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Summary of the 2013 Economic Performance Report on the EU Aquaculture Sector (STECF 13-30)

Scientific, Technical and Economic Committee for Fisheries (STECF)

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Acknowledgement

Reports on the Economic performance of the EU aquaculture sector are prepared annually by independent experts convened under the auspices of the Scientific, Technical and Economic Committee for Fisheries (STECF). This summary report of the 2013 aquaculture report was prepared in draft by the Editors in cooperation with the Structural Policy and Economic Analysis Unit of DG Maritime affairs and Fisheries (DG MARE) who commissioned the work, and the Maritime Affairs Unit of the Joint Research Centre (action FISHREG).

This report was reviewed and adopted by the STECF in November 2013.

KEY FINDINGS

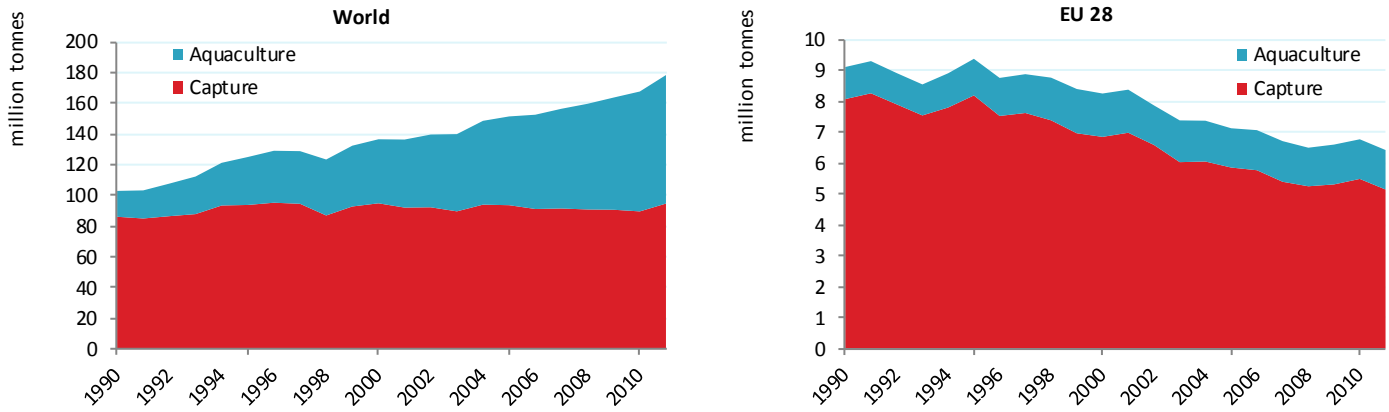
- Aquaculture production by the 28 European Union Member States (EU-28) reached 1.28 million tonnes and 3.51 billion Euros in 2011 according to FAO. Volume and value of sales reached 1.35 million tonnes and 4.02 billion Euros in 2011 (DCF).
- EU aquaculture production is mainly concentrated in 5 countries: France, Greece, Italy, Spain and United Kingdom, making up 77% in volume and 76% in value of EU totals.
- Production in value increased by 8% while production has been stable (decreased by -0.3%) compared to 2010, according to FAO data.
- Price falls of 2008/2009 during the economic crisis forced inefficient firms out of business and lead to mergers and acquisitions resulting in a more efficient industry which is now showing a strong recovery.
- Vertical integration into the processing industry has, in some Member States, helped strengthen profits and add value to fish products often through smoking or packaging.
- Almost 90% of the companies in the sector are micro-enterprises. Employment decreased by 5 to 10% to reach more than 80,000 people. There is an important significance of part-time labour. Female employment made up 29% of EU aquaculture employment and 23% of total FTE.
- Profitability for the EU aquaculture sector was also positive in 2011 (ROI was 10% and EBIT margin 13%), confirming the recovery of the sector already registered in 2010.
- The major cost items are feed (31%), livestock (18%), other operational costs (18%) and labour costs (15%) of the total costs. However, there are important variations by sector.
- The future evolution of the EU aquaculture sector is uncertain due to the following 3 factors hindering the full potential of the EU aquaculture sector: fierce foreign competition that brings market prices down, high labour and capital costs and administrative burdens that slow down investments in the sector.
- There is evidence that the market for farmed fish and shellfish products is capable of continuing the expansion it has shown in the last twenty-five years and that newer products from some of the more traditional wild species could be a source of expansion.

- Where producers have engaged in organic production and certification they have often benefitted from increased profit margins especially when supported by Member State schemes such as those used in Ireland. However caution is needed to prevent cycles of organic 'rebranding' as a form of product differentiation. In some Member States there is little demand for organic products and suppliers view the subsector as too much of a niche for major investment.
- The requirement for the EU organic aquaculture producers to use at least 50% organic juveniles could cause some problems to obtain organic juveniles for the production of particular species (i.e. trout).
- The EU has a competitive advantage in the presence of a well-educated work force. It has space for physical expansion of the industry but often a lack of understanding of the spatial needs and infrastructure for the industry among the planning authorities.
- An important barrier has been the long license application periods of up to three years which increase uncertainty and risk for start-up businesses. This is largely due to numerous points of governmental contact required for approval. A 'Single Contact System' has shown, in Norway, to reduce application time to 6 months. Most Member States would benefit from a reform in the aquaculture license application process.

1 INTRODUCTION

Aquaculture is the fastest growing animal food producing sector in the world and is an increasingly important contributor to global food supply, food security and economic growth. Capture fisheries production worldwide accounted for 94.6 million tonnes in 2011 (83.5 million tonnes from marine fisheries and 11.1 million tonnes from inland fisheries). Production from world capture fisheries has been fluctuating around 90 million tonnes per year during the last two decades. On the other hand, aquaculture production shows an increasing trend that led to a production of 83.7 million tonnes globally in 2011, as can be seen from figure 1.1 (left chart). It should be noted that the aquaculture production includes the production of near 21 million tonnes of aquatic plants.

Figure 1.1: World and EU-28 seafood production (capture and aquaculture): 1990-2011.



Source: FAO, 2013

In 2011, aquaculture represented 47% of the total seafood production in the world, valued at 97.7 billion Euros (136 billion USD). This is a substantial increase. However, as shown by figure 1.1 (right chart), this increase has not been facilitated by EU Member States but predominantly by Asia. Asia produces 91% of the world aquaculture production in weight and 79% in terms of value. Europe represents only 3.2% of the world aquaculture production in volume and 8.2% in value.

Since EU capture fisheries have reduced in volume, aquaculture has become relatively more important to the seafood production mix over the period from 1990 to 2011. Capture fisheries production in the EU-28 accounted for 5.1 million tonnes in 2011 (5.0 million tonnes from marine fisheries and 0.1 million tonnes from inland fisheries).

2 THE EU AQUACULTURE SECTOR

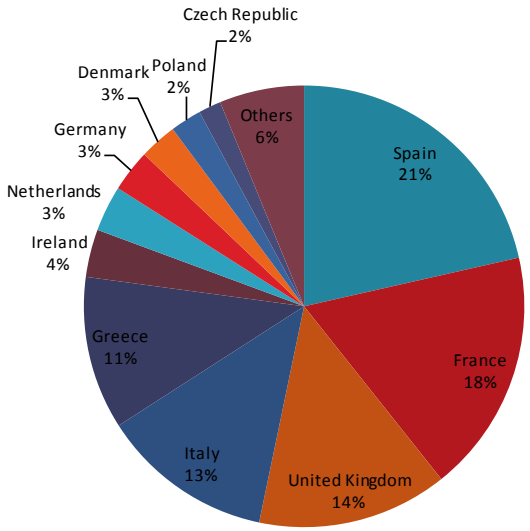
Aquaculture production by 28 European Union Member States (EU 28) reached 1.28 million tonnes and 3.5 billion Euros in 2011 (FAO, 2013). Croatia as a new Member State has been included in this analysis,

even if it evaluates pre-2012 data. The EU (28) represents 1.5% of the world aquaculture production in volume and 3.5% in value.

EU aquaculture production is mainly concentrated in 5 countries: France, Greece, Italy, Spain and United Kingdom. Figures 2.1 and 2.2 show the significance of each Member State's aquaculture in the relation to the total EU aquaculture production, in both weight and value.

Spain, with 21% of the total EU production in volume, is the largest aquaculture producer in the EU, followed by France (18%), United Kingdom (14%), Italy (13%) and Greece (11%). These five countries account for 77% of the total EU aquaculture production in weight (FAO, 2013).

Figure 2.1: Aquaculture in EU per MS in weight terms: 2011.

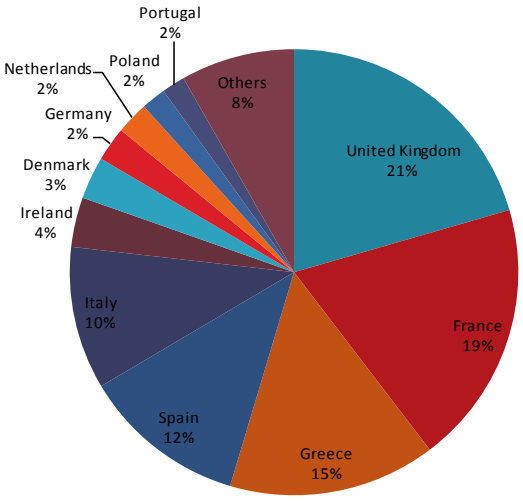


Source: FAO, 2013

In terms of value, United Kingdom is the largest EU producer with 20% of the total EU aquaculture, followed by France (19%), Greece (15%), Spain (12%), and Italy (10%). These five countries are responsible for 76% of all the EU aquaculture value (FAO, 2013).

It should be noted that Spain has the largest aquaculture production volume (21% of the total EU production), but only fourth in value (12% of the total EU production). This is because 77% of the Spanish aquaculture production in volume comes from mussel production but represents only 27% in value due to the low market value of mussels (around 0.53 Euros per Kg.) (FAO, 2013).

Figure 2.2: Aquaculture in EU per MS in value terms: 2011.



Source: FAO, 2013

The social importance of the aquaculture industry does not always reflect the contribution made, of volume or value, to the EU totals. From an employment perspective shellfish production can be very labour intensive and so could therefore be thought to have a greater social impact than a more capital intensive production technique. In some countries (such as Slovenia) and sectors (such as shellfish gathering), unpaid labour is common where businesses are small and family owned or run.

3 DATA COVERAGE FOR THE ELABORATION OF THIS STUDY

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) for the years 2008-2011.The call for data was issued by DG MARE on the 13 May 2013. Member States were requested to submit the data within 1 month of the call, making the submission deadline the 13 June 2013.

All EU Member States are required to collect and provide data on salt water aquaculture while the collection of data on 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. This leaded to data resubmissions by countries after the deadline and even after the EWG meeting.

This was already the third call for aquaculture data from Member States. Although there was an improvement in the quality of the data submitted compared to the previous calls, there are still issues with several parameters that Member States are working to improve.

Detailed information on the data coverage is available in the data coverage section of the report. EU 28 aquaculture sales data has been analysed by including FAO production data to fill in the missing turnover and volume of sales parameters in this report. 2011 data on national level (i.e. number of companies, employees) is available for around 75-90% of total value of EU 28 production. The necessary economic variables for full economic performance of EU aquaculture sector on national level is available for around 70% of value of production, while full economic performance on segment level covering around 50% of EU 28 aquaculture production.

4 ECONOMIC PERFORMANCE OF THE EU AQUACULTURE SECTOR

Table 4.1, reports the number of enterprises, total sales volume, turnover, employment measures in FTE and mean wages for the analysed EU countries in 2011.

The values reported in table 4.1, have been complemented with FAO data mainly to overcome the lack of some Member States freshwater aquaculture data (FAO data reported in red).

Number of companies

Available data (from 15 countries and about 90% of the total EU production) reports more than 11 thousand companies in 2011. We estimate, however, that in the EU (28) the total number of companies with aquaculture as their main activity could be between 14 and 15 thousand. The same figure was estimated in the 2011 and 2012 aquaculture reports (STECF, 2012 and 2013).

The majority of the companies in the EU aquaculture sector are micro-enterprises (with less than 10 employees). In 2011, these comprised 87% of all aquaculture enterprises in the EU. Enterprises with 5 or less employees represented 75% of the EU aquaculture companies in 2011, followed by enterprises with more than 10 employees (13%) and then enterprises with 6 to 10 employees (12%). These micro-enterprises tend to be family owned and run and are usually small scale rather than large companies using capital intensive methods. The number of companies with more than 10 employees has been increasing from 9% in 2008 up to 13% in 2011.

Table 4.1: Economic Indicators for the EU (28) aquaculture sector: 2011.

Country	Number of enterprises *number*	Total sales volume *thousand tonnes*	Turnover *million €*	Employment *number*	FTE *number*	Average wage *thousand €*
Austria		2.2	19.3			
Belgium		0.0	0.2			
Bulgaria	288	4.1	10.0	270	270	2.4
Croatia		12.8	50.6			
Cyprus	15	4.7	30.6	292	276	11.1
Czech Republic		21.0	44.5			
Denmark	135	40.5	145.8	437	299	70.4
Estonia		0.4	1.6			
Finland	132	10.1	56.7	445	349	38.0
France	3290	283.1	898.5	18522	10658	24.8
Germany		39.1	85.9			
Greece	1017	121.8	523.3	5559		
Hungary		15.6	30.3			
Ireland	292	44.8	128.5	1748	958	26.7
Italy	587	157.0	422.9	5076	2116	31.0
Latvia		0.5	1.1			
Lithuania		3.3	7.2			
Luxembourg	0	0	0	0	0	
Malta	6	3.8	50.5	189	165	18.1
Netherlands		42.5	81.2			
Poland	4	29.0	61.6			
Portugal	1453	7.9	56.8	2316	1749	7.2
Romania	201	8.4	16.4	1316	1047	6.3
Slovakia		0.8	2.2			
Slovenia		1.4	3.4			
Spain	3059	276.9	501.1	27180	6639	21.2
Sweden	153	14.5	47.5	392	263	50.6
United Kingdom	575	199.0	740.3	3064	2671	23.3
Total EU	**11226**	**1345.3**	**4018.0**	**66905**	**27549**	**23.0**

FAO data

DCF data

Total Sales Volume

The total sales volume for the EU (28) aquaculture sector, using DCF and complemented with FAO production data, is estimated to be 1.35 million tonnes in 2011. This corresponds to a -1% decrease in the figure reported last year (1.36 million tonnes). EU-28 production reported by FAO was stable between 2010 and 2011 with 1.28 million tonnes for both years. FAO data shows a decreasing trend in the EU-28 aquaculture production for more than 10 years.

