

- Describe if there is any new developments in terms of new technology addressing the above issues (and others) and if there is new regulatory measures being implemented or about to be implemented in the near future?
- Some Spanish autonomous communities are working in the development of spatial planning programs of aquaculture which takes into account the different uses of marine and inland areas with the purpose to locate the aquaculture production into areas where there are not negatives interactions with other economic activities.
- During recent years, industry has invested in diversification in new species, focusing to high added valued species.
- One of the guidelines of Spanish strategic plan is to simplify and standardize the administrative procedures in the national territory.

Future outlook for growth (2013-2014)

- Different new spatial planning programs are expected to improve the operating conditions of the industry.
- In next years, production of high added valued new species is expected to increase the profitability of the companies, helping to overcome the competitive problems of recent years.
- It is expected that the simplification of administrative procedures encourages the investments.

5.5.3.20 ***SWEDEN***

Most important areas to be addressed for production growth (Regulatory/Technical)

Sweden has a strong potential of growth in the aquaculture sector because of an extensive coast line and a myriads of lakes. One of the most important technical barriers for production growth in Sweden is the discharges of nitrogen and phosphorus from aquaculture farms in northern Sweden. The majority of Swedish cage fish fin aquaculture has a net discharge of nitrogen and phosphorus to the rivers with an outflow to the Baltic Sea. The Baltic Sea is already highly eutrophicated, with yearly toxic algal blooms and permanent oxygen-free bottoms. Sweden is committed to continuing the reduction of the emissions of nitrogen and phosphorus to the Baltic Sea in the coming years. The effects of eutrophication reduce the options for founding new aqua farms. Furthermore, the process of new licenses is often prolonged and complicated. For the aqua farmers it is mostly the multiple appeals from different actors and EIA that takes time.

New developments in terms of production technology and regulatory measures

Aquaculture in Sweden has a strong potential for further development of sustainable production techniques. Due to regulation issues (EU-regulations does not allow recirculation aquaculture farms to be certified as organic, only blue mussel aquaculture farms) the organic aquaculture sector still has obstacles and problems to overcome in order to expand production volumes and scaling up to commercial levels. Some of the main issues affecting the economic performance of the sector and the development of new growing techniques are related to difficulties in the implementation of new techniques and stringent regulations (e.g. development of organic and certified aquaculture), which have often pointed out as significant obstacles of growth in production volumes. Development of new and improved farming techniques and fodder can affect the efficiency and profitability of production and the ability of individual entrepreneurs to get permission to fish in that the techniques become more environmentally friendly.

Additionally, there are also examples of new species or new cultivation techniques that are under development (i.e. fish species like tilapia, pike perch and cod) and ongoing research on developments in the feed market (i.e. new production techniques, fodder development, reducing nitrogen emissions and phosphorus emissions), however, not yet at a commercial level.

An analysis of the impact of administrative burdens and governance has been made, and it has been pointed out as high, but little has been done to address the matter. The development of spatial planning has, in large, not been put in place in Sweden. The European Maritime and Fisheries Fund and various schemes designed to meet future demand is expected to play a significant role in the development of the Swedish aquaculture sector.

Future outlook for growth (2013-2014)

The national and local policy has a major impact on aquaculture development opportunities. Aquaculture today is a typical rural industry and the development of the aquaculture industry can contribute to a positive rural development, for example by generating jobs. Primary production and processing of aquaculture products, as well as links to food tourism (tourist fishing, recreational fishing) are a part of the development of Sweden as a food producing country. This together with the production of fish in aquaculture farms is a highly efficient protein production relative to other animal production means that aquaculture is something that most political parties welcomes. However, there are some places a strong local opinion against the establishment of larger farms and mussel farms, which in turn means that few politicians openly take a position for growth in the aquaculture industry.

In the European Maritime and Fisheries Fund (EMFF) from 2014 to 2020, there is an emphasis on environmental sustainability in fisheries and aquaculture. Support as such will be given to investment in aquaculture farms that reduce the negative environmental impacts of aquaculture (e.g. recirculating system) or contribution to a positive environmental impact (e.g. mussel). This may have an effect on how much, and in which direction the aquaculture industry in Sweden will develop.

5.5.3.21 ***UNITED KINGDOM***

Most important areas to be addressed for production growth (Regulatory/Technical)

- The most important barrier for expanding production in the UK is perceived to be access to, and development of, new sites.
- Regulatory constraints, relating to perceived environmental impacts (externalities), are thought to impede approval of new developments
- Technical doubts relating to i) expansion into more exposed marine areas, ii) control of pathogens, iii) efficient production in closed recirculation systems, need to be removed.

New developments in terms of production technology and regulatory measures

- Regulation: In Scotland, the Ministerial Group for Sustainable Aquaculture (MGSA) was established in 2013 to work alongside the Aquaculture & Fisheries (Scotland) Act 2013 to secure sustainability of aquaculture growth and its interactions, supporting industry to achieve

sustainable growth targets with due regard to the marine environment as set out in National Marine Plan Consultation; namely, to grow marine finfish production sustainably to 210,000 tonnes; and shellfish production (especially mussels) to 13,000 tonnes, with due regard to the marine environment, by 2020.
- Technical: The UK aquaculture industry and associated research community are addressing technical challenges.

