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Executive summary

The aim of this study was to investigate the economic performance of organic aquaculture, focusing on price premiums and differences in production costs deriving from organic certification and identifying the beneficiaries of added value in the supply chain.

As agreed with DG MARE, the information has been collected in two phases:

- **Literature review** about EU organic aquaculture production and EU organic fish market, one of the main sources of information being the OrAqua project reports.
- **Interviews** with a limited number of certified organic aquaculture producers, ensuring that the main species and production areas are covered. In addition, a few large-scale retailers and wholesalers have been also interviewed in order to investigate their purchase strategy towards organic fish products.

These two phases led to the collation of updated organic aquaculture production data in EU by MS and by species, the comparison of economic performance between organic and conventional aquaculture, and an analysis of the EU organic fish market characteristics and drivers in the supply chain.

Overall in the EU, organic products accounted for almost 4% of the total aquaculture production and reached approximately 50.000 tonnes in 2015. By far the main producer of organic farmed products is Ireland, accounting for 44% of the EU total organic production; then comes Italy (17%), the United Kingdom (7%) and France (6%).

According to our estimation based on literature review and interviews, the main species produced under organic standards in 2015 were:

- **Salmon:** more than 16.000 tonnes produced (9% of total EU salmon production), the main producers are Ireland and the UK.
- **Mussel:** almost 20.000 tonnes produced (4% of EU total mussel production), Ireland, Italy and Denmark being the main producers.
- **Carp:** about 6.000 tonnes produced (8% of EU total carp production), the main producers being Hungary, Romania and Lithuania.
- **Trout:** almost 6.000 tonnes produced (3% of EU total trout production), the main producers being France and Denmark.
- **Seabass and Seabream:** about 3.400 tonnes produced (2% of EU total production), the main producers being Italy, France and Greece.

A few other species are farmed under organic standards but currently in minor volumes (oysters, sturgeon, perch, etc.).

EU organic aquaculture experienced a strong increase in the last years, at least for the major species: between 2012 and 2015 organic production increased by 24% for salmon, doubled for rainbow trout, and tripled for seabass/seabream. And positive developments are also observed for shellfish (mussel, oyster).

However, the **economic performance** of EU organic aquaculture is far from being satisfactory everywhere or for all species:

- Organic salmon provides good sales price premiums, which on average cover the extra costs generated by organic farming, in a context of increasing international demand.
- Organic farming of seabass and seabream also allows producers to reach price premiums. However these are lower than the additional costs occurred, in a context of limited market expansion.
- Organic trout farming leads to significant price premiums and extra margins, compared to conventional aquaculture; demand is strong, in particular from the smoking industry.
- Organic mussel farming, which developed more recently, is benefitting from a strong demand and can provide 20% price premiums.
- Organic carp, however, cannot cover its extra costs with equivalent sales price premiums and would suffer heavy losses without EFF subsidies.

The part played by the downstream margins (processing, trade and retail) is much bigger in the organic supply chain than in the conventional one. Smaller volumes (which means extra costs per unit), lower turnover rates (which mean higher losses and higher risks) explain this situation.

One of the major economic issues for the development of organic fish farming is the low scale of production and economies of scale are the most obvious way to reduce costs, not only at production level but also at logistics and distribution level. However, economies of scale are often hard to achieve because of the difficulty of access to new farming sites and the limited expansion capacities of the market for some species. The extension of the range of species organically farmed is technically possible but has to face the lack of knowledge and timidity of the market.

Certification is a development driver and strongly established organic labels are likely to speed up the development of the market.

But sustainable is a big competitor to organic. Large-scale retailers sometimes adopt a fish purchasing policy more sustainable-driven than organic-oriented and consumers are sceptical and confused in front of a variety of ecolabels and organic logos.

1 Methodology and objectives

1.1 Objective

The aim of this first study was to investigate the economic performance of organic aquaculture, focusing in particular on price premiums and differences in production costs deriving from organic certification and identifying the beneficiaries of added value in the supply chain.

As agreed with DG MARE, the information has been collected through literature review and interviews with certified organic aquaculture producers, ensuring that the main species and production areas are covered, as well as with large-scale retailers involved in selling organic aquaculture products.

1.2 Methodology

The study included the following steps:

- literature review

A review of studies and reports dealing with organic aquaculture and organic fish market has been completed. One of the main source of information has been the OrAqua project, including a review of organic aquaculture production and economics.

- interviews/case studies with aquaculture companies

In accordance with DG MARE's request, we proposed 7 case studies of fish farming companies covering the main species concerned by organic production (salmon, trout, carp, seabass/seabream, mussel), some of them being purely organic and some of them combining conventional and organic farming. Face-to-face interviews took place in October-December 2016.

- interviews with retailers

In addition, three interviews have been led with a few downstream sector stakeholders: two large-scale retailers in France and Portugal and one major cash-and-carry chain at EU level. These additional interviews allowed us to gather information about consumer habits and market perspectives towards organic aquaculture products.

- analysis and report on the economic performance of organic aquaculture, based on information collected through literature review and interviews.

2 Review of the offer: structure of the sector

2.1 Place of EU in world aquaculture

In 2015, world production of aquaculture reached 106 million tonnes. China is by far the largest producer, accounting for 58% of the world production, exceeding 61 million tonnes. The second largest producer of aquaculture products is Indonesia, accounting for 15% of world production and approaching 16 million tonnes. The EU was in 9th position, just behind Norway, accounting for 1,2% of world production with 1,3 million tonnes produced.

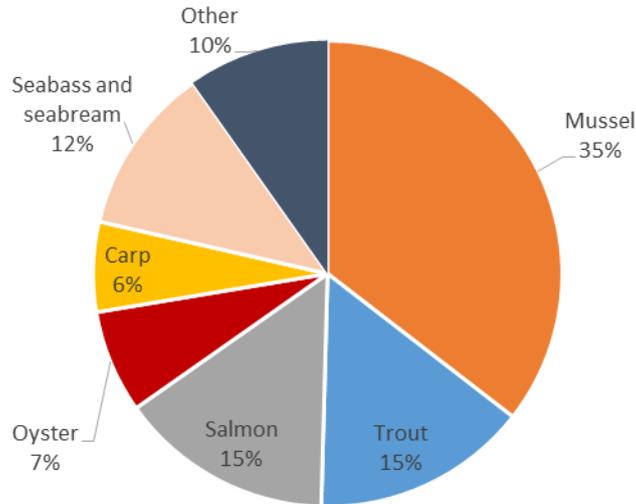
Table 1: World aquaculture production in 2015

Countries	Production (tonnes)	% total
China	61 536 375	58,1%
Indonesia	15 649 311	14,8%
India	5 238 019	4,9%
Viet Nam	3 450 200	3,3%
Philippines	2 348 159	2,2%
Bangladesh	2 060 408	1,9%
Korea	1 676 489	1,6%
Norway	1 380 890	1,3%
EU 28	1 301 463	1,2%
Egypt	1 174 831	1,1%
Chile	1 057 742	1,0%
Japan	1 103 235	1,0%
Myanmar	999 360	0,9%
Thailand	897 096	0,8%
Other	6 130 608	5,8%
Total	106 004 186	100,0%

Source: FAO

In volume, EU aquaculture production in 2015 included mostly mussels (493.000 tonnes); trout (189.000 tonnes) and salmon (186.000 tonnes); seabass and seabream (162.000 tonnes); oysters (93.000 tonnes); and carp (81.000 tonnes).