DCF data on Total Sales Volume was complemented with FAO production data to provide an overview of all 28 EU Member States. Both, FAO and EUROSTAT report data on production, however, their definition of production is based on first sales. EC Regulation No 762/2008 defines "production" used in EUROSTAT as the output from aquaculture at first sale, including production from hatcheries and nurseries offered for sale. A similar approach is used for FAO data. Hence, Eurostat and FAO use total sales as an estimate of total production. However, DCF data may not be identical to Eurostat and FAO data, main differences can be explained by:

- When a country reports no data to EUROSTAT, the data is reported in blank, while FAO statistics provide larger coverage since missing values are replaced with estimates by FAO.
- EUROSTAT and FAO data is based on production destined for human consumption, while DCF data is based on all aquaculture product sales made by companies (for human-consumption and other). Because a product can be sold several times (i.e. as fry and as adult), it is possible that there is some double-counting when trying to estimate production from sales data (DCF).
- EUROSTAT and FAO data is based on all aquaculture production (sales), while DCF data is based only on the sales (production) from the companies whose main activity is aquaculture.
- If DCF data is collected at national level by questionnaires, the quality of the data will depend on the response rate of the survey (achieved sample rate).
- Because it may be not straight forward to identify the income from the different activities of a company, few countries are not reporting the value of sales of aquaculture products but the turnover which may include other income sources.

Turnover

The total value of sales (or turnover) from the EU (28) aquaculture sector is estimated to have reached 4.02 billion Euros in 2011. In the 2012 report, the turnover of the EU aquaculture sector reached 3.58 billion Euros. This increase is not so significant when looking at FAO production value data alone, from 3.26 billion Euros in 2010 to 3.51 billion Euros in 2011 (FAO, 2013).

This larger increase in the reported data could be explained in part due to the inclusion of Croatia (50.6 million Euros) and a better country coverage of DCF data compared to last year report. DCF data on turnover has been complemented with FAO production value data to provide an overview for all 28 EU Member States, considering the limitations already presented.

Employment and FTE

From the available data we estimate that the EU (28) aquaculture sector directly could employ more than 80,000 people. Current data suggest that the total employment has decreased by 5% to 10% from 2010.

For these 14 countries it has been reported a total employment in full time equivalents (FTE) of 27,460 FTEs for 2011, confirming the employment decrease from 2010.

The EU aquaculture sector has an important component of part-time work. This evident from the proportion of employment measured in full time equivalents (FTE) and total employment. The lower the ratio the more part-time or seasonal work exists; while the higher (closest to 1) the ratio is, the occupation is more full time. Current available data shows that the ratio for the EU aquaculture sector in 2011 was 45%.

The importance of this part-time and seasonal employment in the EU aquaculture sector is due to the importance of the shellfish sector that has a significant percentage of part-time and seasonal work.

Data available show that women accounted for the 27% of the EU aquaculture sector employments, but only 23% when measured in FTE in 2011.

Mean wages

Available data (from 13 countries) suggest that the average wage (per FTE) for the EU aquaculture sector in 2011 was about 22,965 Euros per year. The average wage is estimated as the sum of the costs in wages and salaries and the imputed value of unpaid labour divided by the total number of employees in FTEs. This shows a 9.4% increase in salaries; however, salary increases were not perceived in all countries. In fact, there was a salary increase in 7 of the 13 countries.

There is a lot of variability within the salaries paid in each country and subsector. The salaries varied from about 2,360 Euros per year in Bulgaria to 70,373 Euros per year in Denmark.

Gross Value Added

Available data (from 13 countries) report that the EU aquaculture sector provided in 2011 almost 1.18 billion Euros in Gross Value Added. Considering a similar economic structure, it could be estimated that the GVA for the EU (28) aquaculture sector could had been more than 1.5 billion Euros in 2011.

Figure 4.1 shows that income in the EU aquaculture sector is mainly originated in the marine and shellfish sectors, followed by the freshwater and hatcheries and nurseries. Instead, most of the GVA and EBIT is generated in the shellfish sector, followed by the marine, freshwater and hatcheries and nurseries.

Operating Profit or EBIT (Earnings Before Interest and Taxes)

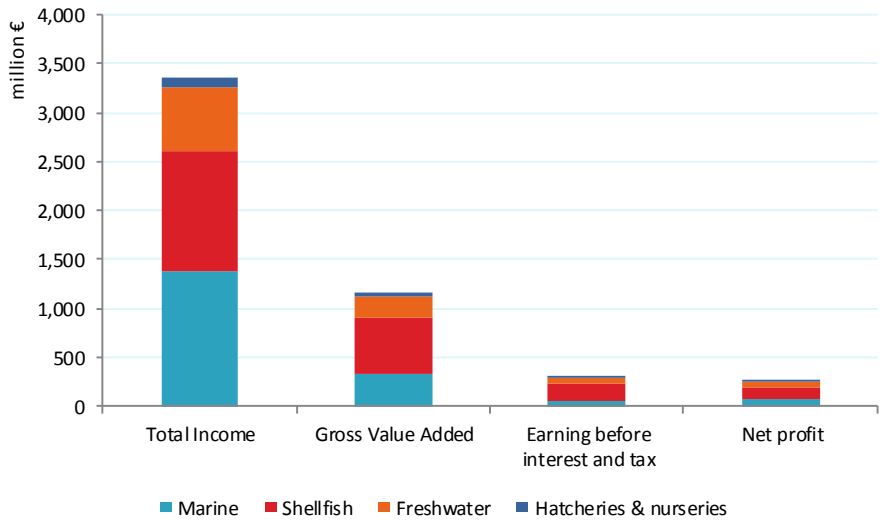
Available data (from 13 countries) confirms that in 2011 the EU aquaculture sector has continued to obtain profits, as in 2010, after suffering losses in 2008 and 2009.

The profitability for these 13 Member States measured in EBIT terms was more than 405 million Euros. It is important to notice that all the 13 Member States that reported data to calculate this indicator in 2011 had positive profits.

Table 4.2: Economic Performance Indicators for the EU aquaculture sector: 2011.

Country	GVA	EBIT	ROI	Labour productivity	Capital productivity	Future Expectation Indicator	Equity ratio
	million €	*million €*	*%*	*thousand €/FTE*	*%*	*%*	*%*
Bulgaria	8.1	7.1	110.6	29.9	125.0	14.2	58.6
Cyprus	12.5	9.8	37.3	45.3	47.5	4.0	83.0
Denmark	36.9	9.5	5.7	123.4	22.0	2.6	25.3
Finland	17.5	1.2	1.2	50.2	18.1	7.0	44.6
France*	401.6	108.2	9.8	40.4	36.5	0.2	37.6
Ireland	53.6	22.7	23.3	55.9	55.2	-2.1	42.2
Italy	155.7	73.4	10.5	73.6	22.2	31.4	41.1
Malta	12.2	10.5	97.7	73.7	113.3	-13.7	-231.9
Portugal	38.8	16.2	6.6	22.2	15.7	-2.6	97.0
Romania	12.4	7.6	10.3	11.8	16.7	0.4	84.2
Spain	198.8	31.7	3.5	30.0	22.1	-1.9	95.5
Sweden	23.3	9.2	14.9	88.7	37.9	1.1	27.0
United Kingdom	206.2	98.0	13.0	67.4	32.7	-2.2	69.6
Total EU	**1177.6**	**405.1**	**10.0**	**44.0**	**29.1**	**4.9**	**59.2**

Figure 4.1: EU Aquaculture economic performance by subsector: 2011.



Operating Profit (EBIT) margin and ROI (Return On Investment)

Data available (from 13 countries) confirms the recovery in the profitability of the EU aquaculture sector in 2011. The operating profit margin is estimated at around 13% for 2011, a slight variation from 2010. The operating profit margin or EBIT ratio is obtained by dividing the EBIT by the turnover. However, the return on investment for aquaculture, which is a better measure of long term viability, was 10% in 2011.

Labour productivity

Reported data (from 13 countries) shows that the labour productivity for the EU aquaculture sector was about 44 thousand Euros per FTE in 2011. This represents a 14% increase from 2010.

The mean wage (23 thousand Euros) represented in 2011 the 52% of the total labour productivity. There is again a large variation between member states in this regard. Bulgaria had labour productivity of 2.4 thousand Euros whereas Denmark labour productivity was 123.4 thousand Euros.

Capital Productivity

Reported data (from 13 countries) shows that the capital productivity for the EU aquaculture sector was about 29.1% in 2011. This represents a 15.7% increase from 2010.

Equity ratio

The equity ratio is a financial ratio that indicates the relative proportion of own capital in the sector own assets. Available data (from 13 countries) show that the equity ratio was 59.2% in 2011. This ratio is relatively high, in part due to the high equity ratio for the Spanish aquaculture sector (95.6%). This high ratio does not match with reality according to alternative accountancy based sources and the overall ratio is expected to decrease with data quality improvements. Due to high variations on the availability of data by Member State further analysis should be done at a more detailed level.

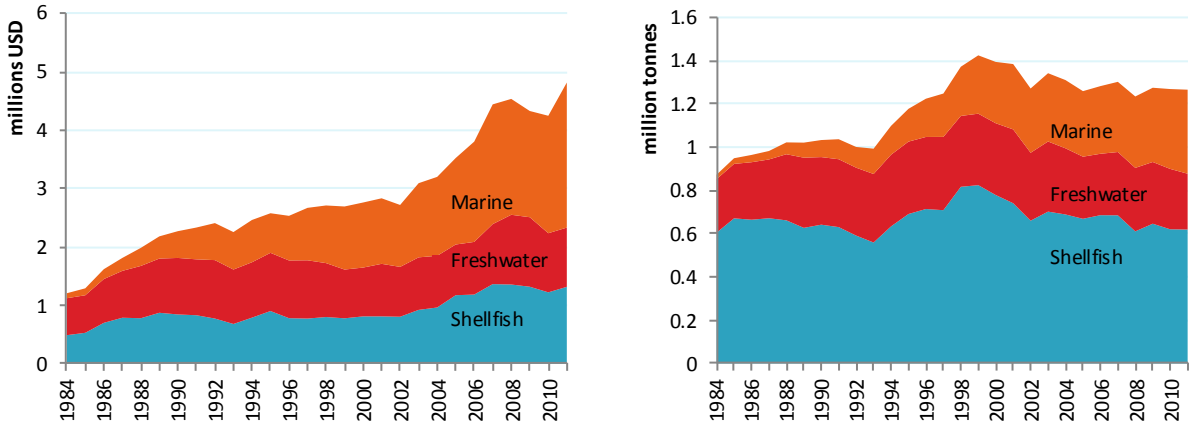
Future Expectations Indicator (FEI)

The FEI (STECF, 2011) indicates whether the industry in a sector is investing more than the depreciation of their current assets. With data from 13 countries the FEI for the EU aquaculture sector was estimated at 4.9%. Therefore, the industry is investing itself, and consequently should have positive expectations on the future development of the sector. However, as it has been said for previous indicators there is the need to look at it at a more detailed level, by sectors, as it is done in next chapter.

5 THE STRUCTURE OF THE EU AQUACULTURE SECTOR

In 2011, marine fish accounted for 31% of the EU aquaculture production in weight, freshwater fish accounted for 20% and shellfish for 49%. While in value terms marine fishes accounted for 52% of the EU aquaculture production, freshwater fishes accounted for 21% and shellfish for 27%. The evolution of the EU aquaculture production in weight and value terms is represented in figure 5.1.

Figure 5.1: EU (28) aquaculture production in weight and value by subsector: 1984-2011.



Source: FAO: 2013

Shellfish aquaculture

The total sales volume for the EU (28) aquaculture shellfish sector is estimated to be 0.68 million tonnes and the total value of sales (turnover) is estimated to be 1.12 billion Euros in 2011. Shellfish aquaculture is a labour intensive segment, which faces limited environmental concerns. This sector has a very important social dimension given the high number of persons employed.

Reported data shows the existence of more than 8.3 thousand companies in the EU aquaculture shellfish sector in 2011. Companies had on average 6.2 employees (2.3 in FTE terms). Indeed, the majority of the companies in the subsector are micro-enterprises (with less than 10 employees). In 2011, 86% of the EU aquaculture shellfish companies in the EU were micro-enterprises. The companies with 5 or less employees represented in 2011 the 76% of the EU aquaculture companies, the companies with 6 to 10 employees represented the 10% and the companies with more than 10 employees represented the 14%.

From the available data we estimate that the EU (28) aquaculture shellfish sector could produce between 55 and 65 thousand direct employments. The EU aquaculture shellfish sector has an important compound of part-time work, since the ratio between the employment measured in full time equivalents (FTE) and the total employment was 36% in 2011. A large part of the employment is not performed under a formal contract, as the workers are either the owners of the company or family members. Available data show that women accounted for the 30% of the EU aquaculture shellfish sector employments, the 26% in FTE terms.

Available data suggest that the average wage (per FTE) for the EU aquaculture sector in 2011 was about 19.3 thousand Euros per year. There is an important variability on the wages in each country. The salaries varied from about 5.6 thousand Euros per year in Portugal to about 136.4 thousand Euros per year 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, more capital intensive in Germany, Denmark and the Netherlands. The unpaid labour is very important in the shellfish aquaculture. The imputed value of unpaid labour represents 45% of the total wages.

Available data report that the EU shellfish aquaculture sector provided in 2011 slightly more than 0.58 billion Euros in Gross Value Added. Available data show that in 2011 the EU shellfish aquaculture sector has obtained profits, measured in EBIT terms, of about 164 million Euros. Moreover, for all Member States that had shellfish aquaculture and reported data to calculate this indicator in 2011, all of them had a positive profitability. The profitability measured in ROI terms was 11.3% in 2011.

The most important costs of the EU shellfish aquaculture sector are the livestock costs, which represent 32% of the total costs. While wages and salaries, and imputed value of unpaid labour represent 19% and 15% the total costs. Hence, a large part of the employment in this sector is not done under a formal contract, because the workers are either the owners of the company or belong to the same family unit. Feed costs are negligible. This occurs because the production is fed by the sea water itself, since mussels, clams and oyster are filtering organisms.

Marine (saltwater) aquaculture

The total sales volume for the EU (28) marine aquaculture sector is estimated to be 0.36 million tonnes and the total value of sales (turnover) is estimated to be 1.77 billion Euros in 2011. Marine fish aquaculture is characterised by being generally capital intensive, with high input and high labour productivity. This segment has potential to compete on the increasingly globalised market but it faces constrains which hinder further expansion. Its environmental impacts are also generally higher than those of other aquaculture segments.

Available data reports more than 600 companies in the EU marine aquaculture sector in 2011. Companies had on average 13.1 employees (9.9 in FTE terms). The majority of the companies in the subsector are micro-enterprises (with less than 10 employees). In 2011, 87% of the EU aquaculture marine companies in the EU were micro-enterprises. The companies with 5 or less employees represented in 2011 the 35.1% of the EU aquaculture companies, companies with 6 to 10 employees represented 36.8% and companies with more than 10 employees represented the 28.1%.