Future outlook for growth (2013-2014)

- The Regulatory environment in Scotland is expected to enable the sustainable development of aquaculture in.
- New technologies need to be proven before wider industry uptake.

6 GLOSSARY

6.1 Parameters requested

Turnover:

"Turnover" comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties.

Turnover includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit vis-à-vis its customer and other similar deductible taxes directly linked to turnover.

It also includes all other charges (transport, packaging, etc.) passed on to the customer, even if these charges are listed separately in the invoice. Reduction in prices, rebates and discounts as well as the value of returned packing must be deducted. Income classified as other operating income, financial income and extraordinary income in company accounts is excluded from turnover. Operating subsidies received from public authorities or the institutions of the European Union are also excluded (Structural Business Statistics (SBS) Code 12 11 0, Commission Regulation (EC) No 2700/98).

Subsidies:

"Subsidies" are the financial assistance received from public authorities or the institutions of the European Union which are excluded from turnover.

It includes direct payments, e.g. compensation for stopping trading, refunds of fuel duties or similar lump sum compensation payments; excludes social benefit payments and indirect subsidies, e.g. reduced duty on inputs such as fuel or investment subsidies.

Other income:

"Other income" refers to other operating income included in company accounts which are excluded from turnover; income coming from other activities than aquaculture, e.g. the licensing of ponds for recreational fishery purposes.

Wages and salaries:

"Wages and salaries" is equivalent to "Personnel costs" on the Structural Business Statistics.

"Personnel costs" are defined as the total remuneration, in cash or in kind, payable by an employer to an employee (regular and temporary employees as well as home workers) in return for work done by the latter during the reference period. Personnel costs also include taxes and employees' social security contributions retained by the unit as well as the employer's compulsory and voluntary social contributions.

Personnel costs are made up of:

- wages and salaries
- employers' social security costs

All remuneration paid during the reference period is included, regardless of whether it is paid on the basis of working time, output or piecework, and whether it is paid regularly or not. Included are all gratuities, workplace and performance bonuses, ex gratia payments, thirteenth month pay (and similar fixed bonuses), payments made to employees in consideration of dismissal, lodging, transport, cost of living and family allowances, commissions, attendance fees, overtime, night work etc. as well as taxes, social security contributions and other amounts owed by the employees and retained at source by the employers. Also included are the social security costs for the employer. These include employer's social security contributions to schemes for retirement pensions, sickness, maternity, disability, unemployment, occupational accidents and diseases, family allowances as well as other schemes. These costs are included regardless of whether they are statutory, collectively agreed, contractual or voluntary in nature. Payments for agency workers are not included in personnel costs. (Structural Business Statistics (SBS) Code 13 31 0, Commission Regulation (EC) No 2700/98).

Wages and salaries: Wages and salaries are defined as "the total remuneration, in cash or in kind, payable to all persons counted on the payroll (including homeworkers), in return for work done during the accounting period." regardless of whether it is paid on the basis of working time, output or piecework and whether it is paid regularly or not. Wages and salaries include the values of any social contributions, income taxes, etc. payable by the employee even if they are actually withheld by the employer and paid directly to social insurance schemes, tax authorities, etc. on behalf of the employee. Wages and salaries do not include social contributions payable by the employer. Wages and salaries include: all gratuities, bonuses, ex gratia payments, "thirteenth month payments", severance payments, lodging, transport, cost-of-living, and family allowances, tips, commission, attendance fees, etc. received by employees, as well as taxes, social security contributions and other amounts payable by employees and withheld at source by the employer. Wages and salaries which the employer continues to pay in the event of illness, occupational accident, maternity leave or short-time working may be recorded here or under social security costs, depending upon the unit's accounting practices. Payments for agency workers are not included in wages and salaries. (Structural Business Statistics (SBS) Code 13 32 0, Commission Regulation (EC) No 2700/98).

Social security costs: Employers' social security costs correspond to an amount equal to the value of the social contributions incurred by employers in order to secure for their employees the entitlement to social benefits. Social security costs for the employer include the employer's social security contributions to schemes for retirement pensions, sickness, maternity, disability, unemployment, occupational accidents and diseases, family allowances as well as other schemes. Included are the costs for all employees including homeworkers and apprentices. Charges are included for all schemes, regardless of whether they are statutory, collectively agreed, contractual or voluntary in nature. Wages and salaries which the employer continues to pay in the event of illness, occupational accident, maternity leave or short-time working may be recorded here or under wages and salaries, dependent upon the unit's accounting practices. (Structural Business Statistics (SBS) Code 13 33 0, Commission Regulation (EC) No 2700/98).