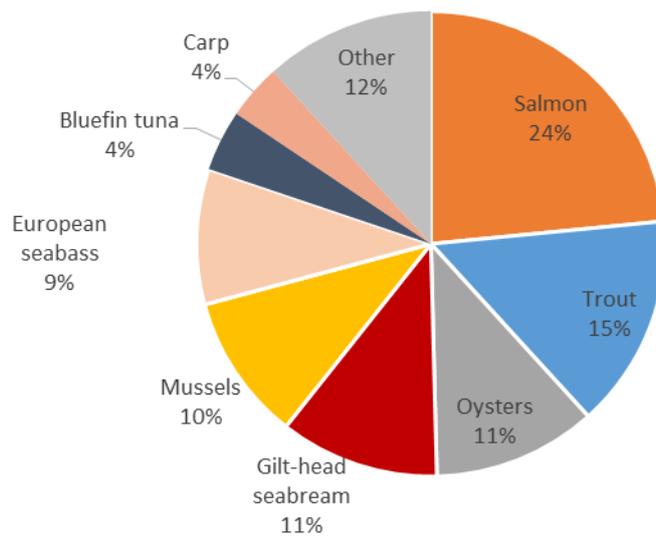
Figure 1: EU aquaculture production breakdown by main species (in volume)



Source: EUMOFA, 2014

In value, the top species farmed in the EU in 2014 were salmon (EUR 923 million); trout (EUR 585 million); oysters (EUR 445 million); seabream (EUR 434 million); mussels (EUR 401 million); seabass (EUR 371 million); and to a lesser extent bluefin tuna (EUR 167 million) and carp (EUR 150 million).

Figure 2: EU aquaculture production breakdown by main species (in value)



Source: EUMOFA, 2014

2.2 State of current organic aquaculture production by Member State

2.2.1 Austria

There are more than 20 organic fish farms in Austria, producing mostly carp, but also brown trout, brook trout, lake trout, perch, pike, pike-perch, tench and Wels catfish.

According to the Institute of Aquaculture of the University of South Bohemia, Austria produces around 150 tonnes of organic carp, mostly in the Waldviertel region. This region, located in Lower Austria, not far from Vienna, also produces organic perch, pike, perch, tench and Wels catfish, while organic brown trout, brook trout and lake trout are mostly coming from Styria, Carinthia and Upper Austria.

According to the FiBL survey 2016, only 9 tonnes of organic fish were produced in 2013, out of which 2 tonnes was trout.

2.2.2 Belgium

Belgium's aquaculture production, which was above 1.800 tonnes in the years 2000-2002, has then regularly decreased to be under 100 tonnes in 2015.

There is no organic production.

2.2.3 Bulgaria

Organic aquaculture production in Bulgaria started in July 2015 when two farms were registered as producers of organic Mediterranean mussels. During the conversion period, in the run of the year, both farms produced 80 tonnes in total. In 2016 one of the farms, Magnifish Ltd., terminated its contract for control and certification, while the other one – Bljak Sij Shels Ltd. (Black Sea Shells Ltd.) continued. This farm has completed the conversion phase and its production from 07.2015 to 09.2016 was 1.400 tonnes.

2.2.4 Croatia

Organic farming in Croatia mainly relies on Cromaris, which is the main company involved in aquaculture, at both conventional and organic levels. Its production of seabass and seabream was 6.500 tonnes in 2015; it started the production of organic seabass and seabream in 2014 in one of its 7 production sites, in Lim Bay, in the North Adriatic (300 tonnes under organic standards in 2015).

According to the Croatian Bureau of Statistics, organic production has decreased in recent years, from 405 tonnes in 2013 to 340 tonnes in 2014 and 300 tonnes in 2015.

2.2.5 Cyprus

Cyprus has a significant aquaculture sector, which produced 5.500 tonnes of fish (mostly seabream and seabass) as well as 36 million juveniles.

No organic production is currently recorded.

2.2.6 Czech Republic

The Czech Republic is a major carp producer and has a significant aquaculture production (19.265 tonnes in 2015, at 97% composed of carps). According to the Czech Fish Farmers' Association, well-established farming companies have not considered investing into the production of organic carp due to high production costs and low demand from the local market.

Only a negligible organic output can be observed (2 tonnes in 2013, 1 tonne in 2014 and 2015, according to Eurostat).

2.2.7 Denmark

The organic production of Danish aquaculture focuses on two species, trout and mussels, and represents approximately 5% of the country's total aquaculture production.

Table 1. Organic aquaculture production in Denmark in 2015

Species	Number of farms	Production (tonnes)
Rainbow trout - freshwater	10	1 410
Rainbow trout - seawater	2	224
Blue mussel	9	1 229
Seaweeds	1	1
Total	23	2 864

Source : EUMOFA

The leading companies are Kaerhede Dambrug APS (freshwater trout), Musholm A/S (seawater trout), and Vilsund Blue A/S (mussel)¹.

Traditionally Denmark exports up to 90% of its fish and seafood products, with a similar share for the exports of organic aquaculture products. Germany, Austria, France and Switzerland are the main destinations for organic trout, while organic mussels are exported mainly to Germany, France and Sweden.

2.2.8 Estonia

The most important species cultivated in Estonia are trout (65% of total volumes produced), eel (15%) and sturgeon (5%). Currently there are no certified organic fish farms in the country and the main reason for that is the dominance of recirculation aquaculture systems (RAS) – almost 90% of the farmed volumes come from RAS. The number of potential farms for organic fish production where the conditions meet the requirements for organic farming is limited, though some interest has been shown from a few smaller farms.

¹ Source: DTU Aqua

According to the Estonian Organic Farming Foundation, 477 tonnes of organic fish have been processed in 2015.

Table 2. Volume of organic fish processed in Estonia

	Volume of organic fish products (t)	Number of processors
2010	0	0
2011	11	1
2012	31	1
2013	156	1
2014	260	1
2015	477	2

Source : Estonian Organic Farming Foundation

2.2.9 France

In France, organic production volume mostly covers rainbow trout and, to a lesser extent, seabass and seabream and bivalves (mussels and oysters).

According to CIPA (fish farmers' national association), about 2.300 tonnes of organic trout (6,5% of national trout production) are currently produced annually. Moreover, about 700 tonnes of organic seabass/seabream (15-20% of national production) are produced, main producing companies being Cannes Aquaculture (400 tonnes), Gloria Maris (200 tonnes) and Provence Aquaculture (100 tonnes).

Approximatively 1.000 tonnes of organic mussels are produced in the Channel and in some other regions (e.g. Pénestin in Brittany and Charron in Charentes) and about 500 tonnes of oysters (farms in the Thau lagoon region for instance). But organic shellfish production figures should be considered with caution as no official data source is available.

2.2.10 Germany

The production of organic fish in Germany is on a downward trend and decreased by 35% since 2013, while the number of companies involved in organic farming fell from 188 to 140.

Table 3. Production of organic fish in Germany

	2012	2013	2014	2015
Number of organic companies*	181	188	160	140
Organic production (tonnes)	866	955	801	621

*according to (EC) Reg. 834/2007

Source : Destatis

Organic production is concentrated in the south of Germany, the two states Baden-Württemberg and Bavaria covering 72% of total production. The farming is usually, especially in Bavaria, a secondary occupation.