From the available data we estimate that the EU (28) aquaculture marine sector produces more than 5 thousand direct employments. Part-time work is not so significant in the EU aquaculture marine sector, since the ratio between the employment measured in full time equivalents (FTE) and the total employment was 72% in 2011. The low percentage of imputed value of unpaid labour in the operational costs confirms this fact. Available data show that women accounted for the 14% of the EU aquaculture marine sector employments.

Available data suggest that the average wage (per FTE) for the EU aquaculture sector in 2011 was about 30.4 thousand Euros per year. There is an important variability on the wages in each country. The salaries varied from about 10.7 thousand Euros per year in France to 81.6 thousand Euros per year in Italy. The variability in the salaries can be explained by differences in the labour productivity and the capital and

production intensity of the different techniques. The imputed value of unpaid labour is almost negligible in this sector since it only represents the 1.2% of the total wages.

Available data report that the EU marine aquaculture sector provided in 2011 more than 328 million Euros in Gross Value Added. Available data show that in 2011 the EU marine aquaculture sector has obtained profits, after suffering losses on previous years. Measured in EBIT terms, profitability reached more than 61 million Euros. Moreover, only Portugal suffered losses in 2011. Overall profitability measured in ROI terms reached 6.8% in 2011. The EBIT ratio was at 10.3% in 2011.

The most important costs of the EU marine aquaculture sector are the feed costs, which represented 42% of the total costs, an important increase from what it was reported for 2010 in the 2012 aquaculture report, where represented the 26%. This significant increase can be due to the feed price increases and the inclusion of data from the United Kingdom with the a significant share of salmon production that demands expensive feed. Other costs are other operational costs (21%), livestock costs (15%) and wages and salaries (12%). It is important to notice the null importance of imputed value of unpaid labour, because most of the work is done under formal contracts.

Freshwater aquaculture

The total sales volume for the EU (28) freshwater aquaculture sector is estimated to be 0.29 million tonnes and the total value of sales (turnover) is estimated to be 0.89 billion Euros in 2011. This segment is often characterized by low labour productivity and low capital intensity, serving mainly local markets (e.g. carp). In this category limited demand and strong international competition is limiting the profitability and growth of production, however the extensive and artisanal production may play a role in environmental and recreational aspects (e.g. regarding biodiversity and preserving cultural landscapes).

Available data reports more than 1,100 companies in the EU freshwater aquaculture sector in 2011; however, real figures could be much higher due to the lack of data reported under the DCF. Companies had on average 3.6 employees (2.2 in FTE terms). The majority of the companies in the subsector are micro-enterprises (with less than 10 employees). In 2011, 94% of the EU aquaculture freshwater companies in the EU were micro-enterprises. The companies with 5 or less employees represented in 2011 the 83.4% of the EU aquaculture companies, companies with 6 to 10 employees that represented the 10.9% and companies with more than 10 employees represented the 5.7%.

From the available data we estimate that the EU (28) aquaculture freshwater sector produces more than 10 thousand direct employments. The EU aquaculture freshwater sector has a significant compound of part-time work, since the ratio between the employment measured in full time equivalents (FTE) and the total employment was 62% in 2010. Available data show that women accounted for the 17% of the EU aquaculture freshwater sector employments.

Available data suggest that the average wage (per FTE) for the EU aquaculture sector in 2011 was about 42.8 thousand Euros per year. There is an important variability on the wages in each country. The salaries varied from about 13.6 thousand Euros per year in Portugal to 206.9 thousand Euros per year in Italy. The unpaid labour is almost negligible in the freshwater aquaculture, since the imputed value of unpaid labour represents 10% of the total wages.

Available data report that the EU freshwater aquaculture sector provided in 2011 almost 210 million Euros in Gross Value Added. Available data show that in 2011 the EU freshwater aquaculture sector has obtained profits, measured in EBIT terms, of more than 63 million Euros. Moreover, for the 9 Member

States that had freshwater aquaculture and reported data to calculate this indicator in 2011, only France had a negative profitability. The overall profitability measured in ROI terms was 6.6% in 2011; while measured with the EBIT ratio (for the same 9 countries) in 2011 was 11.1%.

The most important costs of the EU freshwater aquaculture sector are the feed costs, which represent 37% of the total costs. This is also , an important increase due to an increase in feed price from what it was reported for 2010 in the 2012 aquaculture report, where represented the 27%. Other important costs are wages and salaries (18%) and livestock costs (15%). It should be also noticed the almost null importance of imputed value of unpaid labour on freshwater aquaculture (represented only 2% of the total costs), since only 11% of the labour it is not carried out a formal contract.

6 MAIN SPECIES ANALYSED IN EU AQUACULTURE

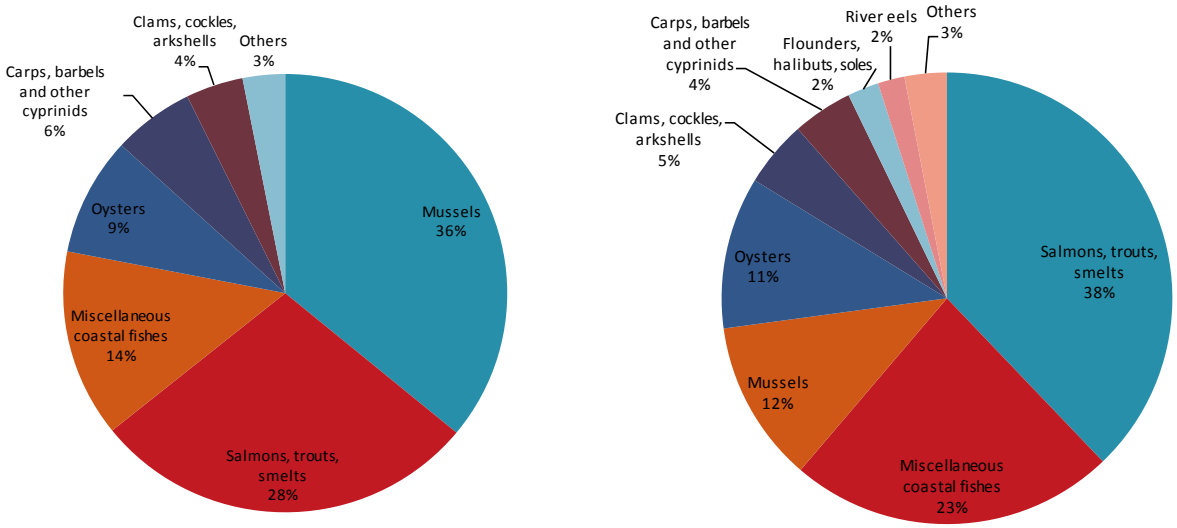
In 2011, the EU aquaculture production weight by species group were dominated by mussels (36%), salmonid species (mainly rainbow trout and Atlantic salmon, with 28%), coastal fishes (including gilthead seabream and European seabass, with 14%) and oysters (9%), as it can be seen in Figure 6.1 (left chart). Therefore, 51% of the total EU aquaculture production volume was fish and 49% shellfish (mainly molluscs).

In 2011, the main aquaculture species produced in weight terms in the EU (28) were mussels (456 thousand tonnes, 36% of total EU production), rainbow trout (179 thousand tonnes, 14% of total EU production), Atlantic salmon (171 thousand tonnes, 13% of total EU production), Pacific cupped oysters (104 thousand tonnes, 8% of world production), gilthead seabream (99 thousand tonnes, 8%), European seabass (73 thousand tonnes, 6%) and common carp (62 thousand tonnes, 5%). These species constituted about 90% of the total EU aquaculture production in weight (FAO, 2013).

While in Figure 6.1 (right chart) it can be seen the EU aquaculture production in value by species groups dominated by salmonid species (38%), coastal fishes (23%), mussels (12%) and oysters (11%). Therefore, 72% of the total EU aquaculture production value was fish and 28% shellfish (mainly molluscs) in 2010.

In 2011, the main aquaculture species produced in value in the EU (28) were Atlantic salmon (754 million Euros, 22% of all EU production), rainbow trout (507 million Euros, 15% of all EU production), gilthead seabream (435 million Euros, 13%), European seabass (359 million Euros, 10%), Pacific cupped oysters (357 million Euros, 10%), mussels (289 million Euros, 8%), and common carp (128 million Euros, 4%). These species constituted more than 80% of the total EU (28) aquaculture production in value (FAO, 2013) for 2011.

Figure 6.1: Production weight (left) and value (right) by species group: 2011.



Source: FAO, 2013

Salmon

The main salmon species cultured world-wide and in the EU is Atlantic salmon (*Salmo salar*). Minor production of Coho salmon (*Oncorhynchus kisutch*) and Chinook salmon (*Oncorhynchus tshawytscha*) are also cultured outside the EU. Total production of Atlantic salmon (*Salmo salar*) in 2011 is around 1.72 million tonnes, valued in 6.98 billion Euros. Norway is the world leading producer with 62% of the weight and 50% of the value produced. The EU produced near 171 thousand tonnes, valued 754 million Euros, in 2011, the 9.9% in weight and the 10.8% in value of the world Atlantic salmon production. In the EU, the main producer is the United Kingdom with more than 158,000 tonnes, followed by Ireland with more than 12,000 tonnes. Production from other EU countries is currently just testimonial (FAO, 2013).

The economic performance for the EU aquaculture salmon sector has been improving since 2008 when losses were registered. The EU salmon aquaculture produced a GVA of more than 181 million Euros.

Trout

The main trout species cultured in the EU is rainbow trout (*Oncorhynchus mykiss*). Minor production of sea trout (*Salmo trutta*) and brook trout (*Salvelinus fontinalis*) are also cultured in the EU. Total production of rainbow trout in 2011 is around 770 thousand tonnes, valued in 2.76 billion Euros. Chile is the world rainbow trout leading producer with 29% of the weight and 47% of the value produced. The EU produced near 179 thousand tonnes, valued 507 million Euros, in 2011. Hence, the EU produced the 23.0% in weight and the 18.4% in value of the global rainbow trout production. In the EU, the main producer is Italy with 38,000 tonnes, followed by France and Denmark with around 33,000 tonnes (FAO, 2013). EU production of sea trout was 3.9 thousand tonnes and 0.7 thousand tonnes of brook trout in 2011.

The economic performance of the trout aquaculture companies have been increasing between 2008 and 2010, but show a slight decrease for 2011, even if all indicators continue to be positive. Indeed, 2011's GVA, EBIT and net profit are lower than the 2010 figures, but ROI has increased between 2010 and 2011.

Seabass & seabream

Global production of European seabass (*Dicentrarchus labrax*) in 2011 was around 144 thousand tonnes, valued in 619 million Euros. Turkey and Greece are the world European seabass leading producers with 33% and 31% of the weight and 29% and 31% of the value produced, respectively. The EU produced near 73 thousand tonnes, valued 359 million Euros, in 2011, accounting for 50.7% global weight and the 58.0% of value. In the EU, The main European producer is Greece with 44,100 tonnes, followed by Spain and Italy with around 17,700 and 6,500 tonnes, respectively (FAO, 2013).

Global production of gilthead seabream (*Sparus aurata*) in 2011 was around 155 thousand tonnes, valued in 667 million Euros. Greece is the world largest gilthead seabream producer, accumulating 46% of weight and 43% of value. The EU produced near 99 thousand tonnes, valued 435 million Euros, in 2011, which represents the 63.8% in weight and the 65.2% in value of the global gilthead seabream production. In the EU, the main producer is Greece with almost 71,000 tonnes followed by Spain with more than 15,000 tonnes (FAO, 2013).

The ongoing debt crisis, especially in Greece, is expected to negatively affect the European production of seabream and seabass in the next years. Absence of credit in the Geek economy is expected to further limit the Greek production and at the same time force for more concentration in the sector. Price is expected to present volatility as companies will be forced to sell livestock in order to acquire liquidity. The 2008-09 price decline is clearly identified in the economic performance (losses) of the sector, even if the sector registered losses before the crisis. The recovery process is also identified for the years 2010 and 2011. While in countries producing relatively small quantities of seabass & seabream, the sector has recovered from the 2008/2009 price decline, in Spain the second larger producer in EU, the sector is still under recovery. The recovery of the sector is still underway also in Greece where despite the fact of positive EBIT, net profit remains negative for 2011 and 2012.

Carp

There are different species of carps produced in aquaculture. Main species produced by weight are silver carp, grass carp, common carp, bighead carp and crucian carp. In the EU the main species cultured are common carp with 61,860 tonnes, silver carp with almost 3,500 tonnes, bighead carp with 2,272 tonnes and grass carp with 1,690 tonnes in 2011. Total production of common carp (*Cyprinus carpio*) in 2011 is around 3.73 million tonnes, valued in 3.82 billion Euros. China is the world common carp leading producer with 73% of the weight and 58% of the value produced. The EU produced more than 61 thousand tonnes of carps, valued 127 million Euros, in 2011. The EU produced the 1.6% in weight and the 3.3% in value of the global common carp production. In the EU, the main producer is Czech Republic with almost 18,200 tonnes, followed by Poland and Hungary with around 14,400 and 10,800 tonnes, respectively (FAO, 2013).

Reported data shows a clear decreasing trend in the economic performance indicators for the carp sector from 2009 onwards. 2008 indicators suffer from high levels of data unreported. Due to the significant 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.

Mussels

There are different species of mussels produced in aquaculture: Chilean mussel, blue mussel, green mussel, Mediterranean mussel, New Zealand mussel, Korean mussel, etc. Total mussel production reached 1.80 million tonnes and 1.60 billion Euros in 2011. China and Chile are the world mussel leading producers followed by France, New Zealand and Spain (FAO, 2013). The main species of mussels produced in the EU are blue mussel (*Mytilus edulis*) and Mediterranean mussel (*Mytilus galloprovincialis*). Total production of blue mussel and Mediterranean mussel in 2011 is around 1.20 million tonnes, valued in 572 million Euros. China is the world blue mussel and Mediterranean mussel leading producer with 59% of the weight and 24% of the value produced. The EU produced more than 454 thousand tonnes, valued 401 million Euros, in 2011. The EU produced the 38.0% in weight and the 70.1% in value of the global blue mussel and Mediterranean mussel production. In the EU, the main producer is Spain with around 208,500 tonnes, followed by France and Italy with around 76,800 and 64,300 tonnes, respectively (FAO, 2013).