Imputed value of unpaid labour:

Unpaid workers normally refers to persons who live with the proprietor of the unit and work regularly for the unit, but do not have a contract of service and do not receive a fixed sum for the work they perform. This is limited to persons who are not included on the payroll of another unit as their principal occupation.

Thus, imputed value of unpaid labour estimates the value of the salaries that these unpaid workers would have received if their work was remunerated.

The chosen methodology to estimate this imputed value of unpaid labour should be explained by the Member State in their national programme.

Energy costs:

“Energy costs” corresponds to the “Purchases of energy products (in value)” on the Structural Business Statistics.

Purchases of all energy products during the reference period should be included in this variable only if they are purchased to be used as fuel. Energy products purchased as a raw material or for resale without transformation should be excluded. This figure should be given in value only. (Structural Business Statistics (SBS) Code 20 11 0, Commission Regulation (EC) No 2700/98).

Livestock costs:

Livestock costs should correspond to the variable livestock volume.

In the Structural Business Statistics it is included inside 13 11 0 “Total purchases of goods and services”.

Feed costs:

Feed costs include the purchasing costs of the feed during the reference period. The feed costs should correspond to feed volume.

In the Structural Business Statistics it is included inside 13 11 0 “Total purchases of goods and services”.

Repair and maintenance:

Under repair and maintenance there should be included the costs incurred to bring an asset back to its earlier condition or to keep the asset operating at its present condition (as opposed to improving the asset).

On the Structural Business Statistics is included inside 13 11 0 “Total purchases of goods and services”.

Other operational costs:

Other operating costs should comprise outsourcing costs, property or equipment rental charges, the cost of raw materials and supplies that cannot be held in the inventory and have not been already specified (i.e. water, small items of equipment, administrative supplies, etc.), insurance premiums, studies and research costs, external personnel charges, fees payable to intermediaries and professional expenses, advertising costs, transportation charges, travel expenses, the costs of meetings and receptions, postal charges, bank charges (but not interest on bank loans) and other items of expenditure.

On the Structural Business Statistics is included inside 13 11 0 “Total purchases of goods and services”.

Depreciation of capital:

Depreciation refers to the decline in value of the assets. In accounting, it is used as the allocation of the cost of tangible assets to periods in which the assets are used, in order to reflect this decline in their value.

The chosen methodology to allocate these costs over periods should be explained in the national programme. ESA (6) 6.02 to 6.05 European System of Accounts 1995 (Regulation (EC) No 2223/96, Regulation (EC) No 1267/2003, Eurostat ESA 1995 manual).

Financial costs, net:

"Financial costs, net" should be calculated as costs, coming from financial activity of the enterprise, minus the financial income.

Extraordinary costs, net:

"Extraordinary costs, net" is the difference between "Extraordinary charges" and "Extraordinary income".

"Extraordinary income" and "Extraordinary charges" are the income and costs that arise otherwise than in the course of the company's ordinary activities (Article 29 of the Fourth Council Directive 78/660/EEC of 25 July 1978).

Total value of assets:

This parameter corresponds to the Balance sheet total of the Structural Business Statistics and the Capital value in the European System of Accounts.

Balance sheet total consists of the sum of items 1 to 16 of the asset side of the balance sheet or of the sum of items 1 to 14 of the liability side of the balance sheet. (Structural Business Statistics (SBS) Code 43 30 0, Commission Regulation (EC) No 2700/98).

Capital value is the total accumulated value of all net investments in the enterprise at the end of the year. ESA 7.09 to 7.24 European System of Accounts 1995 (Regulation (EC) No 2223/96, Regulation (EC) No 1267/2003, Eurostat ESA 1995 manual).

Net Investments:

"Net investments" refers to the difference between Purchase (Gross investment in tangible goods) and Sale (Sales of tangible investment goods) of assets during the year.

Gross investment in tangible goods is the Investment during the reference period in all tangible goods. Included are new and existing tangible capital goods, whether bought from third parties or produced for own use (i.e. Capitalised production of tangible capital goods), having a useful life of more than one year including non-produced tangible goods such as land. The threshold for the useful life of a good that can be capitalised may be increased according to company accounting practices where these practices require a greater expected useful life than the one year threshold indicated above.

All investments are valued prior to (i.e. gross of) value adjustments, and before the deduction of income from disposals. Purchased goods are valued at purchase price, i.e. transport and installation charges, fees, taxes and other costs of ownership transfer are included.

Own produced tangible goods are valued at production cost. Goods acquired through restructurations (such as mergers, take-overs, break-ups, split-off) are excluded. Purchases of small tools which are not capitalised are included under current expenditure. Also included are all additions, alterations, improvements and renovations which prolong the service life or increase the productive capacity of capital goods. Current maintenance costs are excluded as is the value and current expenditure on capital goods used under rental and lease contracts. Investment in intangible and financial assets are excluded. Concerning the recording of investments where the invoicing, delivery, payment and first use of the good may take place in different reference periods, the following method is proposed as an objective:

i) Investments are recorded when the ownership is transferred to the unit that intends to use them. Capitalised production is recorded when produced. Concerning the recording of investments made in identifiable stages, each part-investment should be recorded in the reference period in which they are made.