Table 4. German production of organic fish by state in 2015

State	Production (t)
Baden-Württemberg	281
Bavaria	164
Lower Saxony	84
Nordrhein-Westfalen	12
Schleswig-Holstein	11
Other	69
Total	621

Source : Destatis

The official statistics do not give production data by species. The significance of the different species can only be assessed through the number of companies involved. In 2015, out of the 140 companies, 94 are certified for common carp and 49 for rainbow trout.

Table 5. Organically-certified aquaculture companies in Germany in 2015 by species

Species	Number of companies
Sea trout	14
Rainbow trout*	49
Pink-flesh trout	10
Brook trout	12
Sparctic char	8
Common carp	94
Tench	15
Pike-perch	17
Pike	14
Wels catfish	3
Siberian sturgeon	1
Other fish	24
Crustaceans	2
Molluscs	2
Caviar	3
Algae	2
Total	140

*pink-flesh trout excluded

Source : Destatis

The production of organic carp has decreased in recent years due to marketing problems and to the difficulties of some farmers, especially in Bavaria, to find carp fry as young carps (K-2) are the favorite target of cormorants. Organic carp production probably did not exceed 20 tonnes in 2016.

Even though the number of certified companies is lower for trout than for carp (table 4), the production of organic trout is larger than that of organic carp, as trout farming is carried out in bigger farms and as the largest producing state of organic fish (table 3) is Baden-Württemberg, which farms almost exclusively trout. The production of organic trout can thus be estimated at more than 300 tonnes in 2015.

2.2.11 *Greece*

Greece is the major producer of seabass and seabream in the EU. However, only a small share is produced and sold under organic standards. According to EUROSTAT the production of organic fish was 1.835 tonnes in 2014 and 720 tonnes in 2015. The latter figure seems more realistic, since EUMOFA investigations allowed identifying a production of 400 tonnes of organic seabass/seabream in 2016, produced by two farms: Kefalonia Fisheries and Galaxidi Marine Farm.

2.2.12 *Hungary*

According to Eurostat, organic aquaculture production amounted to 3.498 tonnes in 2015. The main species farmed is carp.

Carp represents an ideal candidate for organic status since it is low in the food chain, feeds naturally, and has a low impact on the environment in pond farming. Despite the way carp are farmed in ponds being already quasi-organic and even though the shift to organic certification is not as demanding as it is for some other species, the proportion of carp on the organic fish market is still very low.

The consumption of organic products (from both agriculture and aquaculture) in Hungary represents only 1% of the total. The demand for organic aquaculture products is considered as moderate.

2.2.13 *Ireland*

The history of Irish organic aquaculture started in the mid-nineties with salmon. Today Ireland is the EU's leading producer of organic salmon. Ireland did also produce organic ocean-farmed trout, but the producer concerned has now switched to salmon.

According to Eurostat, the organic production of aquaculture products amounted to 31.227 tonnes in 2015. This figure seems overestimated. The EUMOFA survey identified an organic production of 22.000 tonnes.

The whole Irish production of farmed salmon (13.000 tonnes in 2015) is now to an organic standard, according to the Annual Aquaculture Survey 2016 issued by the Irish Sea Fisheries Board (BIM). The main companies are Marine Harvest and Irish Salmon Producers Group (ISPG). Prospects for further growth appear quite limited due to a lack of fresh water resources and availability of sea sites.

The main driver behind organic salmon farming in Ireland is the regulatory framework for conventional salmon. The producers realized that it was very difficult for small scale producers to compete with Scotland and Norway in terms of cost of production and consequently price. Instead, the Irish salmon farming industry focuses on the organic niche.

In addition to salmon, Ireland also produces organic mussels from both rope and bottom culture. The main target markets for organic mussels are France and Spain. Organic mussel production was estimated at 9.000 tonnes in 2015 (source: EUROSTAT). The main producing companies are Kush Shellfish and Blackshell Farm Ltd.

2.2.14 Italy

Data on Italian production are available through the BioBreed-H₂O project which has been set up in December 2015 by the Ministry (Ministero delle politiche agricole alimentari e forestali) and assigned to CREA (Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria). This project ('A new impetus for organic aquaculture: the support of participatory research to the growth of the sector') intends to investigate opportunities and difficulties along the organic fish chain.

According to the project, there are 17 companies involved in fish farming and 20 involved in shellfish farming in Italy. Among the fish farming companies, only one produces juveniles for marine species with a commercial interest. 65% of the companies operate in lagoons ('valli da pesca'), 6% in sea cages and 29% in in-land-facilities. Companies are mainly located in the north of Italy, in particular in the Veneto region, mostly in extensive farming systems. Only two farms using sea cages are currently active, in Apulia and Sardinia, due to the difficulty of finding organically certified seabass and seabream juveniles. Land-based systems specialize in trout farming.

The production increased by 41% between 2013 and 2015, mostly due to the development of organic seabream farming, which rose from 400 tonnes in 2013 to 1.500 tonnes in 2015.

The mullet species that are organically farmed are *Mugil cephalus*, *Liza aurata*, *Liza saliens*, and *Chelon labrosus*. The term 'prawn' refers to the species *Penaeus japonicus*.

Table 6. Production of organic fish and crustaceans in Italy

	2013	2014	2015
Seabass	9	239	81
Seabream	402	968	1 526
Mullets	508	476	797
Eel	0	0	12
Rainbow trout	1 404	1 266	898
Sea trout	90	100	100
Prawn	45	50	50
Total	2 458	3 099	3 464

Source : BioBreed-H₂O

Data on shellfish farmed could not be collected through the BioBreed-H₂O project until now. Anyhow Italy has a significant activity in bivalve farming, especially mussels (with a production of 5.188 tonnes in 2015 according to Eurostat). 20 companies, all located in the in north-east of Italy (mainly in the Veneto, Emilia Romagna and Marche regions) are currently producing organic bivalves. Almost all companies are producing Mediterranean mussel (*Mytilus galloprovincialis*), while 4 companies produce grooved carpet shell (*Ruditapes decussatus*) and only one company produces European flat oyster (*Ostrea edulis*). According to MIPAAF (the Italian Ministry in charge of Agriculture and Food Policies), the production of organic mussels amounted to 1.996 tonnes in 2014.

In the context of the SANPEI 2 project², a survey carried out by CREA in 2016 analysed fish farmers' motivations towards organic farming through a panel of 22 aquaculture companies (3 organic, 17 conventional, and 2 back to conventional after an experience in organic farming). This survey showed that the main motivations of conventional farmers for not converting to organic were the costs of production and certification, considered as too high, and the market prices, considered as similar to conventional (i.e. no price premium for organic). Other reasons cited are insufficient demand, low availability of feed and low quality of feed. The first reason invoked by the companies which stopped organic farming is the low quality of feed, which is reflected in the low quality of the final product, as well as in high mortality in the pre-ongrowing stage; then came cost of production, low demand, low availability of feed, and absence of price premium. To the question 'what could be the added values of organic farming?', most farmers answered that there is a need for a stronger recognition of the organic product through a clear, single and easily recognizable certification, instead of a number of labels, each with its own specifications. When asked about the measures necessary to revive the growth of the sector, farmers cited first economic incentives and support to enter into new markets with better prices; they then mentioned the simplification of certification and conversion procedures, and the need for a legislation more specifically designed for organic production in aquaculture.