Available data estimates that the EU mussel aquaculture gross value added reached more than 245 million Euros, EBIT reached almost 93 million Euros, showing a positive economic performance confirmed by a ROI of 16.1%. The evolution of the economic performance indicators show that the sector has recovered from 2008 losses in GVA and net profits and 2009's low profitability, and is currently obtaining profits. Profits measured in EBIT or net profit that seems to come mainly from mussels rafts, followed by mussels bottom and then mussels other; while income is mainly coming from mussels bottom, mussels raft and mussel long-line.

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 4.52 million tonnes and 2.66 billion Euros in 2011. China is the world oyster leading producer with 83% of the weight and 60% of the value produced (FAO, 2013). The main species of oysters produced in the EU 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 640 thousand tonnes, valued in 966 million Euros. Republic of Korea, Japan and Taiwan are the world Pacific cupped oyster and European flat oyster leading producers with 44%, 26% and 5% of the weight and 13%, 25% and 13% of the value produced. The EU produced around 107 thousand tonnes, valued 372 million Euros, in 2011. The EU produced the 16.7% in weight and the 38.5% in value of the global Pacific cupped oyster and European flat oyster production. In the EU, the main producer is France with around 96,000 tonnes, followed by Ireland with almost 8,000 tonnes (FAO, 2013).

Available data suggests that the EU oyster aquaculture gross value added reached more than 265 million Euros, EBIT reached more than 84 million Euros, showing a positive economic performance confirmed by a ROI of 12.0%. Indicators for 2010 and 2011 show a positive economic performance of the sector. For 2008-09, missing detailed data for France, prevents further analysis. The majority of the income and profits are generated in the oyster bottom segment.

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 4.9 million tonnes and 3.5 billion Euros in 2011. According to FAO,

the main clam species cultured in the EU are Japanese carpet shell (*Ruditapes philippinarum*) and grooved carpet shell (*Ruditapes decussatus*) (FAO, 2013). Total production of Japanese carpet shell and grooved carpet shell in 2011 is around 3.69 million tonnes, valued in 2.51 billion Euros. China is the world clam leading producer with 98% of the weight and 92% of the value produced. The EU produced more than 42 thousand tonnes, valued 197 million Euros, in 2011. The EU produced the 1.1% in weight and the 5.0% in value of the global clam production. In the EU, the main producer is Italy with around 36,750 tonnes, followed by Portugal with more than 2,300 tonnes (FAO, 2013).

The EU clam aquaculture gross value added reached almost 50 million Euros; however, profitability was negative, leading EBIT to reach almost -14 million Euros, and ROI at -13.1%. There has been an increase of the total income in the clam aquaculture sector for the period 2008-2011. This was translated in increases in the GVA and net profits, which were negative in 2008. However, due to an important increase in operational costs, the GVA and net profits decreased in 2011; the latter registering losses again.

Other species

Current DCF segmentation classifies the companies according to the main species (or group of species) produced (i.e. salmon, trout, carp, mussels). However, there is a relevant number of companies that produce species not specifically indentified in the segmentation. These species are grouped in other marine fish species, other freshwater species and other shellfish species.

When analysing the EU production in terms of weight, the first species that needs to be classified as **other marine fish species** is turbot, which is the 11th species produced in terms of weight. There were mainly produced in Spain and Portugal, reaching more than 11 thousand tonnes of turbot produced for the whole EU in 2011. On the 19th position there is Atlantic bluefin tuna with more than 3,200 tonnes. There were mainly produced in Croatia, Malta and Spain. 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. Important synergies could be produced if knowledge would be shared between companies, but this is quite improbable to happen since the specific advantages in terms of knowledge a company could have may be lost.

On the 13th position, there is European eel with more than 6,700 tonnes produced in 2011. Main producers in the EU are the Netherlands, Denmark and Italy. As all diadromous fish (i.e. salmon and trout) it is difficult to allocate production to just one environment: marine or freshwater. On the 14th position, there is the North African catfish with more than 5,300 tonnes produced in 2011. Main producers in the EU are the Netherlands and Hungary. On the 22nd position there are sturgeons with more than 2,250 tonnes. Main producers in the EU are Italy, France and Poland. **Other freshwater species** are chars, tench, goldfish, European whitefish, Northern pike, pike-perch, etc.

Under shellfish there are classified molluscs and crustaceans. The main shellfish species are mussels, oysters and clams. Minor productions of **other shellfish species** are Kuruma and common prawns, palaemonid shrimps, great Atlantic scallops, tuberculate abalone, Indian white prawn, Danube crayfish, etc., also take place.

Even if the **other species** group is not currently reported under the DCF, it is important to provide some general overview for the sake of consistency when analysing the whole EU aquaculture. Moreover, when discussing the potential segmentation for the future DC-MAP, it is relevant to know the importance of each group of species. Other species could be further disaggregated between aquatic plants, cephalopods

and other aquatic animals. Nowadays, the EU only has minor production of some of the species in these groups. For aquatic plants, FAO reported only significant production of seaweed in France and Spain for a total of more than 120 tonnes in 2011. There is potential for further development of algae farming. In fact, some initiatives have already been undertaken, as a seaweed production and processing company in Ireland:, expected to expand exponentially from 2013 on. However, one of the main uncertainties is whether demand can absorb relevant increases of algae production. From the cephalopods group, only octopus in Spain were produced with almost 3 tonnes in 2011. Octopus prices are quite high, between 5 and 6 €/kg. Consequently, octopus production in aquaculture could be interesting; however, there are still some problems in the octopus production from a biological point of view. For other aquatic animals, FAO only reported 1.5 tonnes of stony sea urchin in Ireland. Aquatic invertebrates and frogs were no longer produced in 2011. Indeed, there is no farming of amphibians for human food consumption (but they may be bred for pet and research trades).

7 TRENDS AND TRIGGERS OF THE EU AQUACULTURE

Europe represents the largest market for fish in the world. Over the past decades consumption has increased. However, as own production of fish (capture and farmed) has not increased, net fish imports have increased, and self sufficiency has decreased.

The global consumption of seafood is constantly increasing, but there is a limit to what capture fisheries can sustainably produce. Aquaculture may help filling this growing gap and bring safe, healthy and sustainable seafood to the European market.

Today the EU seafood consumption is 13.2 million tonnes; of this, 25% comes from EU fisheries, 65% from imports and 10% from EU aquaculture (European Commission. 2013). Total EU aquaculture production was 1.26 million tonnes, and 3.1 billion Euros. An increasing aquaculture sector can also have a positive impact in terms of job creation in coastal and rural areas. Based on current labour productivity, it is estimated that a percentage point increase in EU consumption of cultured seafood could create between 3,000 and 4,000 full-time jobs if this increase in production was taken place inside EU (European Commission. 2013).

There are many reasons that have lead to an increase in demand for fish. First, population size has increased. Second, overall the real price of fish has come down, making the product more attractive to consumers. Third, real incomes have increased, causing greater demand for fish. Finally, consumers have become more health conscious, causing a positive shift in demand as fish consumption is known to have important health benefits.

EU landings of wild fish have been stagnant or even decreasing; while EU aquaculture production has been stagnant. There are some successful stories in the EU aquaculture (STECF, 2012). However, overall, aquaculture in the European Union has not come up with new species that have “taken off” in the way that was the case, for example, for salmon in Norway and Chile or pangasius in Vietnam. There may be several reasons for that (some of them reviewed by STECF, 2012).

Successful development of aquaculture presupposes control with the biological production process. Beyond that, what may be called economic sustainability, namely profitable production over time, is required. This depends not only on the "sale" price, but also on the cost of production. Considering the fierce competition (foreign but also internal) and high labour and capital costs that the EU aquaculture sector bears, high value species are most relevant for EU producers. More than that, in view of the high costs, species of interest are those where productivity improvements can be achieved over time, giving rise to lower costs of production. This is an absolute necessity, because as production expands, price is likely to come down.

Moreover, governance takes on an important responsibility in the future of aquaculture. Positive important roles for governments include expediting the planning process for new farms (and farm extensions), as well as makings sites available. In addition, there is an important role for governments in terms of R&D.

Data for 2011 show a continuation on the improvement in the economic performance of the EU aquaculture sector from the beginning of the economic crisis (2008-2009). However, the future evolution of the EU aquaculture is rather uncertain. The aquaculture sector has to face a fierce foreign competition that brings market prices down, high labour and capital costs and administrative burdens that slow down investments in the sector, hindering the full potential of the EU aquaculture sector.

The new strategic guidelines are not overruling any existing EU legislation, but the guidelines are seen as a first step in this process of voluntary cooperation between Member States and the Commission to improve the condition for aquaculture production in Europe. The next step is for Member States to prepare their multiannual national plans for the development of sustainable aquaculture. It is up to the Member States to coordinate their efforts and to exchange best practices and know-how.

The EMFF is expected to be the main financial tool to support the development of aquaculture. Thus, it is important that the Management Plan that each Member State will prepare in the context of the EMFF (currently under negotiation) is consistent with its multiannual national plan for the development of sustainable aquaculture, in order to foster the overall coherence of aquaculture policy. The content of the Management Plan and the multiannual national plan will be defined by each Member State taking into consideration its specific conditions, starting points and objectives.

Giving special consideration to the current period of crisis and austerity it is important that this financial support is used in the most efficient way possible. Therefore, in order to obtain the largest long-term benefits, it would make sense that it is spent in those activities where the EU aquaculture has or can obtain competitive advantage in front of competing third countries.

It is also important to strengthen and improve the image of aquaculture on aspects of environmental, animal welfare and food. Communication efforts shall be promoted to improve the image of aquaculture products in the EU.

Finally, this support to the EU aquaculture needs to be accompanied with measures that try to minimize the current and future obstacles to growth of the EU aquaculture sector.

7.1 Main obstacles for the EU aquaculture to grow

EU aquaculture production is stagnating; problems of governance have been identified, resulting in very few authorizations/licenses being issued in the main producing Member States in past years. Factors contributing to this situation include: the competition for space in coastal areas, lack of clear priorities for the development of the sector, fragmentation of competences for the authorization of aquaculture farms and sites, and the way environmental legislation is implemented. Most obstacles identified are in line with the main hindrance for growth identified by the previous STECF reports, European Commission, OECD and JRC (i.e. European Commission. 2013).

Simplify administrative procedures

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.

SMEs represent a substantial part of the aquaculture sector, and they are disproportionately affected by red tape and regulation: the relative weight of regulatory and administrative costs compared to turnover and number of employees can be up to ten times higher for SMEs than for large companies.

Fragmentation of competences for the authorization

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 on all level 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 should be issued. As an example, if a new license or a permit to rebuild an existing farm in Denmark should be approved the following authorities must be involved: The Ministry of Food, Agriculture and Fisheries, The Ministry for Environment and the local municipality. This makes it very difficult for a small enterprise to deal with this bureaucracy and it is very time consuming.

The many different institutions involved in the process and lack of expertise on different levels of the governmental institutions is an important reason for the unnecessary long time of treating application for the establishment of new aquaculture production.

Moreover, often these different institutions may have different aims and targets, which some of them could be opposed to the existence of aquaculture exploitations in their area. It could happen that national and regional governments were in favour of aquaculture farms in their area, but locals governments could be against the existence of aquaculture farms in their areas. The position against aquaculture farms of local governments could be explained by the fact that often local governments have more power when the number of inhabitants increases. Moreover, often taxes local governments collect are proportional to the number of inhabitants or visitors they receive and not to the companies taxation. Therefore, local governments may prefer to use their coastal space for the construction of residential areas.

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.

Regulation and implementation of environmental legislation

The existing regulation in most EU countries is based on command and control. This kind of regulation can secure a certain level of environmental impact or that a certain level of pollution is not exceeded, such as the level of nitrogen, phosphorus and organic material. However, when the goals are reached the farmer has no incentive to decrease the environmental impact further.

As an example, under the feed quota system in Denmark, the farmer’s main focus was to optimize production based on the farms feed quota, whilst they has no incentive to reduce the pollution discharged from the farm (Nielsen 2011). A regulatory change to an incentive based regulation system such as pollution rights on nitrogen will give the farmer an incentive to reduce his environmental impact if the farmer in exchange is allowed to raise production (Nielsen 2012). This can potentially increase both production and income in the sector, without increasing pollution. Furthermore, it would provide the farmers with an incentive to reduce pollution even further 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 very important to identify the possible gains and losses of regulatory changes, because if a regulation is not optimal, it can lead to welfare losses for the society and individual producers.

The conclusion that can be drawn from this, based on economic theory of incentive based regulation and the case study of Danish aquaculture (Nielsen 2012), is that the existing regulation in most EU countries has most likely reduced the potential production and income and postponed the innovation of more environmental friendly and sustainable aquaculture technology.

New licenses are needed

One of the common constraints identified is the lack of new licenses issued. Over the past years very few authorisations/licenses have been issued in the primary aquaculture sector all over Europe. 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 6 months after the introduction of the "single contact point" approach. Another comparison is the authorization of a new agricultural farm in France which seems to be only 4-6 months.

The aquaculture sector is a sector with high risk (Asche & Bjørndal 2001). The long expedition time for new or renewal of aquaculture production permits and licenses creates even more uncertainty in the sector, which makes the sector less attractive to investors. Furthermore, the willingness to invest in new larger facilities is reduced if you are not certain that they can be used immediately after they are finished and ready to produce.

The competition for space in coastal areas

The issue of space is often perceived as a hindering factor for the expansion of EU marine aquaculture; however, the surface and coastline occupation by aquaculture sites is extremely limited and the availability of space along the coastline in absolute terms seems to be more than adequate to accommodate an expansion 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 planning. 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.

Aquaculture interacts with many different interests in the coastal zone and at the moment it seems like Member States weigh other activities higher, because the aquaculture sector in most areas are rather insignificant and there is a general negative perception of aquaculture impact on the surrounding environment. 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.

Small and medium size enterprises (SMEs)

The vast majority of EU aquaculture producers are SMEs; many are family-owned micro enterprises. Data available suggests that microenterprises represent around the 87% of all aquaculture companies in the

EU. One of the key barriers to the development of aquaculture is represented by the high administrative costs, long times and uncertainties connected to the licensing process for new farms, and the lack of new 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.

Diverging interpretations and applications of legislation in member states

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.

Lack of clear priorities for the development of the sector

There is a lack of clear priorities in the development of the EU aquaculture sector, in great part due to the existence of different governmental institutions with different levels of spatial representativeness.

7.2 Organic aquaculture

In the European context the situation regarding the production of organic aquaculture fish species needs to be distinguished between freshwater and marine species.

7.2.1 Freshwater aquaculture

The main species farmed in Europe is the rainbow trout (*Oncorhynchus mykiss*). This species is widespread and appreciated by European consumers. In particular, organic production has a strong market especially in Central Europe, mainly Germany. Although the price of organic fish is higher, for trout, the consumer price remains an affordable price that consumers are willing to spend to get seafood products certified organic.