In practice this may not be possible and company accounting conventions may mean that the following approximations to this method need to be used:

i) investments are recorded in the reference period in which they are delivered,

ii) investments are recorded in the reference period in which they enter into the production process,

iii) investments are recorded in the reference period in which they are invoiced,

iv) investments are recorded in the reference period in which they are paid for.

Gross investment in tangible goods is based on Gross investment in land (15 12 0) + Gross investment in existing buildings and structures (15 13 0) + Gross investment in construction and alteration of buildings (15 14 0) + Gross investment in machinery and equipment (15 15 0). (Structural Business Statistics (SBS) Code 15 11 0, Commission Regulation (EC) No 2700/98).

Sales of tangible goods includes the value of existing tangible capital goods, sold to third parties. Sales of tangible capital goods are valued at the price actually received (excluding VAT), and not at book value, after deducting any costs of ownership transfer incurred by the seller. Value adjustments and disposals other than by sale are excluded. (Structural Business Statistics (SBS) Code 15 21 0. Commission Regulation (EC) No 2700/98).

Debt:

Financial assets created when creditors lend funds to debtors, either directly or through brokers, which are either evidenced by non-negotiable documents or not evidenced by documents.

Short-term loans: loans whose original maturity is normally one year or less, and in exceptional cases two years at the maximum, and loans repayable on demand.

Long-term loans: loans whose original maturity is normally more than one year, and in exceptional cases more than two years at the minimum.

“Debts” account for provisions and long- and short-term debt (STECF meeting SGECA 06-01).

Livestock (volume):

Volume of livestock purchased during the reference period. The livestock volume should correspond to the livestock cost.

Fish feed (volume):

Volume of feed purchased during the reference period. The feed volume should correspond to feed cost.

Volume of sales:

The volume of sales should correspond to the variable on turnover value. In case of hatcheries and nurseries conversion factors from numbers to tonnes should be stated in the national programmes.

Number of persons employed (Total employment):

This indicator refers to the number of people employed (including full-time and part-time employees) (SGECA-09-03). It corresponds to the Number of people employed of the Structural Business Statistics.

The number of persons employed is defined as the total number of persons who work in the observation unit (inclusive of working proprietors, partners working regularly in the unit and unpaid family workers), as well as persons who work outside the unit who belong to it and are paid by it (e.g. sales representatives, delivery personnel, repair and maintenance teams). It includes persons absent for a short period (e.g. sick leave, paid leave or special leave), and also persons on strike, but not those absent for an indefinite period. It also includes part-time workers who are regarded as such under the laws of the country concerned and who are on the pay-roll, as well as seasonal workers, apprentices and home workers on the pay-roll. The number of persons employed excludes manpower supplied to the unit by other enterprises, persons carrying out repair and maintenance work in the enquiry unit on behalf of other enterprises, as well as those on compulsory military service. Unpaid family workers refer to persons who live with the proprietor of the unit and work regularly for the unit, but do not have a contract of service and do not receive a fixed sum for the work they perform. This is limited to those persons who are not included on the payroll of another unit as their principal occupation. (Structural Business Statistics (SBS) Code 16 11 0, Commission Regulation (EC) No 2700/98).

The number of employees should be reported by gender.

FTE National:

“FTE national” is the number of employees converted in full time equivalents (calculation methodologies vary between countries).

It corresponds to the “Number of employees in full time equivalent units” of the Structural Business Statistics.

The number of employees converted into full time equivalents (FTE). Figures for the number of persons working less than the standard working time of a full-year full-time worker, should be converted into full time equivalents, with regard to the working time of a full-time full-year employee in the unit. Included in this category are people working less than a standard working day, less than the standard number of working days in the week, or less than the standard number of weeks/months in the year. The conversion should be carried out on the basis of the number of hours, days, weeks or months worked. (Structural Business Statistics (SBS) Code 16 14 0, Commission Regulation (EC) No 2700/98).

Reporting the number of FTE national by gender is optional.

Number of enterprises:

The “Number of enterprises” parameter corresponds to a count of the number of enterprises active during at least a part of the reference period (SGECA-09-03).

A count of the number of enterprises registered to the population concerned in the business register corrected for errors, in particular frame errors. Dormant units are excluded. This statistic should include all units active during at least part of the reference period. (Structural Business Statistics (SBS) Code 11 11 0, Commission Regulation (EC) No 2700/98).

Both definitions are similar. However, there are often some divergences with Eurostat data. This is mostly due to the use of the Veterinary list (which is necessary to trade with food products) to update the business register and so companies that are dormant or focusing on other products have been excluded.

Moreover, under the DCF regulation, the number of companies should be disaggregated by the number of persons employed (in ≤5; 6-10 and >10 FTE) (Structural Business Statistics (SBS) Code 16 14 0, Commission Regulation (EC) No 2700/98).