2.2.15 *Latvia*

According to the data from Latvian Food and Veterinary Service there are ten small fish farming companies registered as producers of organic fish. Output volumes are not high and the major share belongs to carp farmed in ponds. Low volumes can be explained by high production costs of organic aquaculture products (which also include longer cultivation period and use of extensive methods) and low demand from the local consumer market.

Fish farms often offer organic fish in their ponds for angling.

Species farmed are common carp (major volumes); tench; pike perch; pike and crucian carp (minor volumes). Organic farmed fish production is estimated at 9 tonnes (2016).

Ten companies are currently certified under organic standards; the leading companies are Silva-AA SIA, Madaras ZS, and Brivnieki ZS.

2.2.16 *Lithuania*

Organic pond aquaculture in Lithuania has existed since 2003. Traditional pond culture is the predominant production method. Common carp takes a 90% share of the total volumes of organic production

Species farmed are common carp, grass carp, pike, bighead carp, sturgeon, and tench. Organic farmed fish production is estimated at 1.117 tonnes (2015) out of 12 companies certified under organic standards. Leading companies are Vasaknos UAB, Akvilegij UAB, Raseinių žuvininkystė UAB.

In 2010 there were attempts to sell organic carp at a retail price which was 14% higher than for non-organic; however these attempts were without success – consumers were more concerned about the price than about the farming methods.

² SANPEI = SANE come un Pesce biologico Italiano (Healthy as an Italian organic fish)

2.2.17 *Malta*

There are currently six operational fish farms in Malta, involved in tuna fattening and seabass/seabream farming.

There is no organic production recorded.

2.2.18 *Netherlands*

Species organically farmed in the Netherlands are mostly mussels, and to a lesser extent oysters. The volumes are not known (according to Eurostat, there was no organic aquaculture production in 2015).

The first company for organic mussels was registered in June 2012. The certification was provided by Skal Biocontrole which is the only control authority in Netherlands, dedicated to proving the reliability of organic products. Most of the certified organic mussels are sold as conventional because there is only a limited demand for organic mussels yet.

Eight companies are producing organic bivalves, 7 for mussels and one for oyster. The leading company is Oestercultuur W. Pols-Bom in Yerseke, which produces organic flat and cupped oysters.

2.2.19 *Poland*

The main species farmed organically in Poland are common carp and trout. Smaller volumes of other fish species like crucian carp, silver carp, grass carp, pike, perch, roach, and tench among others are also farmed as organic. The main species farmed are carp (68%), trout (10%), and other species (22%).

Organic farmed fish production is estimated at 19 tonnes (2015) out of 4 companies.

Leading companies are Czarny Mieczysław, Gospodarstwo Rybackie Byliny Jerzy Cwiertnia, Mr. Karolczak Hubert.

2.2.20 *Portugal*

Organic fish farming in Portugal relies on mussels. According to Eurostat, the Portuguese aquaculture sector reached a total production of 1.300 tonnes in 2015, all of which were mussels.

The production started in 2013 in a 395 ha concession off Lagos in the Algarve region. It is mostly destined for export to Spain, France and Germany. There are plans to extend the production capacity to 9.000 tonnes in the coming years.

The market for organic fish is still very limited in Portugal. It is a high-end market. This is why medium-range supermarket chains, such as Pingo Doce or Continente, do not sell organic fish.

2.2.21 *Romania*

Organic fish farming started in Romania in 2010 with the assistance of EFF 2007 – 2013 funding. The conversion process focused on common carp because the differences between a normal traditional rearing practice and organic practices were not significant. The pond farming in Romania is managed

using extensive and semi-intensive technologies which are based on the natural productivity of the ponds with some additional feed based on local cereals (corn, wheat, sunflower).

Organic farmed fish production is estimated at 2.042 tonnes (2014), including mostly common carp, produced by 29 certified companies covering 14.840 ha of certified ponds.

2.2.22 *Slovakia*

The organic aquaculture proved unprofitable without the aid of the state. Higher production costs make the products difficult to sell on the Slovakian market. There is currently no organic production.

2.2.23 *Slovenia*

According to Slovenia's Statistical Office, the Slovenian aquaculture has produced 1,8 tonnes of organic fish and 30 tonnes of organic mussels in 2015.

There are 5 organic fish farms in Slovenia, all of them with very low production capacity.

Kranjčič Farm, in Sromlje, has been the first fish farm organically certified in 2014. It produces organic trout, which is mostly sold in the restaurant owned by the Kranjčič family.

2.2.24 *Spain*

The production of organic fish in Spain is on an upward trend (+52% between 2012 and 2015). This growth is mainly attributable to the development of trout farming.

Table 7. Production of organic fish in Spain, in tonnes

Species	2012	2013	2014	2015
Rainbow trout	40	321	365	409
Adriatic sturgeon	4	0	10	4
Seabream	163	140	11	233
Seabass	134	126	164	157
Mediterranean mussel	550	0	407	550
Total	892	587	957	1 353

Source : MAPAMA/JACUMAR

The production is located in three regions: Andalusia for seabream, seabass and mussel, La Rioja for trout, and the Canary Islands for seabass.

Table 8. Spanish production of organic fish by region (autonomous community), in tonnes

Species	Region				
	Andalusia	Canary Islands	Castilla La Mancha	La Rioja	Total
Rainbow trout			11	398	409
Adriatic sturgeon	4				4
Seabream	233				233
Seabass	41	116			157
Mediterranean mussel	550				550
Total	828	116	11	398	1 353

Source : MAPAMA/JACUMAR

According to JACUMAR data, organic mussels are produced in Andalusia. But during the survey only mussels coming from Galicia could be seen on the market, either fresh (usually in plastic trays) or preserved in cans (marinated mussels, mussel pâté).

2.2.25 *Sweden*

There is some organic blue mussel production, but production data are not available (the total Swedish production of farmed mussels reached 1.525 tonnes in 2015).

2.2.26 *United Kingdom*

Organic aquaculture production in the United Kingdom is primarily directed towards salmon and trout, where Scottish farmed salmon represents the majority of volume produced.

Aquaculture production in England covers a wide range of finfish species, although with very marginal volumes besides the trout. Freshwater rainbow trout and brown trout are the only species representing notable volumes. Less than half of the production volume in 2012 was for the table-market (3.774 tonnes, out of 8.109 tonnes.) Although no statistics are published on the organic share of this volume, there are still a few trout farms that have organic certification; among them Hawshead Trout Farm and Purely Organic Trout Farm. The British Trout Association estimated that out of a table-market production of more than 6.000 tonnes in 2009, around 200 tonnes were organic, and in decline.

Wales had only a production of around 100 tonnes for the table-market in 2012. Only a marginal share of this is estimated to be certified as organic.

In Northern Ireland, the largest producer of salmon, Glenarm Organic Salmon, represents the majority of the region's 600-800 tonnes of annual production.

For Scotland, the Scottish Annual Finfish Production Surveys have for the past few years, included organic production, as part of the survey questions. Of the 250 active Atlantic salmon seawater cage sites in 2015, five were certified as organic, producing 2.382 tonnes.