To this must be added that the supply chain (from the tank to the consumer) of the trout is very well integrated and developed: the majority of the supply of trout is sold "as is" cool but undergoes a process: it is transformed into fillets, smoked, canned , pre-cooked, etc., it is able to satisfy a wide range of consumers. Analyzing the “situation” on the hand of weakness for rainbow trout segment, it is the lack of fry organic the most important weakness. To get the organic fry (i.e. eggs, fry, juveniles) farmers must use fish caught in the wild (by wild catch), however, the rainbow trout isn’t a native species in Europe , for both the broodstock are wild. Apart from the main weakness represented by the scarcity of wild broodstock, another weakness for the development of organic farming of cultured trout is represented by the operating (production) costs of consumables: feed, in particular, are available, but cost an average of 30% more than the non-organic feed.

Moreover, from experimental tests , the use of organic feed showed greater amounts of PCBs in the flesh of fish sold for human consumption: this aspect is even a threat to organic aquaculture.

Another aspect that could represent a weakness for economic development of organic farming of trout and, in general, of all freshwater species, is represented by the correct control of the density of product

per cubic meter of water. This is related to the efficiency of dissolved oxygen: it tends to hold little biomass in the tank so as not to increase consumption and thus the costs linked to oxygen.

At present producers operating in organic trout are:

- Italy with amounts of about 200-300 tons,
- France which was the first member state to produce 100 tons of organic trout,
- Denmark which, however, is able to have fry only for their own consumption but the potential of organic farmers to produce fry is uncertain.

For other species farmed in freshwater the organic fry availability problem of biological is irrelevant: the carp is reared biological especially in Austria and Germany.

7.2.2 Marine aquaculture

For sea bass and sea bream species is very easy to obtain organic fry, because the broodstock are easily caught in the wild (wild catch). The biggest problem is the weakness of the sector for the development of organic sea bream and sea bass is the disinterest of the market to buy fresh organic product. The main factor that hampers the development is represented by the final consumer price (market/selling price): the price for these species is particularly high and due to a sharp decline in the purchasing power of consumers, is an obstacle to development. In addition to price, one other weakness is the fact that the sea bass and sea bream are purchased mainly fresh and unprocessed, for both the export market is quite close to the production facilities and is primarily aimed at a smaller number of consumers. The higher costs for the Organic Marine Aquaculture are represented by the feed and the ability to plant efficiency.

Many of the organic fry bread in Italy is bound to foreign markets, because in Italy as there is no demand from the market, it is uneconomical to raise organic. In the EU, also France, Greece and Spain produce significant amounts of marine organic eurhyaline species and are able to self procure the fry.

Must be addressed in a different manner, however, the case the farming of the salmon and the production of caviar. In the first case, Norway has strong capitalization in plants both in Ireland and in Scotland, productive areas in which Norway has focused on the production of organic salmon. So, in the EU there is excellent production in organic salmon, however, the funds are Norwegian.

The market potential in organic caviar is very wide, but there is a large initial weakness: the European regulation is not clear on the specific rules for the recognition and, moreover, there is no clarity on the sacrifice of the animal to get the eggs. There is now within the EU only one certified farm that produces organic caviar in Spain.

8 THE EU AQUACULTURE BY COUNTRY

8.1 Austria

Summary

The Austrian aquaculture sector produced 2.2 thousand tonnes of fish in 2011 valued at about 19.3 million Euros (FAO, 2013). Austria produces no marine or shellfish aquaculture. A fall in production weight of less than 1% was displayed from 2010 to 2011 in freshwater aquaculture bringing the total production down from 2,167 tonnes to 2,160 tonnes. This is still 73 tonnes above that of 2008. The value of production has also fallen more sharply over the past year by 5% from € 20,365 thousand to 19,338 thousand Euros. As with weight this figure is larger than pre 2010 figure which, in 2008, was at 12,803 thousand Euros and so production in 2011 were 51% higher than in 2008. In 2011 rainbow trout represented 56% of the weight and 55% of the value, with other important species including common carp and brook trout.

Trends and Triggers

The various segments of the Austrian aquaculture sector have followed a very similar trend in the 2008 - 2009 period. Prices of the main 5 species (rainbow trout, brook trout, common carp, wels catfish and sea trout) have seen a rise in the country of 50% before suffering a slight fall in 2011. The price of rainbow trout in Austria was 7.9 €/Kg in 2011. The price for common carp was 6.0 €/Kg, for grass carp 8.9 €/Kg, for brook trout and for northern pike it was 11.9 €/Kg in 2011.

8.2 Belgium

Summary

The Belgian aquaculture sector only produced 49 tonnes in 2011, valued at about 230 thousand Euros (FAO, 2013). Belgium produces no marine or shellfish aquaculture. Rainbow trout was the main species produced by the Belgian aquaculture sector, representing the 73% in weight and 68% in value of total production. However, production in both weight and value shows significant variations overtime that should be analysed if they are due to real production oscillations or data collection inaccuracies.

Trends and Triggers

Rainbow trout was the main species produced by the Belgian aquaculture sector, representing the 73% in weight and 68% in value of total production in 2011. The average first-sale price for cultured rainbow trout has been stable at 4.3 €/Kg for the period 2008-2011. This could offer a high income stability for the Belgian aquaculture companies.

8.3 Bulgaria

Summary

In 2011, the Bulgarian aquaculture sector sales reached 4.1 thousand tonnes, a 10% increase from 2010. In fact, DCF shows a steady increase for the period 2008-2011 (+41%). Sales in 2011 were valued at about 10.04 million Euros, a 4% increase from 2010. However, there is been an important decrease in the sales value since 2008 (-54%). Production trends in both weight and value reported by FAO are different from DCF sales figures and show no significant variations in production between 2008 and 2011. The main species produced are rainbow trouts representing 45% in weight and 76% in value of total Bulgarian production in 2011. Common carp represented the 18% in weight and 8% in value, while Mediterranean mussel represented the 15% in weight and 5% in value of the total Bulgarian production in 2011.

Trends and Triggers

There has been an important decrease in the employment in the Bulgarian aquaculture sector between 2009 to 2010 (-84%), even if the number of companies increased by 3% during the same period. From 2010 to 2011, the employment, both measured in number of employees and FTE, has increased in 24%. This important decrease in the employment could be explained by the economic crisis. The evolution of the Bulgarian aquaculture sector is largely affected by the changes occurred between 2009 and 2010. Between 2009 and 2010, turnover decreased by 36%, livestock decreased costs by 98% even if livestock weight increased by 16%, feed costs decreased by 57% even if feed weight increased by 23%, other operational decreased by 90%, financial costs decreased by 87% and total value of assets decreased by 75%. This has produced a reduction in the production accompanied with improvements in the labour productivity and economic performance of the aquaculture sector. If these trends are confirmed, it would be important to see if it is possible to recover the production in the Bulgarian aquaculture sector while maintaining the economic performance.

8.4 Croatia

Summary

The Croatian aquaculture sector produced 22.6 thousand tonnes of produce in 2011. This production was valued at about 50.6 million Euros (FAO, 2013). Within this; marine aquaculture production decreased to 6.1 thousand tonnes and 38 million Euros, while freshwater aquaculture grew to 6.3 thousand tonnes and 12.1 million Euros in 2011 (FAO, 2013). From this we can see that the overall value of marine aquaculture products is much higher than that of freshwater aquaculture products. Total sales weight fell by 8% but this was largely down to an 80% fall in shellfish aquaculture output. Croatia has a diverse and fairly evenly distributed aquaculture sector as demonstrated by the percentages of the top 5 species produced in terms of weight (common carp 22%, European seabass 22%, rainbow trout 19%, gilthead seabream 13% and Atlantic bluefin tuna 13%). The value of produce is slightly less evenly distributed as Atlantic bluefin tuna makes up 38% of output value.

Trends and Triggers

Fish and juveniles production is very volatile for the 4 year period from 2008 – 2011 going from a high of 189 million to a low of zero. From 2010 to 2011 output fell by -18%. Atlantic blue fin tuna prices in Croatia reached around 12 €/kg in 2011, followed by European seabass with 4.4 €/kg, gilthead seabream with 3.7 €/kg, rainbow trout with 2.7 €/kg and common carp with 1.5 €/kg.

Common carp, gilthead seabream, rainbow trout and European seabass have showed a very similar pattern in terms of price changes over the period of 2008-2011. Prices for all four of these species changed relatively little as European seabass and rainbow trout gained some market value and gilthead seabream and common carp both lost some market value. In contrast the value of Atlantic bluefin tuna started the period at a value of around 5.5 €/kg but this rose to 12 €/kg. The majority of this price increase was experienced over the 2008-2009 time period.

Croatia entered in the EU in 2013, so it has not participated in the data collection (DCF). Therefore, FAO and EUROSTAT data have been used in this analysis.

8.5 Cyprus

Summary

In 2011, marine aquaculture production was 4,592 tonnes with a value of 26.7 million Euros. Also, marine hatcheries produced slightly more than 23 million fingerlings with a value of 3.4 million Euros. Regarding freshwater aquaculture, in 2011 production was 67.5 tonnes valued at 555 thousand Euros**.** In Cyprus, there are nine marine fattening farms using intensive offshore cage farming techniques. They mainly culture seabream (*Sparus aurata*), seabass (*Dicentrarchus labrax*), meagre (*Argyrosomus regius*), rabbit fish (*Siganus rivulatus*) and pandora (*Pagellus erythrinus*). The most important cultured marine fish species are seabream and seabass with 3,000 tonnes and 1,500 tonnes respectively. There are also eight freshwater aquaculture farms mainly constituted of concrete tanks with their water intake coming from neighbouring springs and rivers, all located on Troodos mountains. The fish farms, are mainly focused on the fattening of freshwater fish species such as rainbow trout (*Oncorhynchus mykiss*) and sturgeon (*Acipenser baerii*). Some of these farms also operate as fish hatcheries.

Trends and Triggers

The production in Cyprus is increasing over time 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, in the production increase. The production is expected to continue increasing, however the extent of the increase is uncertain since the prospects and the stability of the economic performance depends on the demand from new markets. It is uncertain and difficult to predict if the EU market will be able to absorb further increases in the production of seabass and seabream. Moreover, during recent years the production cost have increased significantly mainly due to the substantial increase of feed prices and the cost of energy, putting pressure in the producers profitability.

8.6 Czech Republic

Summary

The Czech aquaculture sector produced 21 thousand tonnes in 2011 valued at about 44.5 million Euros (FAO, 2013). The Czech Republic produces no shellfish or marine aquaculture products. Mild growth has been shown both in the weight (21 thousand tonnes) and value (45 million Euros) of freshwater produce showing growth of 3% and 10% respectively. Overall this indicates a rise in value of produce holding weight constant. 86% of the weight and 83% of the value of this production is made up of common carp.

Trends and Triggers

Northern pike prices are the highest of the major species relevant to aquaculture but have also shown the greatest fluctuation from a low of under € 2/Kg in 2008 to over € 8/Kg in 2009. Other species have been more consistent with common carp and grass carp in particular showing little volatility around the € 2/Kg mark. This lack of volatility (although only shown over a small time period) is beneficial as the Czech aquaculture production relies heavily upon it and this will allow for easier investment planning in the medium and long term. A lack of data prevents further analysis.

8.7 Denmark

Summary

In total, the Danish aquaculture sector produced 40,454 tonnes in 2011, which corresponded to a decrease of 4% from 2010 to 2011. On the other hand, the total value of the production was 144 million Euros in 2011, which corresponded to an increase of 7% over the same period. From 2008 to 2011, the total volume decreased by 9%, whereas the total value increased by 13%. The main species produced is rainbow trout which comprises 94% of the weight and 91% of the total aquaculture output in Denmark. This is mostly for export and 90% of the trout is exported to Germany meaning 81% of all Danish aquaculture is exported to Germany.

Total employment is virtually unchanged (0.2%) from 2010 to 2011 at 437employess, 393 of which are male. Female total employment has fallen -12% over the same period and female FTE has fallen -9%. In contrast male employment has risen by 2% and male FTE has risen by 4%. 86% of the Danish enterprises had less than 5 employees in 2011. The number of enterprises has fallen -14% following the four year trend.

Profitability shows a marked improvement when compared to 2010 as EBIT rose 89% to reach 9.5million Euros and net profit rose 482% to 5.6million Euros. Having said this only 'trout cages' of the four main segments (trout combined, trout cages, other freshwater fish species combined and mussels long line) returned a positive net profit value.

Competitive advantage

Natural Resources

Natural resources in form of suitable aquaculture sites play an important role in Denmark. On land, the competition for space is extraordinary due to the highly intensive agriculture sector. Furthermore, both sectors are competing for the same rights to discharge negative externalities into the water environment, such as nitrogen, phosphorus and organic materials. On the positive side, the availability of clean freshwater is plenty if productions are allowed.

Sea based aquaculture also faces strong competition for space, especially in the Baltic Sea, competing with traffic, fisheries, windmill parks and recreational activities. The competitive advantage for aquaculture production in the Danish part of the Baltic Sea is that farms are relatively well sheltered against storms, and there are available sites not far from the coast from which the strong current is helping disperse the negative externalities from the production sites.

Legal and political bottlenecks

The multilevel decision making process on new licenses, renewal of existing farms, and establishment of new farms is a major problem for all kind of aquaculture activity in Denmark. The approval of new aquaculture activities and renewal of the farms "environmental licenses" can take from 3 to 5 years.

Labour

The technical innovation and implementation of new highly sophisticated recirculation farms is increasing the demand for more skilled labour in the aquaculture sector, whereas the availability of unskilled labour is not considered a bottleneck.

Capital

The Danish Aquaculture sector is becoming more and more capital intensive. The higher competition for available capital and new investment in the sector has led to mergers to take advantages of economics of scale. The 10 largest enterprises now control more than 50% of the total production in both volume and value. The more capital intensive the sector is becoming, the more attention is focused on steady available input for production and that the fish can be sold the moment they are ready.

Other

Some of the leading fish feed companies and technical system manufacturers are located in Denmark. Both feed and technical innovations are sold nationally as well as internationally.

Denmark has more than 100 years of expertise in aquaculture production and an elaborate research infrastructure on aquaculture that in cooperates biologist, economist, and technicians, as well as the producers organisation including producers, feed companies, system manufacturers and fish processing.

Trends and Triggers

Investment has been increasing for the past three years in the Danish aquaculture sector. Between 2010 and 2011 investment rose by 18%, however, investments are still below the pre-crises level in 2008. The

increasing investment might indicate that firms within the sector are expecting a positive income in the future.

Demand for fish within the EU is increasing and yet supply from within the EU is stagnating. The framework condition, such as bureaucracy, administration and environmental regulation, has been the main barrier to growth in the Danish aquaculture sector. The introduction of new technology allowing for an emission reduction of nitrogen, phosphorus and organic material has made it possible to actually increase production without increasing emissions.