6.2 Indicators calculated

Average wage:

The average salary or mean wage estimates the salary an employee working full time is receiving on this sector. It includes the salaries themselves, the social security costs and imputed value of unpaid labour.

$$\text{Mean wage} = (\text{Wages and salaries} + \text{Imputed value of unpaid labour}) \,/\, \text{FTE}$$

Gross Value Added (GVA):

Gross Value Added measures the contribution of the sector to the economy.

The Gross Value Added indicator calculated in this report is similar, but does not fully correspond to the Value added at factor cost of the Structural Business Statistics.

Value added at factor cost as defined in the Structural Business Statistics is the gross income from operating activities after adjusting for operating subsidies and indirect taxes. It can be calculated from turnover, plus capitalised production, plus other operating income, plus or minus the changes in stocks, minus the purchases of goods and services, minus other taxes on products which are linked to turnover but not deductible, minus the duties and taxes linked to production. Alternatively it can be calculated from gross operating surplus by adding personnel costs. Income and expenditure classified as financial or extra-ordinary in company accounts is excluded from value added. Value added at factor costs is calculated "gross" as value adjustments (such as depreciation) are not subtracted. (Structural Business Statistics (SBS) Code 12 15 0, Commission Regulation (EC) No 2700/98).

Thus, Gross Value Added is calculated on this report as:

$$GVA = \text{Turnover} + \text{Other Income} - \text{Energy costs} - \text{Livestock costs} - \text{Feed costs} - \text{Repair and maintenance} - \text{Other Operational costs.}$$

GVA to Revenues:

Gross value added to revenue ratio - indicates the share of revenue that contributes to the economy through factors of production (returns to labour and returns to capital). Indicator is calculated as the ratio between gross value added and revenue (the sum of Turnover and Other Income). Expressed as a percentage.

$$GVA\ to\ Revenue = \frac{GVA}{Turnover + Other\ Income} 100\%$$

Earnings Before Interest and Tax (EBIT):

"Earnings before interest and taxes (EBIT)" or "Operating profit" is a measure of a firm's profitability that excludes interest and income tax expenses.

$$EBIT = Turnover + Other\ Income + Subsidies - Energy\ costs - Wages\ and\ salaries - Imputed\ value\ of\ unpaid\ labour - Livestock\ costs - Feed\ costs - Repair\ and\ maintenance - Other\ Operational\ costs - Depreciation\ of\ capital$$

Net profit:

"Net profit" is a measure of a firm's profitability that includes the results of financial activity of the enterprise.

Net profit = EBIT – Financial_costs_net

Net profit margin:

Net profit margin is a measure of the economic performance of a sector or enterprise expressed in relative terms. It is a difference between total income and all incurred costs (operating, capital and financial). Expressed in a percentages.

$$Net\ profit\ margin = \frac{Net\ profit}{Total\ Income} 100\%$$

Return on Investment (ROI):

Return on investment is a performance measure to evaluate the profitability (efficiency) of an investment.

During the SGECA-10-04 meeting it was decided that it was more appropriate to calculate the Return on Investment using the "Earnings Before Interest and Tax (EBIT)", rather than the Net profit.

$$ROI = \frac{EBIT}{Total\_Value\_of\_Assets} * 100\%$$

Running Cost to Turnover Ratio (in %):

This indicator shows how much of the turnover (income) is consumed by production costs.

Running cost to turnover ratio = (Energy costs + Wages and salaries + Livestock costs + Feed costs + Repair and maintenance + Other Operational costs) x 100 / Turnover

Earnings Before Interest and Tax (EBIT) to Revenue ratio:

"Earnings before interest and taxes (EBIT) to revenue ratio" measures the margin of the companies profit. Expressed in a percentages.

$$EBIT\ to\ Revenue = \frac{EBIT}{Turnover + Other\ Income} * 100\%$$

Labour productivity (by FTE or Employee):

Labour productivity is calculated as the average output per worker or per time unit. For It can be calculated as Gross Value Added (GVA) divided by Full Time Equivalents (FTE). This indicator describes the value added to the economy from the activity, in this case the value added to the economy by one FTE.

$$Labour\_productivity = \frac{GVA}{FTE}$$

When a MS cannot report the level of employment in FTEs, the number of employees is used as a second best alternative. However, this alternative compromises the comparison and should be clearly stated in the report.