Table 9. Organic production of Atlantic salmon in Scotland

	Number of active cage sites	Number of cage sites certified as organic	Production (tonnes)
2010	247	14	6 122
2011	252	10	3 104
2012	255	7	4 597
2013	253	8	5 207
2014	257	8	3 588
2015	250	5	2 382

Source : Scottish Annual Finfish Production Survey

In 2014, 3.588 tonnes were certified as organic, where 8 out of 257 active cages were used for organic production.

Out of a total of 46 rainbow trout sites, none were certified as organic. The same, no organic certification, applied to the 29 sites used for other finfish species than salmon and trout.

The corresponding Scottish Annual Shellfish Production Survey has no records on share of production being certified as organic, but most of the mussel production is estimated to be conventional and not certified.

2.2.27 Summary table by member state

The table below sums up the main production data available for organic fish.

Table 2. Summary table of organic production available data by MS

COUNTRY	Total production (FAO, 2015)	Volume of organic production (EUROSTAT 2015)	Volume of organic production (Eumofa - survey, 2015 or 2016)	% of organic production	Breakdown of organic production (Source: Eumofa survey and EUROSTAT breakdown when available)	Leading companies
Spain	289 821	2 709	1 353	0,5%	409 tonnes of rainbow trout, 233 tonnes of seabream, 550 tonnes of mussel, 157 tonnes of seabass, 4 tonnes of sturgeon	
United Kingdom	206 834	0	3 382	1,6%	In 2015: 2.382 tonnes of organic salmon in Scotland, 800 tonnes in Northern Ireland and 200 tonnes of organic trout in England. Recent trend: organic production in decline	Hawshead Trout Farm Purely Organic trout farm Glenarm Organic Salmon
France	206 800	N.A.	3 000	1,5%	About 2.300 tonnes of organic salmonids (6,5%), mostly rainbow trout, and about 700 tonnes of organic seabass/seabream (15-20%) + mussels and oysters but small volume unknown	Aqualande (trout) Cannes Aquaculture (seabass, seabream) Gloria Maris (seabass, seabream)
Italy	148 763	5 492	8 500	5,7%	According to EUROSTAT 2015: more than 5000 tonnes of mussels. In addition, according to national sources in 2015 : 1.526 tonnes of seabream, 898 tonnes of rainbow trout, 797 tonnes of mullets, 100 tonnes of sea trout, 81 tonnes of seabass, 50 tonnes of praws and 12 tonnes of eel.	La Fenice (mussel)
Greece	106 118	720	400	0,4%	Seabass and seabream (400 tonnes in 2016)	Kefalonia Fisheries Galaxidi
Netherlands	62 920	0	N.A.	N.A.	Some organic mussel and oyster production but mostly sold as conventional because no demand	Oestercultuur W. Pols-Bom (oyster)

COUNTRY	Total production (FAO, 2015)	Volume of organic production (EUROSTAT 2015)	Volume of organic production (Eumofa - survey, 2015 or 2016)	% of organic production	Breakdown of organic production (Source: Eumofa survey and EUROSTAT breakdown when available)	Leading companies
Ireland	39 650	31 227	22 000	55,5%	13 000 tonnes of Atlantic salmon 9.000 tonnes of mussels	Marine Harvest (salmon) Irish Salmon Producers Group (salmon) Kush Shellfish (mussel) Blackshell Farm Ltd (mussel)
Poland	36 971	18	19	0,1%	Carp (68%), trout (10%), and other species (22%)	Czarny Mieczysław Gospodarstwo Rybackie Byliny Jerzy Ćwiertnia Mr. Karolczak Hubert
Denmark	35 867	2 934	2 864	8,0%	1.634 tonnes of organic trout 1.229 tonnes of organic mussel 0,5 tonne of organic seaweed	Kaerhede Dambrug APS (freshwater trout) Musholm A/S (sea trout) Vilsund Blue A/S (mussel)
Germany	29 909	621	621	2,1%	Carp and trout. No breakdown available (mostly trout)	
Czech Republic	20 200	1	0	0,0%	No significant organic production so far	
Hungary	17 337	3 498	3 498	20,2%	Mostly carp	Many small pond farmers.
Croatia	15 572	300	300	1,9%	Mostly Seabass (about 300 tonnes) and mussel production under organic standards	Cromaris (since 2014)
Finland	14 877	0	0	0,0%	-	-
Bulgaria	13 537	80	80	0,6%	80 tonnes of mussels in 2015, 1.400 expected in 2016	Bljak Sij Shells Ltd.
Sweden	12 020	N.A.	N.A.	N.A.	Some organic production for mussel but no data available	
Romania	11 042	6 384	2 042	18,5%	2.042 tonnes of common carp in 2014	
Portugal	9 322	1 300	1 300	13,9%	Mussels	Algarve Offshore Seashells
Malta	5 913	0	0	0,0%	-	
Cyprus	5 459	0	0	0,0%	-	
Lithuania	4 450	1 300	1 117	25,1%	90% common carp, 10% grass carp, pike, bighead carp, sturgeon, tench	Vasaknos UAB, Akvilegij UAB Raseinių žuvininkystė UAB

COUNTRY	Total production (FAO, 2015)	Volume of organic production (EUROSTAT 2015)	Volume of organic production (Eumofa - survey, 2015 or 2016)	% of organic production	Breakdown of organic production (Source: Eumofa survey and EUROSTAT breakdown when available)	Leading companies
Austria	3 503	N.A.	120	3,4%	Mostly carp. But also rainbow trout, lake trout, brook trout, perch, pike-perch	Biofisch Schmalzbauer & Romann Fischer-Ankern
Slovenia	1 607	32	32	2,0%	30 tonnes of mussels and 1,8 tonnes of fish (trout)	Kranjčič Farm (trout)
Slovakia	1 248	0	0	0,0%	-	
Latvia	863	7	9	1,1%	In 2015, 9 tonnes of common carp (major volumes), tench, pike perch, pike and crucian carp (minor volumes).	Silva-AA SIA Madaras ZS Brivnieki ZS
Estonia	799	0	0	0,0%	No significant organic production so far	
Belgium	82	0	0	0,0%	-	
Totals	1 301 484	56 623	50 637	3,9%		

2.3 Synthesis of EU organic aquaculture by species

2.3.1 *Salmon*

Two EU Member states are involved in the organic production of Atlantic salmon, which is the major species organically certified in the EU.

The largest part of EU organic salmon producer is Ireland. The rest is produced in the United Kingdom: in Scotland and, to a much lesser extent, in Northern Ireland.

Table 10. EU production of organic Atlantic salmon in 2015 (tonnes)

MS	Total	Organic	%organic
United Kingdom	186 500	2 400	1,3%
Ireland	13 000	13 000	100%
Total 2 MS	199 500	15 400	8%

Sources : FEAP (total UK), Marine Scotland Science (UK - organic), BIM (Ireland)

The organic production, which was estimated at 12.500 tonnes in 2012 (EAS) has thus increased by 23% thanks to Irish development (+35%), while Scottish organic production decreased by half in the same period.

For comparison, Norway organic production was about 16 000 tonnes in 2015 (EUROSTAT).

The history of Irish organic aquaculture started in the mid-nineties with salmon. Today Ireland is the country in the EU with the highest production of organic salmon. Ireland did also previously produce organic ocean-farmed trout, but the producer concerned has now switched to salmon.