To support the implementation of more new technology, the existing feed quota regulation has been changed to an incentive based regulation on farm emissions, in 2012. This change should give the farmers an incentive to reduce emission, by implementing new technology, because if they lower emission they are allowed to produce more. However, the bureaucracy and administration of the new legislation are staggering. A change from the existing feed quota system to an emission permit can take up to 3 years or more and new permit or licenses are not issued.

8.8 Estonia

Summary

The Estonian aquaculture sector produced 388 tonnes in 2011, which was 32% less than the year before. The production was valued about 1.5 million Euros which is a fall of -24% on 2010 (FAO, 2013). Both sales weight and value fell consecutively over the period from 2008 to 2011. There is a small production of fish eggs and juveniles which, in 2011, was 1 million.

The Estonian aquaculture sector is comprised of around 20 companies, the majority of which are family owned and run. This can make investment very challenging especially when the lack of availability of credit is considered. Rainbow trout is the most important species as it represents 86% of the quantity and 84% of the value of Estonian fish stocks. The next most important species is the common carp however this only represents 10% of the total quantity.

Competitive advantage

Availability of natural resources (water and land) and low labour costs are main sources of competitive advantage for the aquaculture in Estonia. However, the lack of investment capital and know-how have been the main factors restricting the development of fish farming in Estonia.

Trends and Triggers

To counter investment funding issues 12 million Euros was allocated from the EFF in order to modernize firms. Further funding of 839 thousand Euros was awarded from the EFF in 2013 to establish a training centre to teach fish farming and in 2012 Estonia started to develop its aquaculture strategy plan.

Estonian aquaculture is categorized by low production volumes which make it impossible to cater to the needs of supermarket chains or large exporters especially given the high production cost of red-flesh trout. This problem is intensified by foreign competition that do not face environmental charges however some manufacturers are succeeding in adding value by processing the fish and cultivating new species.

Medium term production may fall after the heat wave of 2010 caused a great fall in rainbow trout production in that year. The full extent of knock-on effects is still to be calculated.

8.9 Finland

Summary

In 2011 total sales volume was 10 thousand tonnes which showed a 20% increase on the 2010 figures whilst sales demonstrated a 13% rise in value from 2010 to reach a value of 57 million Euros. While this is an improvement from 2011 the value is a more than 10 million Euros less than it was in 2008. For both weight and value the main contributor is freshwater aquaculture.

93% of the 132 enterprises engaged in Finish aquaculture have equal or less than 5 employees and overall the number of enterprises shrank by -10%. Total employment however increased by 24% to 445 people with FTE improving for both men (+18%) and women (+27%) whilst at the same time the average wage rose by 2% and the net effect of this is that labour productivity has fallen by -13%.

Overall the aquaculture industry was in net profit of 1.3 million Euros but this was a fall of -71% on the previous year. Almost identical figures were posted for EBIT. Whilst this shows the industry as a whole is narrowly profitable this varies between market segments. The Cages and Hatcheries & Nurseries segments returned profits of € 0.7 million and € 2.2 million respectively while the Combined and On Growing segments made losses of 1.2 million Euros and 0.5 million Euros. As you can see those two segments that posted profits are both still vulnerable at a time of economic uncertainty.

Trends and Triggers

The most prominent factor in the Finish aquaculture industry is the presence of environmental permits which are required by almost all producers in order to operate, with the foremost aim of the system to reduce the nutrient load on the Baltic Sea. We have however seen a fundamental imbalance between environmental and economic goals as no new permits have been issued since the 1980s even in the midst of increasing demand however the Government is working to overcome this. Perhaps as a result recirculating aquaculture systems have become more commonplace but will need to be more concentrated on species of high economic value.

8.10 France

Summary

The total sales of the French aquaculture sector in 2011 were 283.1 thousand tonnes and 898.5 million Euros as turnover. From 2010 to 2011, the sales volume decreased by 10% but turnover increased by 2%. The French aquaculture sector is largely dominated by bivalve molluscs farming. In weight, shellfish farming ranks first with a production of 240.7 thousand tonnes (85% of national total) and 719.1 million Euros for turnover (80%). The second group is the freshwater fish sector with 36.1 thousand tonnes (13%) and 119.9 million Euros (13%).

All aquaculture sectors made a positive net profit in 2010 but this parameter became negative in 2011 for freshwater farming sector. Three segments have a ratio of net profit to the total income greater than 15%: oyster other (23%), mussel culture on bottom (19%), sea bass and sea bream hatcheries (16%). All segments get a ratio of gross value added to total income higher than 35% except for trout on growing.

Trends and Triggers

In the oyster sector, the situation of mortalities of spat is continuing on 2012 and 2013. 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. Subsidies allow oyster farmers to buy spat. 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). As a supplement to the direct support for companies, 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 2014-2015.

French mussel production is not enough to meet the national demand. Imports come mainly from Chile, Netherlands and Spain. Since May 2013, "*Moules de Bouchot*" are a protected name. It's the first French product to obtain the Traditional Speciality Guaranteed (TSG) designation. 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. Hence, the increase of the production remains as a consequence an objective for coming years: the improvement of the productivity of the traditional sites of breeding, the use of new areas, located rather at sea opened, could allow an increase of the mussel production in the next years.

8.11 Germany

Summary

Germany is collecting economic data under the DCF for marine species only (blue mussels). The most recent data are from the Aquaculture survey 2012 (Federal Statistical Office, 2012). 4,762 facilities are reported with a production volume of 39,202 tonnes, including about 21,000 tonnes of marine aquaculture production of blue mussels. About 18,000 tonnes freshwater finfish production consisting of 11,000 tonnes of trout and salmonids and 5,400 tonnes of carps and cyprinids are listed. 100 tonnes are from Crustaceans, roe and caviar and some algae. About 900 tonnes are declared as organic products. 2/3 of the production volume goes to the gross market, about 10% directly to consumers. Production of Blue Mussels is concentrated at the German North Sea Coast with companies in the States of Schleswig-Holstein and Lower Saxony. The volume of production differs from years to year as it very much depends on the natural seed fall, but the increase in 2011 was unusual.

Trends and Triggers

The German freshwater market is dominated by traditional small producers for the regional market (carp and trout). The competition by trout from Denmark and Turkey is quite heavy in the general retail sector, so most production is sold regionally. For the carp segment, producers are facing declining demand for

carp, which is traditionally eaten in some regions at New Year´s Eve. Even if some marketing actions are going on, demand is still quite restricted.

For the carp production sites problems with diseases and cormorans are so significant, that more and more small farmers are going to give up this activity. The trout producers are facing urgent problems with lack of therapeutic options for parasites and bacteria. Cormorans and gray heron are causing less problems than in the carp sector, but in particular some small producers are faced with serious economical impacts of those predatory activities.

Currently different bodies in Germany develop strategies in order to increase the aquaculture production. Unfortunately it is not obvious what the strategic targets and measures will be. From this experts point of view Germany has some strength in providing cultured fish for local and regional market, in particular as the landscape is very much characterised by traditional ponds in some German regions (Franken/Lausitz). This serves also as a touristic attractor, while some concentration in the segment seems to be necessary in order to create economies of scale. In the trout segment it seems to be necessary to create value added for the consumers, e.g. by regional and organic labelling, but obviously the sector can survive with the regional and local markets. Some other currently small segments may increase if more volume is created and supply could be stabilized in higher volumes during the year to be interesting for the big retailers.

In 2008 there was no collection of seed mussels in Lower Saxony possible as there was no seed fall (and very small volume in 2007 already). This was for the first time in the more than 100 years of this business. This explains the sharp decrease in sales volume in 2009, which shows the volume of collected seed mussels and sales volume of blue mussels for the mussel farmers in Lower Saxony. 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 number of companies also varies, but this is more due to changing legal structure of the companies, where sometimes a group of affiliated companies is founded and sometimes disintegrated again. The employment is relatively stable.

8.12 Greece

Summary

Total sales weight fell by -1% over the period from 2010 to 2011 to 121 million tonnes. This however does represent a 5.7% increase on the 2008 figure but is the second consecutive annual fall from the peak in 2009. Sales value also fell from 2010 (-2%) to 523 million Euros. Marine finfish aquaculture makes up 80% of the volume and 92% of the total aquaculture value however shellfish and freshwater production are very important as they support rural employment. Shellfish and freshwater farms are mostly small and family owned whereas finfish farms are predominantly large and vertically integrated.

1017 different farming sites existed in 2011 and this number had been stable since 2008. Of these 1017 farms, 704 of them have employment of 5 people or less. The total number of employees however has fallen by -8% reflecting the on-going restructuring and concentrating of the market.

Due to a lack of data it is hard to comprehend the profitability of the market, and market segments, however it is clear that it is going through major changes. The bankruptcy of a large trout producer

contributed heavily to the decline in output however this softened a declining sales value to only a -24% fall by restricting supply. The situation is made worse by rising costs of energy, fish feed and financial costs as well as by a shortfall of credit.

Competitive advantage

Sources of competitive advantage for aquaculture in Greece:

- availability of suitable environment for marine finfish aquaculture
- skilled labour
- knowledge of production technology

Trends and Triggers

The aquaculture sector is characterized by a shortfall of credit however the level of output is very steady largely due to supply side decisions to limit production and the effects of the debt crisis on Southern European demand which is the main source of demand in Greece. Growth and recovery is being further limited by the lack of EFF direct investment subsidies or financial engineering instruments.

In the future it is expected that labelling, including organic labelling, will continue to be a niche market but expansion could happen with investment into processing as well as into research and development of low cost production.

8.13 Hungary

Summary

The Hungarian aquaculture sector produced 15.6 thousand tonnes in 2011. This production was valued at about 30.3 million Euros (FAO, 2013). This represents a rise in volume of 9% from 2010 and is almost equal to the levels reached in 2008 showing good recovery from the economic crisis. Sales value also rose but by 8% and this is still around 1 million Euros under the value of 2008 showing that values have fallen over the time period. Fish eggs and juveniles production fell to zero in 2010 and has not recovered from this.

Common carp was the main species produced by the Hungarian aquaculture sector, representing 69% in both weight and value of total production in 2011. Other important fish species are north African catfish, silver carp, grass carp (=white amur) and wels catfish.

Trends and Triggers

Common carp was the main species produced by the Hungarian aquaculture sector, representing 69% in both weight and value of total production in 2011. This high reliance to one particular species could leave the market susceptible to asymmetric shocks and investment in diversification could prove advantageous in the long run.

The average first-sale price for common carp in Hungary was 1.9 €/Kg in 2011. Catfish (north African catfish and wels catfish) prices are higher than carp prices. For carps, common carp is the most expensive

one, followed by grass carp and silver carp is the cheapest one. Fish prices across the market show little variation from their 2008 prices. This consistency will help with market confidence as it allows for investment to be planned more appropriately than if prices varied much more. The larges variations shown were in 2009 when common carp and wels catfish in particular lost value.

8.14 Ireland

Summary

In 2011 sales weight had fallen by -4% on the previous year meaning a volume of 45 thousand tonnes was posted. While this was the second consecutive annual fall it is comparable to the figure from 2008. Within this, output from Hatcheries & nurseries, Freshwater and Shellfish segments all increased and it was just the marine sector that shrank (-21%). In contrast, the sales value of the overall market rose by 5% to 128 million Euros with the Shellfish and Hatcheries and nurseries sharing the positive growth between them with growth of 23% and 30% respectively. Blue mussels represented 28% of the sales volume but only 9% of the value whereas Atlantic salmon represented 27% of the volume but 57% of total value.

Total enterprises fell by -4% to 292 of which 209 employ 5 people or less. These enterprises employed 1748 people showing a 2% increase on the previous year although between 2008 and 2011 employment fell by -11%. FTE for the period also fell (-26%) and at the end of the period represented 958 employees. The female FTE figure increased by 13% but was still very low. Having said this, labour productivity for the period had risen by 160% to 55 thousand Euros but the average wage fell -10% to 26.7 thousand Euros.

Overall the Irish aquaculture was profitable in 2011 posting net profits of 21.8 million Euros and EBIT of 22.7 million Euros both increasing by 16% on the previous year and looking resilient when considered that both these figures were narrowly negative in 2008. Within this only the mussel long line segment was unprofitable of the 4 major segments. This may partially be down to bay closures due to red tides.

Trends and Triggers

Demand for organic salmon is currently very high and is considered to be outstripping supply. 82% of salmon is produced by ‘organic’ methods but only 75% is marketed as such due to equally high demand for ‘premium’ product. Branding is very prominent in the market as a whole.

There are currently significant challenges posed to the major subsectors by seed supply and juvenile stock mortalities as a result of disease, parasites, red tides and recent weather conditions. These challenges have been made more acute by the location of most producers adjacent to or within Natura 2000 areas and the bureaucracy involved in obtaining or renewing licences. Restrictive licence conditions limit the producers ability to move healthy stock away from areas of high risk at certain times. The lag time in processing licences has also meant that supply has not kept up with increasing market demand. A national approach to identify key areas suitable for aquaculture and relatively free from other sector demand has been suggested, that would be offered to potential applicants with the advantage over the previous individual application process, of being partially assessed/processed by the public sector beforehand.

8.15 Italy

Summary

In total, production fell 114 thousand tonnes in volume (-42%) and 162 million Euros (-25%). Freshwater produce carried the highest sales value at 206 million Euros which is over 50% of overall aquaculture values (-22% on 2010). Whilst sales weight and value fell in all segments (marine, shellfish, freshwater) the marine sector was the worst affected showing a fall of -25% in weight but a fall of -49 in value demonstrating a loss of value of produce. Both industry costs and incomes fell resulting overall in a -34% fall in GVA to 155 million Euros. Total employment in the industry is 5,076 (42% FTE), a fall of -13% on 2010 and average wage has fallen -20% to 31 thousand Euros.

A formal definition of an aquaculture farmer has been introduced by Legislative Decree no. N.228/2001 representing greater social security and legal status for farmers. This is no surprise as the aquaculture sector comprises 43% of the volume of the total Italian fishery production although this has fallen from a 59% share in 2010. It is worth noting that the data from 2008-2011 indicates this fall is due to an unusually good year for Italian aquaculture in 2010.

Overall, employment in the industry has fallen with the number of enterprises decreasing by -15% with this fairly evenly distributed amongst small, medium and large businesses. Female employment has fared better than male employment which have risen by 94% and fallen by -24% respectively. Female FTE has only increased by 25% and overall FTE has fallen -25%. Males make up 90% of the industry FTE.