Capital productivity:

Capital productivity is calculated as the average output per unit of capital. It can be calculated as Gross Value Added (GVA) divided by Capital value (total value of assets) in percentage. The indicator describes the value added to the economy by one unit of capital.

$$Capital\ productivity = \frac{GVA}{Total\ value\ of\ assets} 100\%$$

Future Expectations of the Industry indicator:

The indicator “Future Expectations of the Industry” can be interpreted as a proxy for the industry’s intent to remain in the market in the medium/long term. If investment minus depreciation is positive, it has the meaning that the sector is allocating resources to increase its production capacity, and therefore it expects to remain in the market to recover the cost of the investment. If investment minus depreciation is close to zero, it could be interpreted as an indicator that the sector is only wishing to maintain its production capacity in the future, and that it is not planning to expand. The third case is where the sector is not even covering its depreciation costs, thus disinvesting with the possible intention to reduce its presence in the market in the future. Therefore, this indicator would be used to approximate the industry’s investing behaviour in the future and it has been considered useful by the experts.

$$FEI = \frac{(Net\_investment - Depreciation)}{Total\_value\_of\_\ assets} * 100\%$$

Change 2012-11:

The indicator of the relative change in corresponding indicators compared to the previous year. Expressed in a percentages, calculated as following:

$$Change\ 2012-11 = \frac{(X_{2012} - X_{2011})}{X_{2011}} * 100\%$$

Development 2012/(2008-2011):

The indicator of the relative change in corresponding indicators compared to the average of previous years for which the data is available (usually 2008-2011). The estimate is showing the long term development of the corresponding indicator. Expressed in percentages, calculated as following:

$$Development\ 2012/(2008-2011) = \frac{(X_{2012} - average(X_{2008,}X_{2009,}X_{2010,}X_{2011}))}{average(X_{2008,}X_{2009,}X_{2010,}X_{2011})} * 100\%$$

REFERENCES

Asche, F. and Bjørndal, T. (2011) The Economics of Salmon Aquaculture, Wiley-Blackwell: Chichester.

Asche, F. and Guttormsen, A.G. and Nielsen, R. (2013) Future challenges for the maturing Norwegian salmon aquaculture industry: An analysis of total factor productivity change from 1996 to 2008. Aquaculture, 396–399; 43–50.

Asche, F., Oglend, A. and Tveteras, S. (2013) Regime shifts in the fish meal/soybean meal price ratio. Journal of Agricultural Economics 64 (1), 97-111.

Asche, F., Nøstbakken, L., Øglend, A. & S. Tveterås (2011) BUYING POWER IN UK RETAIL CHAINS: A RESIDUAL SUPPLY APPROACH, Aquaculture Economics & Management, 15:1, 1-17.

Asche, F and Tveterås, S. (2004) On the Relationship Between Aquaculture and Reduction Fisheries. Journal of Agricultural Economics. 55, 245-265.

Atkinson, S.E. & Tietenberg, T.H., (1987) Economic implications of emissions trading rules for local and regional pollutants. Canadian Journal of Economics-Revue Canadienne D Economique. 20, 370–386.

Bourret, V., P T O'Reilly, P.T., Carr, J.W., Berg, P.R., and Bernatchez L. 2011, Temporal change in genetic integrity suggests loss of local adaptation in a wild Atlantic salmon (Salmo salar) population following introgression by farmed escapees, Heredity, 106(3): 500–510.

Coase, R. (1960) The Problem of Social Cost. Journal of Law and Economics. 3, 1-44.

Connecticut Department of Agriculture, Environmental Benefits of Shellfish Aquaculture, www.ct.gov/doag viewed 09th September 2014.

Cotterill, R.W. & Samson, P.O. (2002). Estimating a brand-level demand system for American cheese products to evaluate unilateral and coordinated market power strategies. American Journal of Agricultural Economics, 84, 817–823.

Crocker, T.D. (1966) The Structuring of Atmospheric Pollution Control Systems. In: H. Wolozin, ed. The Economics of Air Pollution (W. W. Norton & Company, Inc., New York).

Dales, J. (1968) Pollution, Property and Prices (University Press, Toronto).

Digal, L. N. (2011) Market Power in the Philippine Retail and Processed Food Industry, Journal of International Food & Agribusiness Marketing, 23:4, 289-309

Ermoliev, Y., Michalevich, M. and Nentjes, A. (2000) Markets for tradeable emission and ambient permits: a dynamic approach. Environmental and Resource Economics. 15, 39–56.

European Commission (2009) Communication from the Commission to the European Parliament and Council. Building a sustainable future for aquaculture. A new impetus for the Strategy for the Sustainable Development of European Aquaculture. COM(2009) 162 final.

FAO (2010) The State of World Fisheries and Aquaculture 2010. Food and Agriculture Organization of the United Nations, Rome.

Fernandez Polanco, J. & L. Luna (2012). “Factors affecting consumers’ beliefs about aquaculture”. Aquaculture Economics & Management, 16, 1, 22-39.

Fofana A. & Jaffry S. (2008) Measuring Oligopsony Power of UK Salmon Retailers. Marine Resource Economics, Volume 23, pp. 485–506.

Guttormsen, A. G. (2002) Input factor substitutability in salmon aquaculture. Marine Resource Economics. 17, 91–102.

Hahn, R.W. and R.N. Stavins (1991) Incentive-based Environmental Regulation: a New Era from an Old Idea? Ecology Law Quarterly. 18, 1-42.

Hanley, N., Shogren, J.F. and White, B. (2007) Environmental Economics. In Theory and Practice. Second Edition, Palgrave Macmillan, New York.