The main driver behind organic salmon farming in Ireland is the regulatory framework for conventional salmon. The producers realized that it is very difficult for small scale producers to compete with Scotland and Norway in terms of cost of production and consequently price. Instead, the Irish salmon farming industry focuses on the organic niche.

2.3.2 *Trout*

Organic trout production is widely spread among EU member states.

The main producers are France (2.300 tonnes in 2015), Denmark (1.634 tonnes) and Italy (1.000 tonnes). Then come Spain, Germany and the UK.

Table 11. EU production of organic rainbow trout in the main producing countries in 2015 (tonnes)

MS	Total	Organic	%organic
France	36 700	2 300	6%
Denmark	38 000	1 600	4%
Italy	38 000	900	2%
Spain	15 900	400	3%
Germany	9 100	300	3%
UK	15 000	200	1%
Total 6 MS	152 700	5 700	4%

Source : FEAP (total), EUMOFA (organic)

Organic trout production has experienced a significant upward trend in recent years (1.600 tonnes were produced in the EU in 2012). However, in the main producing countries, organic production is concentrated in a few companies (such as Aqualande in France or Kaerhede Dambrug in Denmark).

2.3.3 *Carp*

Carp is one of the most widely spread farmed fish species in Europe, traditionally in Eastern Europe. EU total carp production reached 83.400 tonnes in 2015 (out of which 71.200 tonnes of common carp).

According to a presentation made by the Institute of Aquaculture of the University of South Bohemia at 'Aquaculture Europe 15', world production of organic carp was estimated at 7.200 tonnes, out of which approximately 700 tonnes in Hungary, 150 tonnes in Austria and less than 200 tonnes in Germany. These figures appear to be overestimated, at least for Germany and Austria.

According to EUROSTAT the main producers of organic carp in the EU are Hungary (more than 3.000 tonnes in 2015), Romania (2.700 tonnes) and Lithuania (1.200 tonnes). Much smaller volumes are produced in Austria, Germany, Poland, Latvia.

In Germany, the production of organic carp does not play any significant role in the carp supply chain. Out of the 2.142 aquaculture companies recorded by the Federal Statistics Office (Destatis) as involved in carp farming in 2015, 89 are certified as fully organic according to Reg. 834/2007. This figure was higher in 2014 with 105 organic companies. The decrease can be explained by the difficulties with the supply of juveniles but can also be partly due to the changes occurred in the statistical survey process.

Most of these companies (81) are located in Bavaria, but according to LfL (the Bavarian Regional Office for Agriculture) these companies are generally farms which are organically certified for agriculture, but have not certified their carp farming activity. According to LfL there are 16 companies effectively involved in organic carp farming in Bavaria, and covering 100 ha of ponds.

In 2015 the production of organic carps in Saxony fell to 6 tonnes, i.e. 0,3% of the total production of carp in this federal state.

In Romania, organic carp farming started in 2010 with the assistance of EFF 2007 – 2013 funding. The conversion process focused on common carp because the differences between a normal traditional rearing practice and organic practices are not significant. Pond farming in Romania is managed using extensive and semi-intensive technologies which are based on the natural productivity of the ponds with some additional feed based on local cereals (corn, wheat, sunflower).

The EU production of organic carp reached 7.000 tonnes in 2015.

2.3.4 *Seabass/seabream*

Seabass and seabream production occur exclusively on the Mediterranean coast. Thus, member states involved in organic farming for these species are Italy, Greece, France, Croatia, and Spain.

Organic production is at significant levels in France and Italy. In the leading overall producer member state Greece, organic production decreased in the 2010s to stabilize around 400 tonnes with only two companies continuing to grow organic seabass and seabream (Kefalonia Fisheries and Galaxidi) and only one of them producing organic juveniles (Galaxidi).

The production of organic seabass/seabream reached 3.400 tonnes in 2015 in the EU.

Table 12. EU production of organic seabass/seabream in 2015 (tonnes)

MS	Total	Organic	%organic
Greece	110 000	400	0,4%
Spain	37 600	400	1%
France	3 500	700	20%
Croatia	9 000	300	3%
Italy	13 800	1 600	12%
Total 5 MS	173 900	3 400	2%

Source : FEAP (total), EUMOFA (organic)

Compared to 2012, when the production had been estimated at 1.600 tonnes (out of which 1.000 tonnes for Greece), there has been a significant increase (apparent doubling of the production), which is not fully in line with some comments heard from some important producers and retailers on the market's capacity to absorb new quantities of organic seabass/seabream.

A change in the geographical structure of the production can also be noticed between 2012 and 2015. The center of gravity of the organic production moved towards the west, from Greece to Italy/France; i.e. closer to the market, which is sensitive to the issue of proximity.

2.3.5 *Mussels*

The main EU producers of organic mussels are Italy, Portugal, Denmark and Spain.

Ireland appears in the statistics as the largest EU producer of organic mussel (9.100 tonnes in 2015 according to Eurostat). Organic mussels are generally grown on ropes that are suspended on longlines. The two leading companies are Kush Shellfish and Blackshell Farm. They market fresh mussels in jute bags and MAP trays, precooked vacuum packed mussels, and frozen mussel meat. Most of the organic production is exported.

Italy is the second-largest EU producer (5.200 tonnes in 2015 according to Eurostat). Some twenty companies are active in organic mussel farming in Italy, all located in the north-east of the country (mainly in Veneto, Emilia Romagna and Marche regions). The leading company is the cooperative La Fenice, in Cervia (Emilia-Romagna), which obtained the organic certification in 2013 and produced 2.500 tonnes of organic mussel, of which 70% are exported, mainly to Spain and France.

Portugal started offshore organic farming in 2013 in the Algarve region and reached a production of 1.300 tonnes in 2015 according to Eurostat. The production takes place in a 395 ha concession off Lagos in the Algarve region. It is mostly destined for export to Spain, France and Germany.

In Denmark 9 production units of organic line mussels have been approved for a total production capacity of 3.500 tonnes per year. The production reached 1.229 tonnes in 2015. In particular the Danish production of mussels is taking place in the "Limfjorden" (North West Jutland), where the main producer currently is

Seafood Limfjord in cooperation with the mussel processing company Vildsund Blue in Nykøbing Mors. The mussels are farmed on lines and in big socks, and due to the fact that they are reared higher in the water column than wild mussels more feed is available for their growth. The natural occurring mussel fry settle on the lines each year, and harvesting takes place by boat. The mussels contribute to the removal of nitrogen and phosphorus from the water. The positive development in the production of organic line mussels has been facilitated by various initiatives from the Danish aquaculture sector. This includes contribution to establishment and development of a sustainable market for organic line mussels in cooperation with the organic line mussel producers and the processing industry and supported by governmental funds³.

In Spain the production was 250 tonnes in 2014 (according to Eurostat) and 550 tonnes in 2015 (source: MAPAMA/JACUMAR).