If we look at the industry over the last 3 years we can see some positive trends. Capital productivity increased from 15 to 22% over the period and return on investments increased from 5 to 10%. The FEI also improved from 19 to 21 indicating the medium to long term confidence in the market as more resources are allocated towards increased production capacity. Having said this, the debt structure worsens over the period.

Competitive advantage

Natural Resources

A threat to Italian aquaculture is the lack of definition of spaces (spatial access) to be used for aquaculture and the development of new facilities. Aquaculture, today, is not recognized as an economic activity that uses water resources (freshwater/salt water) on an equal manner with other sectors, such as fisheries, tourism, navigation, agriculture, industry, etc. To this must be added that the existing licenses and authorizations do not consider the carrying capacity, which means that cannot plan for development which is economically and environmentally sustainable. For the future, it will be important to include aquaculture between economic activities currently recognized as a user of the resource "water" (both marine and fresh water"). Such recognition will make aquaculture the same as other economic activities that are potential competitors, ensuring the possibility of access to resources, both as regards the use of inland waters of the salt waters. In addition, many aquaculture farms have had a serious injury caused by new regulations governing the licensing fees for the use of marine and spatial areas. In many cases the annual cost of the license for the use of public marine areas is about 150% more than the annual turnover of each undertaking. This is due to the tariffs charged: competent public bodies have used rates per square meter of area granted to aquaculture companies like the tariffs for recreational activities carried out on the coast, such as private beaches and seaside restaurants. In practical terms, many aquaculture

enterprises have not obtained the renewal of licenses and therefore could not even qualify for public funding that would cover costs of investments already made by the same companies. This has paralyzed the aquaculture sector as it is not been able to receive lines of credit from banks.

Labour

Italian aquaculture is labour intensive. Given Italian labour cost, as demonstrated by a study GFCM / FAO, is one of the highest among its competitors Mediterranean countries (in addition to those outside the EU), it certainly is a performance of economic inefficiency.

Having said this, using the same data points, we can see that Italian aquaculture is characterized by a very high level of specialization of labour and, therefore, contains a trained and experienced workforce. Unfortunately, the decline in production, or the sharp reduction in the number of active aquaculture farms, has reduced employment in the sector. In addition to creating unemployment, it also means a reduction of investment in education and training of the employees.

In some segments, however, such as the shellfish segment, there is a phenomenon that is different. As many blocks to the activity of small-scale fisheries exist, fishermen have started to work for seasonal operations in the sector of clams, mussels or oysters. Also in the same sectors some young people, who have lost their jobs, for example, have decided to work to help relatives already employed in that sector.

Capital

The selection phase has affected numerous sea bass and sea bream farms, which 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 quality production both as regards the fry, and the products fattened, as well as equipping the companies to withstand the increasing competition with other Mediterranean productions, especially North African.

As for public subsidies, in some regions many subsidies were not assigned, because the existing facilities had failed, closed or been put in stand-by mode (inactive). In other cases it was difficult for companies to apply for subsidies because they had reliable and sound banking, in addition to which was added, in some cases recorded for example in Sicily, the lack of a requirement for aquaculture enterprises and their renewal of their licenses. The problem, as already mentioned, has been a bureaucratic / administrative bottleneck.

Trends and Triggers

The most successful Italian aquaculture firms have been those that are highly specialized with high levels of industrialization. In general Italian aquaculture has suffered as a result of competition from other countries such as Greece and Turkey which have been priced 25-35% lower (referring to sea bass and sea bream). The growing coastal cage farming industry in these countries has lower costs than Italian land based aquaculture and so domestic suppliers have been unable to take advantage of the higher propensity to consume fish products which has been brought about by the economic crisis. Italy has been slow to react to foreign competition due to high levels of bureaucracy including the renewal of state concessions, management of health permits and the renewal of operating licenses. Plants have also had difficulty accessing lines of credit as well as government funding. Integrated vertical channels (from cage

to table) of production have increased GVA and prices for farmers but this system would benefit from greater sharing of processing platforms by SMEs.

8.16 Latvia

Summary

Latvian aquaculture produces only freshwater produce and some fish eggs and juveniles due to the fact that it is landlocked. In 2011 the market produced 545 tonnes of produce which was a fall of -1% on the previous year. The volume of output was very constant over the period of 2008 to 2011. The value of output rose from 2010 to 2011 by 6% to 1.1 million Euros but this represents a fall of -27% from 2008 (FAO, 2013). Fish eggs and juveniles production fell by -67% to 12 million. Common carp is the most important market segment as it represents 82% of the volume and 64% of the total market value.

In 2011 there over 140 aquaculture farms however only 55 of these were registered as economically active. Instead most firms are small with 10 or less employees. This market structure can prevail as there are no quotas or restrictions in place for aquaculture and so there are few entry barriers. Total employment has increased from 326 in 2008 to 341 in 2011 however productivity of labour is very low.

Trends and Triggers

There has been little to no development of processing industry in Latvia and so the majority of farmed fish are consumed locally and are sold fresh to customers. It is possible that the processing industry has failed to take off because there is no effective trade system in place for aquaculture and investment such as this is not viable on the individual scale for small producers.

Under the Operational Program for 2007-2013 companies were modernized and new breeding technologies were introduced to help focus more producers on the market and larger scale production.

8.17 Lithuania

Summary

Lithuanian aquaculture sector produced 3.3 thousand tonnes valued about 7.3 million Euros in 2011 (FAO, 2013). Lithuania produces no marine aquaculture. The common carp was the main species produced by the Lithuanian aquaculture sector, representing the 93% in weight and 87% in value of total production in 2011. Other important fish species are: sturgeons, trouts, Northern pike, grass carp and bighead carp.

Trends and Triggers

The common carp was the main species produced by the Lithuanian aquaculture sector, representing the 93% in weight and 87% in value of total production in 2011. The average first-sale price for common carp in Lithuania has been stable around 2 €/Kg during the period 2008-2011. Sturgeon and grass carp prices have been decreasing during the period analysed; while Northern pike have been decreasing but recovered in 2011.

8.18 Luxemboug

Luxembourg produces no aquaculture

8.19 Malta

Summary

The Maltese aquaculture sector sales accounted for 4.16 thousand tonnes of marine fish, with a total value of 53.7 Euros million in 2011. This implies a decrease of 23% from 2010 in weight, but only a 1% decrease in value. Quantity of sales (in terms of weight) showed a gradual decrease over the four years whilst the value was quite stable from 2009 to 2011. No other segments of aquaculture are represented in Malta.

There are only 6 aquaculture enterprises in Malta all of which had more than 10 employees in both 2010 and 2011. Total employment fell -17% in the period from 2010 to 2011 to 189. Of this only 12 employees are female. FTE rose by 3% to reach 165 however this rise was comprised only of male employees and female FTE fell by -24%.

Not only was the industry profitable it also made impressive growth in this regard, with EBIT growing by 104% to 10.5 million Euros and net profit rising by 149%, compared to the previous year, reaching 10 million Euros. This is promising considering that both the EBIT and net profit figures were below -35 million Euros in 2009 and the figures from 2011 are comparable to those from 2008 - before the crisis took hold. The level of net investment fell by -71% which reflects the improved, but still negative, future expectations indicator (-13.7%).

Competitive advantage

Natural Resources

Land availability is a major limiting factor for most Maltese Industries due to the small size of the country and the high population and degree of urbanisation. Nevertheless, the Maltese Aquaculture industry is mostly concentrated at-sea and thus, this is not a major limiting factor for this sector.

The coasts of the Maltese Islands have several different uses ranging from tourism purposes (such as hotels), sport activities, aquaculture, marinas, fishing activities, beaches and port uses amongst others. Heavy competition for space is thus present especially close to the coast. This has led to bottlenecks for fish farm cages permits and most cages are now situated further away from the coast. This incurs higher costs such as that of energy. Water quality is monitored following a compulsory programme for aquaculture fish farms in Malta.

Labour

Aquaculture is labour intensive and it also requires a high degree of specialisation. Experience is rather important. Nowadays, courses at Maltese colleges are being designed to educate more people in this sector and in an effort to have more qualified personnel.

Capital

The Aquaculture Industry in Malta is one of the major national industries and contributes to a significant portion of the Gross Domestic Product (GDP). The investments and financial growth in this segment over the past years have been considerable. Companies have obtained funding mainly through research programs.

Trends and Triggers

The relatively small number of companies can explain some of the large variations in data year on year because if there were more enterprises then changes in one firm would be softened in the national data by other firms. This can especially be seen in costs such as repair and maintenance costs as well as energy costs.

The Maltese aquaculture industry has a very sound export base and consumes very little domestically. Its main export partners are Japan, for the export of Atlantic bluefin tuna, and Libya and Italy, for the export of European seabass and gilt-head seabream.

8.20 The Netherlands

Summary

Total production in 2011 was 43 thousand tonnes representing a fall of -36% on the previous year but showing very little change when compared to 2008. The value of produce was 81 million Euros which again represents a fall from 2010 figures (-24%) (FAO, 2013). The Netherlands has a small marine sector which produced 220 tonnes in 2011 but the largest sector is the shellfish sector which produced 36 thousand tonnes.

Overall the industry has posted impressive data for profitability. EBIT grew 115% to a high of 58.7 million Euros in 2010 and net income grew by 480% to 55.4 million Euros in the same year (data for 2011 is unavailable). This shows resilience to possible effects of the economic crisis. Surprisingly, in spite of these high figures, the future expectation indicator was at -5.1%.

Mussel bottom culture is the most profitable segment of the Dutch aquaculture industry however all large segments are profitable on the whole. Due to the labour intensive nature of mussel culture wages and salaries make up 27% of costs with rent for farmed areas also presenting a major cost.

Competitive advantage

Within Holland a distinction can be made between shellfish and freshwater aquaculture and this is detailed below.

For shellfish:

Natural Resources

Natural resources play an important role in creating a competitive advantage for the shellfish sector. The shallow estuaries offer easily accessible production grounds and at the same time are nutrient rich, providing aquaculture with sufficient feed. Trade of shellfish is concentrated in the South-Western province Zeeland where there is sufficient space to “store” the shellfish in the estuaries, waiting to be sold at auction.

Availability of land is of far lesser importance as shellfish production does not require much land.

The geographical location is another advantage. Belgium is a major export market and is located close to Zeeland, easily accessible by road.

Legal and political bottlenecks

The performance of the mussel sector is hindered by restrictions on mussel spat collection. Environmental considerations have led to resistance to the traditional ways of collecting mussel spat (bottom trawling in the Wadden Sea). Permits for this method are granted on a year-to-year basis, leading to insecurity among the producers. Experiments with mussel spat collection systems, in the offshore Wadden Sea, that have been underway for a few years show positive results. Commercially mussel spat collection systems are now used.

An important aspect, which is hard to quantify, is the informal relationships with local and regional politicians which is strong in the main production centre Zeeland.

Labour

The shellfish sector requires relatively little labour. Since shellfish are cultivated in areas where there is a history of fishing, there is personnel available who are experienced with working “on water”.

Capital

The main competitive advantage here is presumably the long history of shellfish cultivation. As equipment has been used for many years, resulting costs for depreciation are low. The shellfish entrepreneurs have generally sufficient “good years” in which they have built up capital. This allows them to innovate where necessary (e.g. mussel spat collection).

Subsidies are not of great importance, they are generally limited to research and innovation projects but there is a tendency to ask business for in-kind of cash contributions.

For freshwater fish:

Natural Resources

Natural resources play no important role. Freshwater aquaculture is dispersed throughout the country. Availability of land is of importance but since the spatial claims of freshwater aquaculture are limited this cannot be considered a competitive advantage, nor a competitive disadvantage.

Legal and political bottlenecks

There are no known legal or political bottlenecks.

Labour

Availability of unskilled labour is not considered a bottleneck, nor is it a competitive advantage. Concerning skilled labour, it is noteworthy that universities educate in fish farming. Some of the graduates become involved in commercial aquaculture.

Capital

Most freshwater aquaculture companies perform only weakly and do not make large profits. Capital accumulation is difficult. In some cases, the main production facilities are barns that are already paid for (as families have had farms before).

Other

A number of strong fish feed companies and system manufacturers are located in the Netherlands. They are active on the national and international market.

The Netherlands have an elaborate research infrastructure on aquaculture that cooperates with some of the entrepreneurs, as well as fish feed companies and system manufacturers.

Trends and Triggers

As with many other MS the level of production is limited to a certain extent by the red tape surrounding permits. Permits are needed for the collection of mussel spats and at present permits are at a level such that demand is greater than supply. One upside of this is that the market is relatively stable and predictable at present.

Certification has not featured heavily in Dutch aquaculture despite the presence of a number of schemes. The situation is so extreme that no companies in the Netherlands are certified organic producers.

8.21 Poland

Summary

Polish aquaculture is comprised of several different species all within the freshwater segment. In 2011 the production volume fell by -6% compared to 2010 to a value of 29 thousand tonnes. This is the 3rd annual fall in volume and compared to 2008 figures represents a -21% fall. The total value of the produce fell by 9% over the year from 2010 to 2011 and this took the total value to 61 million Euros (FAO, 2013). This shows that the average price of output has fallen as well as the quantity.

Full data is not available for the Polish aquaculture segment and so in-depth information is only known on those farms that rear and breed Atlantic salmon fry. Within this area there were 4 firms in 2011, one less than the previous years, and these employed 49 people showing a fall of employment of 9 people. Of this 41 were male and 45 out of the 49 were employed full time (FTE). While the average wage rose 12% to 13.1 thousand Euros labour productivity fell -38%.

While profitable, the industry performed relatively poorly falling -83% in terms of EBIT and -85% in terms of net profit from the previous year. This left both figures resting at 0.1 million Euros which is very vulnerable to becoming loss making.

Trends and Triggers

One particular issue faced is the pressure on the output of both carp and trout which are very susceptible to extreme temperatures. Part of the decline in output in 2011 was caused by adverse weather conditions. Other pressures include the growth in numbers of fish eating animals such as cormorants and otters which are protected by law.

Polish aquafarmers have made efforts to increase their profitability by becoming organic (and being labelled as such) and by increasing their participation in the processing market which adds more value to their products.

Carp production has fallen slowly over past years in reaction to changing tastes of consumers. In response the government has launched publicity campaigns to attempt to boost domestic consumption of trout and carp and to reduce the traditionally skewed consumption patterns centred on Christmas.

8.22 Portugal

Summary

The marine and shellfish segments are the main contributors to both the total weight and value of Portuguese aquaculture with freshwater aquaculture contributing a much smaller amount. Total sales weight in 2011 was nearly 8 thousand tonnes which represented a 22% increase from the previous three years when weight had been fairly constant. The value of sales followed a similar pattern increasing of 36% to 57 million Euros after being relatively steady for three years. All three main segments grew in value and only freshwater fell in terms of tonnage.