Hessel, V. (1993) (in Danish) Dansk ørred erhverv gennem 100 år. Forlaget Skellerup.

Homans, F.R. and Wilen, J.E. (1997) A model of regulated open access resource use. Journal of Environmental Economics and Management. 32, 1-21.

International Fishmeal & Fish Oil Organization (2011) Fishmeal and Fish Oil – The facts, figures, trends and IFFO’s responsible supply standard. International Fishmeal and Fish Oil Organization, February 2011.

Jaffe, A.B. and R.N. Stavins (1995), “Dynamic Incentives of Environmental Regulation: The Effects of Alternative Policy Instruments on Technology Diffusion”, Journal of Environmental Economics and Management. 29, 43-63.

Kristofersson, D., and Anderson, J.L. (2006) Is there a Relationship between Fisheries and Farming? Interdependence of Fisheries, Animal Production and Aquaculture. Marine Policy. 30, 721–25.

Laura McCann, L., Colby, B., Easter, K. W., Kasterined, A. & K.V. Kuperane (2005) Transaction cost measurement for evaluating environmental policies”. Ecological Economics, 52, 4, 1, 527–542.

Lindahl, O and Kollberg, S (2008) How mussels can improve coastal water quality: mussel farming a way to combat eutrophication, Bioscience Explained, Vol 5,No 1.

Montgomery, D. (1972) Markets in Licenses and Efficient Pollution Control Programs. Journal of Economic Theory. 5, 395-418.

Nielsen, M., Jensen, F., and Nielsen, R. (2014) Increased competition for aquaculture from fisheries: Does improved fisheries management limit aquaculture growth? Fisheries Research 159; 25–33.

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OECD (2010). Advancing the Aquaculture Agenda: Policies to Ensure a Sustainable Aquaculture Sector. Workshop proceedings (Paris 15-16 April 2010). OECD, 13 September 2010, Paris, 361-405.

OECD (2011). Governance of aquaculture. National Aquaculture Legislation Overview. (http://www.fao.org/fishery/topic/13542/en).

Pigou, A.C. (1920) The Economics of Welfare. London: Macmillan.

Reardon, T., Timmer, C. P. & B. Mintend. (2010) Supermarket revolution in Asia and emerging development strategies to include small farmers. Proceedings of the National Academy of Sciences of The United States. www.pnas.org/cgi/doi/10.1073/pnas.1003160108.

Shabbar Jaffry , Abdulai Fofana & Andrew D. Murray (2003) Testing for market power in the UK salmon retail sector, Aquaculture Economics & Management, 7:5-6, 293-308.

Skaala, Ø., Wennevik, V., and Glover, K. A. 2006. Evidence of temporal genetic change in wild Atlantic salmon, Salmo salar L., populations affected by farm escapees. ICES Journal of Marine Science, 63: 1224-1233.

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Straeten, B.V, Buysse, J., Nolte, S., Lauwers, L., Claeys, D., Huylenbroeck, G.V. (2011) Markets of concentration permits: The case of manure policy. Ecological Economics. 70, 2098-2104.

Tietenberg, T. H. (1995). Tradeable Permits for Pollution Control When Emission Location Matters: What Have We Learned? Environmental and Resource Economics. 5, 95-113.

Tveterås, R. and Heshmati, A. (2002) Patterns of productivity growth in the Norwegian salmon farming industry. International Review of Economics and Business. 49, 367-93.

United Nations Environmental Programme, 2010. Turning the Tide on Falling FishStocks, Preview Report from the ENEPlLED Green Economy Charts SustainableInvestment Path, Available at: www.unep.org/greeneconomy.

Wilen, James E. (2000) Renewable Resource Economists and Policy: What Differences Have We Made?. Journal of Environmental Economics and Management. 39, 306-327.