Table 13. EU production of organic mussel in 2015 (tonnes)

MS	Production			Sources	
	Total	Organic	%organic	Total	Organic
Spain	270 635	550	0,2%	JACUMAR	JACUMAR
Ireland	16 000	9 100	57%	BIM	Eurostat
Denmark	1 869	1 229	66%	Danish Agri-Fish Agency	Eurostat
Portugal	1 244	1 300	?	INE (2014)	Eurostat
France	75 100	1 000	1%	FAO (2014)	EUMOFA
Italy	63 700	5 200	8%	Eurostat (2014)	Eurostat
Total 4 MS	428 548	18 379	4%		

Source : EUMOFA

In France, organic shellfish farming has previously mostly concerned oysters. But organic mussel production is starting to develop in Brittany and Charentes, mainly initiated by a northern Brittany company, which also markets organic mussels farmed in the Channel Islands (Chausey). The first organic mussel certification in the Mediterranean (Thau Lagoon) took place in 2016, but the capacity is likely to increase as many producers gave draft of intent.

Other smaller scale experiences of organic mussel farming take place in the Netherlands, in Sweden and in Croatia.

2.3.6 Other species

In addition to the main five species previously mentioned, some other species are produced in EU under organic standards. However most of them concern niche markets for high-value species/products and volumes produced are relatively low.

For instance, sturgeon is produced under organic standards in Spain (4 tonnes in 2015, in Andalusia) and in Estonia, especially to produce organic caviar.

In Italy, mullets (800 tonnes), prawns (50 tonnes of *Penaeus japonicas*) and eels (12 tonnes) were produced under organic standards in 2015.

In addition, a small production of meagre is sold as organic in France and organic oysters are produced in France and in Netherlands (but sold as conventional in the Netherlands). A small production of organic seaweed was recorded in Denmark (0,5 tonne in 2015). In Latvia and Poland, in addition to carp, freshwater fish farms produce several other species under organic standards such as tench, pike-perch, pike, etc.

³ EAS/DTU Aqua-Technical University of Denmark

2.3.7 Synthesis by species

Species produced under organic standards	Total production (FAO 2015)	Estimated production under organic standards (2015)	Estimated share of organic production	Main producing Member States	Main producing companies
Salmon	185.995 tonnes	15.400 tonnes	8%	Ireland UK	Marine Harvest (IE) ISPG (IE) Glenarm Organic Salmon (UK)
Rainbow trout	185.889 tonnes	Nearly 6.000 tonnes	3%	France Denmark Italy Spain	Aqualande (FR) Kaerhede Dambrug (DK) Musholm A/S (DK)
Carps	83.447 tonnes*	About 7.000 tonnes	8%	Hungary Romania Lithuania	Vasaknos UAB (LT) Akvilegij UAB (LT) Raseinių žuvininkystė UAB (LT)
Seabass Seabream	151.557 tonnes	About 3.400 tonnes	2%	Italy France Greece Spain Croatia	Cannes Aquaculture (FR) Kefalonia (GR) Galaxidi (GR) Cromaris (HR)
Mussel	492.572 tonnes	Nearly 20.000 tonnes	4%	Ireland Italy Denmark Portugal France	Kush Shellfish (IE) Blackshell Farm (IE) La Fenice (Italy) Vilsund Blue (DK) Cultimer (France)

Source: EUMOFA

*common carp : 71.210 tonnes

For the six species displayed in the synthesis table, organic production represents on average 4,7% of the total aquaculture production.

3 Economic performance

3.1 Carp

3.1.1 Comparative economic performance of organic and conventional carp

- Results of the OrAqua study⁴

In the three countries analysed the cost of organic carp is substantially higher than the cost of conventionally produced carp, from 0,65 EUR/kg in Germany to 0,89 EUR/kg in Poland, that is an extra cost of 30% in Germany and 46% in Poland.

The main differences are for juveniles and feed. For both items, the cost is about double for organic.

Extra juveniles are needed in organic farming because of the extra predation in the extra raising year. In Germany and Poland, 100% more juveniles are needed. The cost is higher in Romania because Romanian farms buy older juveniles (and the extra need for juveniles is estimated at 50%), whereas juveniles are produced by the organic farmers themselves in Poland and Germany.

The feed consists mainly of cereals. The nutritional value of organic cereals is equal to conventional cereals, but the price is double. And due to problems occurring during the juvenile production (lower growth rate) an extra year of growing is necessary. This leads to a higher overall feed conversion rate of 15%.

The extra year of growing necessary for organic carp also explains the extra costs for depreciation and labour.

Table 14. Cost of production of conventional and organic carp in Romania, Poland and Germany

Cost items	Romania		Poland		Germany	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Subsidies & other income	-1,22	-1,36	-0,15	-0,16	-1,57	-1,74
Livestock (juveniles)	0,46	0,77	0,06	0,14	0,03	0,06
Feed	0,48	0,96	0,69	1,38	0,33	0,75
Energy	0,06	0,07	0,13	0,14	0,09	0,09
Repair and maintenance	0,08	0,08	0,10	0,10	0,54	0,58
Other operational costs	0,14	0,17	0,42	0,45	0,64	0,71
Wages and salaries	0,69	0,75	0,45	0,50	1,45	1,59
Depreciation	0,28	0,33	0,14	0,16	0,66	0,78
Financial costs	0,06	0,07	0,10	0,12	0,00	0,00
Cost of production per kg - excluding subsidies	2,25	3,20	2,09	2,99	3,74	4,56
Cost of production per kg	1,03	1,84	1,94	2,83	2,17	2,82
Sales price per kg	1,87	2,43	2,16	2,81	2,41	3,13
Cost difference organic/conventional		0,81		0,89		0,65

Source : OrAqua

⁴ The OrAqua project (full name: "European Organic Aquaculture – Science-based recommendations for further development of the EU regulatory framework and to underpin future growth in the sector") was financed under the EU 7th Framework Programme and developed between January 2014 and December 2016.

According to the OrAqua study, the extra cost of organic carp is not fully covered by the price premium and the margin is thus inferior for organic carp, except in Germany (but this is not confirmed by our own investigations in Saxony – see below).

Table 15. Extra cost and price premium of organic carp

EUR/kg	Extra cost	Sales price premium	Extra margin
Romania	0,81	0,56	-0,25
Poland	0,89	0,65	-0,24
Germany	0,65	0,72	0,07

Source : EUMOFA based on elaboration of OrAqua results

- Bavaria study

The Fisheries Institute of LfL (Bavarian State Research Center for Agriculture) carried out a study in 2012 on conversion from conventional carp farming to organic farming in the two largest farming areas of Bavaria (Aischgrund and Upper Palatinate), with two options:

- same marketing size as in conventional production (1,25 kg),
- larger marketing size in organic farming.

In the first variant, the study concludes that, to reach the same profitability as in conventional production in Aischgrund, it is necessary to generate an extra 1,33 EUR/kg in a 2 ha-farm, an extra 0,85 EUR/kg for a 10-ha-farm and 0,75 EUR/kg more in a 50-ha-company. In Upper-Palatinate, where conventional production takes place on a more extensive way than in Aischgrund, the price rise needed would be lower: 1,17 EUR/kg, 0,58 EUR/kg and 0,45 EUR/kg respectively.

In the second variant, the weight obtained at the end of the farming period is 1,81 kg in Aischgrund and 1,58 kg in Upper-Palatinate. To reach the same profitability as before the conversion, 0,52 EUR/kg more has to be realized in a 2 ha-farm, 0,19 EUR/kg in a 10 ha-farm and 0,12 EUR/kg in a 50 ha-company. In Upper-Palatinate it would be necessary to obtain 66, 19 and 9 cents more per kg, respectively.