The number of enterprises had been practically unchanged from 2008 to 2011 at 1,453, and all but 15 of which had equal to or less than 5 employees. The total number of employees was unchanged at 2,316 but the number of female employees within this grew by 11%. The FTE grew by 42% meaning that those employed were working more hours on average. Labour productivity rose by 122% to 22.2 thousand Euros.

Profitability was also strong displaying an EBIT of 16.2 million Euros (+1084%) and net profit of 10.8 million Euros (+684%). No data was available for the clam bottom segment but for the other three main segments the data shows they were all profitable in 2011 apart from other marine fish on growing which, while improved on the previous year, posted a loss of -9.3 million Euros.

Trends and Triggers

Portuguese aquaculture is largely offshore and in estuaries with 90% of the sites in public domain areas where business purchase rolling 10 year leases. A particular threat to the polyculture regimes is that of high labour costs however this is slightly mitigated by the high rates of family owned and run businesses in Portuguese aquaculture.

The emergence, in 2009, of a larger company has gone a long way to altering the structure of the industry and this is yet to settle into a discernible and stable pattern. In addition to this considerable investment has been made from 2009 to 2013 in offshore aquafarming and this is expected to pay off over the next two years.

Portugal has not made large inroads into certification as a way of differentiating products but is expected to improve on this with some facilities intending to convert to a bio-ecological model of organic aquaculture production.

8.23 Romania

Summary

The Romanian aquaculture sector sales reached 8.35 thousand tonnes valued at about 16.38 million Euros in 2011. Most of the Romanian aquaculture sector production comes from the freshwater sector. There are important fluctuations during the period 2009-2011. From 2009 to 2010 aquaculture sales increased by 76% in weight and 124% in value. However, between 2010 and 2011 aquaculture sales in Romania decreased by 35% in weight and 47% in value. Cyprinids family (mainly carps) land base cultured, in an extensive way, represented 79% in weight and 60% in value of total production in 2011; trout represented the 20% in weight and 38% in value.

Trends and Triggers

The Romanian aquaculture sector decreased in 2011 due to the economic crisis, after registering a positive trend from 2009. However, the whole Romanian economy has a positive trend, so the domestic demand is also growing, which is encouraging the aquaculture products sells. In fact, 2012 aquaculture production increased. It is expected that this positive trend will continue or even increase for the coming years thanks to the recovery of the sector and the better fructification of the opportunities in the country. Internal demand for aquaculture products is affected by the level of the imported fish and the trading policy of the supermarket chains, present all over the country.

Moreover, the aquaculture sector didn't and still is not benefiting from a very clear sector policies adopted by the government/national authority responsible for fisheries and aquaculture. No subsidies granted by national authorities, no other simulative support were registered. Only under EFF Program some farmers get European aid on developing their business in the field, specially related to enlarge the production of sturgeon species, or for the investments on modernizing the existing productive units, the main direction for financial support in aquaculture sector.

8.24 Slovakia

Summary

The Slovakian aquaculture sector produced 814 tonnes in 2011. This production was valued at about 2.2 million Euros (FAO, 2013). Slovakia produces no marine or shellfish. The greatest volume of the 4 years shown was in 2008 before two consecutive years of falling output caused a low of 687 tonnes representing a fall of -39% before a more towards recovery (+18%) in 2011.

Whilst no marine or shellfish aquaculture is produced due to the landlocked nature of Slovakia there is a stable production of fish eggs and juveniles. This fluctuated either side of 40 million for the 4 year period with 2011 showing an 11% increase on the previous year.

Trends and Triggers

It can be seen from the sales figures that there is no real discernible patter over the 4 years shown but that a fairly high level of volatility is present. Whilst the 2011 and 2009 figures are comparable for weight the same cannot be said of the value of this output in the same years. This indicates that not only is there a lot of variation in weight but also in value and, perhaps most importantly, that on the face of the data below there may be only fairly weak linkages between weight produced and value per unit.

8.25 Slovenia

Summary

Total output in 2011 was 502 tonnes which translated into € 5million. The volume of output shows an increase of 303% on the previous year while the value increased by 72%. This is largely due to issues with biotoxins reducing production but even compared to previous years, unaffected by biotoxins, the volume is larger. In terms of value however € 5million is comparable to 2008 but a fall of -25% of 2009.

In total there are 11 enterprises which employ a total of 32 people. This is a -15% fall in the number of enterprises but a 3% rise in employment and both these figures are relatively stable for the period from 2008 to 2011. Female employment is very low at only 66 people but total FTE amounts to 28 people. Labour productivity is very high at € 0.18million and the average wage is € 24.4thousand.

The industry is profitable with EBIT of € 4.0million and net profits of € 3.8million which shows growth of 91% and 104% from the previous year respectively. There are only two main segments which are Sea bass & sea bream cages and Mussel rafts both of which were positive. Having said this, the former only posted net profits of € 0.8million and so is vulnerable to shocks.

Trends and Triggers

Due to natural limitations opportunities to expand marine aquaculture are limited. In 2007 three large areas for marine aquaculture were set up however it is unlikely that these will be expanded due to competing needs for the space. There is however a strong possibility of expansion in the freshwater inland sector due to good quality water and its available in large quantities.

In 2010 production value and volume were low due to the prohibition of sales for most of the year due to phytotoxic organisms which prevented the sale of products. The industry bounced back in 2011 however, in part thanks to large investments in Slovenian marine aquaculture facilities.

'Other income' contributed in 79% of the total income. This happens because in many companies analysed, aquaculture is not the main activity of the company. This leads to the situation that subsidies contributed, in 2011, more than aquaculture turnover to the income of the companies.

8.26 Spain

Summary

The total sales value of the Spanish aquaculture sector increased by 7% from 2010 to 2011 but this is very varied between the different market segments (marine, shellfish, freshwater, hatcheries & nurseries) due to their differing structures. The greatest increase in sales value was shown by Hatcheries & nurseries which increased 34% to 58 million Euros whilst freshwater aquaculture fell -20% to 39 million Euros. An increase of 36% of feed input may indicate future growth.

Total employment was at 27,108 and was split between 5,343 different farms however this figure represents 6,639 FTE. These figures represent an overall fall of 3% from 2010 but an increase in FTE of 4% indicating an improvement in job stability and skilled labour. This increase in FTE is largely due to an improvement in female employment.

Profitability shows good recovery from the slump in 2009 with EBIT rising 598% from 4.5 million Euros to 31.7 million Euros. Net profit increase by 77% to 44.1 million Euros and these statistics were further supported by recovery in other key indicators. This however varied between market segments as mussels were the most profitable, despite environmental issues, while bass and bream were unprofitable but improving.

Due to the fact that 90% of Spanish aquaculture income is derived from sales turnover profitability relies heavily upon the markets. The mussel segment has very high labour demands and is very regional and so in these areas the market can have a large impact on regional employment. This shows the importance of managing supply and demand to ensure economic success and stable employment.

Trends and Triggers

The value of assets has fallen by -7% due to a rise of 12% in the depreciation of capital. This is owing to the lack of relevant investment in new equipment and could be a barrier to growth in the medium term.

A notable point is that as production levels in fish farming have fallen firms' performances have improved. In the case of bass and bream, production levels are regulated by prices and demand as they have high demand elasticity and so increasing production may not result in higher profitability.

Certification continues to play a very muted role as production is fuelled by domestic demand and Spanish residents are showing little reaction to certification introduction. Any changes in this sector are being driven by retailers searching for greater market shares. There is also little evidence of an organic

aquaculture sector as consumer's income constraints and confusion over industry terminology prove to be bottlenecks. This is compounded by lack of exports.

Any major growth in aquaculture is likely to come from emerging species such as meagre and Atlantic bluefin tuna into which research and investment is being made.

8.27 Sweden

Summary

While aquaculture in Sweden may only make up 3-4% of the overall production of fish and shellfish it is still sizeable. In 2011, around 14,510 tonnes of shellfish and freshwater produce was sold at a total value of 47.5 million Euros. Of this 90% of the volume and 98% of the value was from freshwater produce. Overall the weight of aquaculture increased by 24% from 2010 however we can observe an increasing trend since 1998 when weight was only 5,500 tonnes which, over the 13 years, is an increase of 164%. Likewise value has increased by 227% over the same period.

The number of enterprises fell by -13% from 2010 to 2011 but the number of workers fell by -2% implying that the number of workers per enterprise has increased. The number of female employees, and total FTE have both increased by 14%. Labour productivity is up 70% (88.7 thousand Euros) and average wage is up 77% (50.6 thousand Euros). FTE/Enterprise has increased from 1.2 to 1.7 from 2009 to 2011.

Profitability, in terms of EBIT, has improved by 109% to 9.2 million Euros while net profit has increased by 112% to 8.4 million Euros. This large positive improvement is mirrored by all of the other key performance indicators. Broken down by sector we can see that all sectors are profitable but that some have shown a decreasing trend and are very close to becoming loss making. Of the 4 main segments only Other freshwater fish cages has EBIT and net profits above 1 million Euros.

Trends and Triggers

Aquaculture in Sweden is widely dispersed across the country and is often very rural but clustered. Output of rainbow trout and arctic char had increased steadily since 1998 and this can be put down to large domestic and foreign demand as well as high prices. Structural changes have also helped to encourage growth through mergers and acquisitions and allowing exploitation of economics of scale. In addition subsidies from the EFF have increased year on year to peak in 2011 at 1.4 million Euros.

The FEI indicator shows that investment is greater than depreciation but that the ratio is decreasing and this could be attributed either to a lack of confidence from farmers or perhaps to a maturing industry.

The outlook, in many ways, is positive as several large firms are currently applying for production licenses which would increase capacity. There is need however to put in place a firm strategy plan to help determine key geographical areas for growth as well as to allow increased focus on organic labelling to increase the value of products.

8.28 United Kingdom

Summary

British aquaculture production accounted in 2011 for over 199 thousand tonnes, valued at 740 million Euros. Salmon, trout and mussels total over 90% by either volume or value. However, smaller segments might be considered for social or regional reasons. The UK is increasingly governed on a regional basis.

Scotland is currently the largest producer of farmed Atlantic salmon in the EU and third largest globally - producing 158,018 tonnes in 2011 with an estimated value of GBP 584.7 million at farm gate prices and accounting for over one-third by value of Scotland's food exports.

Competitive advantage

Natural Resources

There are few sites left in the UK coastal areas that would be suitable for use for aquaculture but there may be some smaller opportunities for expansion within the existing sites. Salmon production is in the hands of large multi-national companies and the industry is already quite concentrated. Other aquaculture products are generally the output of small enterprises whose markets offer plenty of opportunity for expansion and which are competitive.

Labour

It is not obvious that the UK enjoys any particular competitive advantage from its labour force, but this may hide careful training and a willingness to allow the flow of information from staff to managers as well as the other way round. On the management side there is clearly a willingness to tackle the immediate problems of marketing which have been addressed and overcome.

Capital

Capital in the salmon industry has been concentrated into a few larger firms. This is much less marked in other areas of the industry. Hence, it is both a source of existing competitive advantage where mergers have already taken place and the potential source of improved competitive advantage among the smaller producers.

Overall, the strength of UK production lies in the existence of competitive advantage derived from factor endowment and other sources which are much less easy to identify. There seems little doubt that production skills have played an important part but business acumen and marketing skills must have played a significant role.

Trends and Triggers

According to the Defra consultation on aquaculture strategy, the main factor militating against growth was price competitiveness, since the UK has historically enjoyed a good supply of wild-caught fish. UK consumers are also reluctant to try new species and products, which limits the possibility to develop diversity and hence resilience against diseases.

Against this, salmon production continues to develop and increase, as the product is popular and versatile: it can be sold fresh, frozen or processed and remains highly competitive in price and quality with Atlantic salmon or similar species produced elsewhere whether wild-caught or cultivated. Salmon production in Scotland was boosted when production was reduced by disease in Chile. Scottish farms may operate and report at the site level, but are very largely owned by multinational companies with scope to switch production between countries. This is reflected in the evolution of prices: the series below are prices reported by the SSPO as annual averages. The GBP price for 2012 is virtually identical to the 1989 price, which represents a considerable drop in real terms (more than halved). The very low prices in years after 2000 reflect strong competition from Norway and were drivers toward consolidation.

Given the support in principle for commercial development in rural areas offered by the Scottish Government and by local authorities, and the evidence of continuing growth in demand, barriers to development of new sites fall into two categories. Nationally, there are pressure groups who promote widespread beliefs that salmon farms may be ecologically damaging: the accusations include chemical pollution of surrounding water by surplus food, fish excreta and applied medicines, etc; secondly, that the intensive holding of salmon provides reservoirs of parasites and diseases that affect surrounding wild fish; and thirdly that losses from fish farms (escapees) can interbreed with local stocks and change the genetic make-up. Locally, there may be specific planning objections to each individual application, based on competing economic or aesthetic interests. Production within existing sites is growing, as is productivity. Further increase may be achieved (or may be limited) by site developments (larger cages or more cages), disease control (vaccinations or stock selection), and changes in growth rates through feeds or genetic improvements (selective breeding or GM).

Failure to grow production of trout may reflect failure to develop demand for table fish and a preference to cater more for angling and tourism (e.g. by supplying local restaurants). According to the British Trout Association (BTA), “To support a trout farm a clean river is needed for adequate water supply, which limits expansion possibilities in the UK. The majority of fish farming concerns are small with owners doing much of the work themselves. Production is increasingly concentrated on farms producing 100 tonnes or more. The Industry is moving away from smaller producers, as they are becoming less competitive. Competition from larger trout producers, other fish species and cheaper imported fish are reducing profit margins as prices remain the same or fall”.

European Commission

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Abstract

This report, on the Economic Performance of the European Union (EU) Aquaculture sector, is the third report of this type produced for the 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. This summary report serves to highlight some of the key findings of the 2013 Aquaculture report. The data used in this publication was collected under the Data Collection Framework (DCF). In 2011, the aquaculture sector production in the EU-28 accounted for 1.28 million tonnes, with an estimated value of 3.51 billion Euros. In the EU there are about 14 to 15 thousand companies whose main activity is the aquaculture production, producing a Gross Value Added of more than 1.5 billion Euros. Available data confirms the profitability improvement in 2011 following 2010, after suffering losses in 2008-9. Profitability based on the Return On Investment calculated from the EBIT was 10%. The EU aquaculture sector gave direct employment to more than 80,000 people in Europe, with an annual average wage of around 23 thousand Euros. Women accounted for 27% 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 45% of the total number of employees). Part-time employment is important in the shellfish and freshwater aquaculture subsectors. The economic performance and the productivity differ enormously by subsector and segment. The cost structures of the different subsectors (i.e. shellfish, marine and freshwater aquaculture) and species are also analysed on the report.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle. Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

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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