APPENDICES

1. Segment codes

Code	Segment name	Main species	Environment
seg.01_1	Salmon Hatcheries & nurseries	salmon	Hatcheries & nurseries
seg.01_2	Salmon on growing	salmon	Finfish salt water
seg.01_3	Salmon combined	salmon	Finfish salt water
seg.01_4	Salmon cages	salmon	Finfish salt water
seg.02_1	Trout Hatcheries & nurseries	trout	Hatcheries & nurseries
seg.02_2	Trout on growing	trout	Finfish fresh water
seg.02_3	Trout combined	trout	Finfish fresh water
seg.02_4	Trout cages	trout	Finfish salt water
seg.03_1	Sea bass & Sea bream Hatcheries & nurseries	sea bass & sea bream	Hatcheries & nurseries
seg.03_2	Sea bass & Sea bream on growing	sea bass & sea bream	Finfish salt water
seg.03_3	Sea bass & Sea bream combined	sea bass & sea bream	Finfish salt water
seg.03_4	Sea bass & Sea bream cages	sea bass & sea bream	Finfish salt water
seg.04_1	Carp Hatcheries & nurseries	carp	atcheries & nurseries
seg.04_2	Carp on growing	carp	Finfish fresh water
seg.04_3	Carp combined	carp	Finfish fresh water
seg.04_4	Carp cages	carp	Finfish fresh water
seg.05_1	Other freshwater fish Hatcheries & nurseries	other freshwater fish	Hatcheries & nurseries
seg.05_2	Other freshwater fish on growing	other freshwater fish	Finfish fresh water
seg.05_3	Other freshwater fish combined	other freshwater fish	Finfish fresh water
seg.05_4	Other freshwater fish cages	other freshwater fish	Finfish fresh water
seg.06_1	Other marine fish Hatcheries & nurseries	other marine fish	Hatcheries & nurseries
seg.06_2	Other marine fish on growing	other marine fish	Finfish salt water
seg.06_3	Other marine fish combined	other marine fish	Finfish salt water
seg.06_4	Other marine fish cages	other marine fish	Finfish salt water
seg.07_1	Mussel rafts	mussel	Shellfish
seg.07_2	Mussel Long line	mussel	Shellfish
seg.07_3	Mussel Bottom	mussel	Shellfish
seg.07_4	Mussel Other	mussel	Shellfish
seg.08_1	Oyster rafts	oyster	Shellfish
seg.08_2	Oyster Long line	oyster	Shellfish
seg.08_3	Oyster Bottom	oyster	Shellfish
seg.08_4	Oyster Other	oyster	Shellfish
seg.09_1	Clam rafts	clam	Shellfish
seg.09_2	Clam Long line	clam	Shellfish
seg.09_3	Clam Bottom	clam	Shellfish
seg.09_4	Clam Other	clam	Shellfish
seg.10_1	Other shellfish rafts	other shellfish	Shellfish
seg.10_2	Other shellfish Long line	other shellfish	Shellfish
seg.10_3	Other shellfish Bottom	other shellfish	Shellfish
seg.10_4	Other shellfish Other	other shellfish	Shellfish

2. Data

The economic data used to compile this report are provided in the Excel file as data tables at the following address:

https://stecf.jrc.ec.europa.eu/data-reports

3. Contact details of STECF members and EWG-14-10 List of Participants

Information on STECF members and invited experts' affiliations is displayed for information only. In some instances the details given below for STECF members may differ from that provided in Commission COMMISSION DECISION of 27 October 2010 on the appointment of members of the STECF (2010/C 292/04) as some members' employment details may have changed or have been subject to organisational changes in their main place of employment. In any case, as outlined in Article 13 of the Commission Decision (2005/629/EU and 2010/74/EU) on STECF, Members of the STECF, invited experts, and JRC experts shall act independently of Member States or stakeholders. In the context of the STECF work, the committee members and other experts do not represent the institutions/bodies they are affiliated to in their daily jobs. STECF members and invited experts make declarations of commitment (yearly for STECF members) to act independently in the public interest of the European Union. STECF members and experts also declare at each meeting of the STECF and of its Expert Working Groups any specific interest which might be considered prejudicial to their independence in relation to specific items on the agenda. These declarations are displayed on the public meeting's website if experts explicitly authorized the JRC to do so in accordance with EU legislation on the protection of personnel data. For more information:

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Abstract

This is the fourth EWG-14-10 report, on the Economic Performance of the European Union (EU) Aquaculture sector. It provides a comprehensive overview of the latest information available on the structure, social, economic and competitive performance of the aquaculture sector at both national and EU level. The data used in this publication was collected under the Data Collection Framework (DCF). In 2012, the aquaculture sector production in the EU28 accounted for 1.39 million tonnes, with an estimated turnover of 4.36 billion Euros. The EU aquaculture industry contained about 15,000 enterprises, whose main activity is the aquaculture production, producing a Gross Value Added of around 1.5 billion Euros. Available data suggest that the profitability in the sector decreased in 2012 compared to 2011. Profitability based on the Return On Investment calculated from the EBIT dropped from 9.4 % to 7% and the future expectation indicator decreased from 5% to 3% from 2011 to 2012. The EU aquaculture sector employed approximately 80,000 people in Europe, of which more than half was employed in shellfish farming. Women accounted for 24 % of these jobs. The large percentage of part-time work in the sector should be highlighted, as can be seen through comparison of the total employment numbers with employment expressed in Full Time Equivalents (FTE is 50 % of the total number of employees). Part-time employment is important in the shellfish and freshwater aquaculture subsectors. The economic performance, productivity and cost structures differs a lot in the different sectors, marine, shellfish and freshwater, as well as, for the different technique used and different species produced. Administrative barriers, like the lack of licenses, strict environmental regulation and multilevel governments is still considered to be the most important issue to solve to lay out the foundation for future growth in the European aquaculture sector.

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The Scientific, Technical and Economic Committee for Fisheries (STECF) has been established by the European Commission. The STECF is being consulted at regular intervals on matters pertaining to the conservation and management of living aquatic resources, including biological, economic, environmental, social and technical considerations.

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