- Results of EUMOFA case study: Oberlausitzer Biokarpfen

Oberlausitzer Biokarpfen is the result of a collaboration between three carp farms in the Upper-Lusatia region (Oberlausitz) and the administration of the biosphere reserve “Oberlausitzer Heide- und Teichlandschaft”. This UNESCO biosphere reserve of 301 km² covers the largest contiguous pond landscape of Germany, to the north-east of Dresden, where ponds have been used to breed carp since the 13th century, and aims at preserving the cultural landscape. The organic carp project started in 2008, with the objective to produce 40 tonnes per year of organic carp. Three companies (Kreba-Fisch, Teichwirtschaft Ringpfeil, Teichwirtschaft Bergmann/Klitten) became involved in the project but could never reach the target set. They reached 30 tonnes at maximum, when the three companies were producing, but not all the production was sold as organic. Today only one company (Ringpfeil) continues to farm organic carp. Teichwirtschaft Klitten stopped for economic reasons (unprofitable activity) and Kreba-Fisch for structural reasons (loss of rental ponds reclaimed by the owner). In 2015 the production was limited to 6 tonnes and in 2016, out of the 5 tonnes produced, no more than 2 tonnes could be sold as organic.

3.1.2 *Production costs and price premiums*

- Results of OrAqua study

The OrAqua study shows that the margin is much lower for organic carp than for conventional in Romania and Poland and slightly higher in Germany, which is contradicted by EUMOFA Team’s own investigations.

Anyhow the study clearly shows that carp organic farming is not viable without subsidies.

Table 16. Margin of conventional and organic carp in Romania, Poland and Germany

Margin per kg	Romania		Poland		Germany	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Margin	0,84	0,59	0,22	-0,02	0,24	0,31
Margin - excluding subsidies	-0,38	-0,77	0,07	-0,18	-1,33	-1,43

Source : OrAqua

- Results of EUMOFA study

Germany

In 2016 the Saxony producer of organic carp could sell his production of organic carp at 2,50 EUR/kg, i.e. 0,20 EUR/kg more than conventional carp. The activity is profitable for conventional carp, which is produced at a cost around 2,10 EUR/kg but not for organic carp, which costs around 2,80 EUR/kg.

The biggest extra cost comes from the feed. The organic cereal (triticale) is paid 250 to 300 EUR/tonne, and the carp farmer has to fetch it from the farmers, who are too small to have trucks.

Lithuania

In Lithuania, currently, there is no difference between the prices for organic and non-organic aquaculture products. Average price of common carp is 3,47-3,50 EUR/Kg. It is the same situation in Romania where no difference between the prices for organic and non-organic aquaculture products is reported. Retail price for common carp is 14 - 16 RON/Kg (3,11 - 3,55 EUR/Kg).

Hungary

Carp organic farming costs are higher by approximately 10-20 % whilst the profit is higher by ca. 15-30 % (sometimes also by 30-40 %).

3.1.3 Breakdown of revenues in the supply chain

- Results of OrAqua study

In the conventional supply chain for whole carp, the farmer's price represents 42% of the consumer price, while it is only 37% in the organic supply chain.

Table 17. Costs and margins in the supply chain for conventional and organic carp (whole)

Supply chain	Conventional	Organic
Farmer's price	1,90	2,50
Cost of gutting and gutting loss	0,70	0,80
Price of gutted fish	2,60	3,30
Processing, trade & retail margin	1,90	3,50
Consumer price	4,50	6,80

Source : OrAqua

The same situation can be observed for fillets, where the farmer's price represents 27% of the retail price for conventional and 24% for organic.

Table 18. Costs and margins in the supply chain for conventional and organic fresh/frozen carp fillets

Supply chain	Conventional	Organic
Farmer's price	1,90	2,50
Price of gutted fish	2,60	3,30
Price per kg fillet	6,00	7,90
Processing, trade & retail margin	1,00	2,60
Consumer price	7,00	10,50

Source : OrAqua

Downstream margins are thus higher in the organic supply chain: 51% for organic vs. 42% for conventional for processing, trade and retail in the whole carp market, and 25% vs. 14% in the fillet market.

- Results of EUMOFA case study

For the Saxony carp farmers met, the only profitable way to produce organic carp is to process it and to sell it as a value-added product. This is why 'Oberlausitzer Biokarpfen' carp are smoked and packed in modified atmosphere and sold as 'organic carp fillets with sesame' or 'organic carp fillets with traditional herbs' at an ex-factory price of 20,50 to 21,00 EUR/kg.

The attempts to sell frozen carp fillet proved unsuccessful as the competition of the organic salmon fillet is too big.

The 'Oberlausitzer Biokarpfen' project would not have been possible without the initial start-up support of the UNESCO Biosphere Reserve, which carried the project, and the EFF subsidies. According to the OrAqua study, subsidies represented 1,74 EUR/kg, i.e. 38% of the production cost.

The current organization of the organic carp supply chain in Upper Lusatia is too complicated for such a low level of production.

The organizational structure of the 'Upper Lusatia organic carp' includes:

- two carp farmers in Upper Lusatia (of which one is currently not producing),
- two processors (one in Upper Lusatia, the other in Lower Saxony),
- the marketing company, which sells the processed products (and which was one of the producing farmers at the beginning of the project).

3.2 Salmon

3.2.1 Comparative economic performance of organic and conventional salmon

- Results of OrAqua study

In the two member states analysed, the cost of organic salmon is markedly higher than the cost of conventionally produced salmon: from 0,73 EUR/kg in the United Kingdom to 1,75 EUR/kg in Ireland.

The main differences are for feed, juveniles (smolts) and depreciation/repair/maintenance. The last item is explained by the fact that to achieve the same production quantity you need a bigger production capacity in organic farming, as density and daily growth are much lower; this extra capacity entails extra costs in terms of depreciation, repair and maintenance, and, to a lesser extent, financial costs.

Table 19. Cost of production of conventional and organic salmon in Norway, Ireland and the UK

Cost items	Norway		Ireland		UK	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Subsidies & other income	-0,16	-0,16	-0,05	-0,05	-0,01	-0,01
Livestock (juveniles)	0,28	0,43	0,56	0,86	0,04	0,04
Feed	1,35	1,79	1,83	2,42	1,34	1,51
Energy	0,00	0,00	0,17	0,17	0,03	0,03
Repair and maintenance	0,00	0,00	0,29	0,75	0,14	0,36
Other operational costs	0,58	0,62	1,47	1,57	1,29	1,36
Wages and salaries	0,19	0,22	0,97	1,11	0,19	0,22
Depreciation	0,14	0,37	0,09	0,24	0,14	0,37
Financial costs	0,05	0,14	0,01	0,02	0,00	0,01
Cost of production per kg - excluding subsidies	2,59	3,57	5,39	7,14	3,17	3,90
Cost price per kg	2,43	3,41	5,34	7,09	3,16	3,89
Sales price per kg	3,13	4,07	5,46	7,10	4,19	5,45
Cost difference organic/conventional		0,98		1,75		0,73

Source : OrAqua

The United Kingdom (Scotland) is the only one of the three countries which achieves a sales price premium significantly superior to the extra cost generated. But the other two are very close.

Table 20. Extra cost and price premium of organic salmon

EUR/kg	Extra cost	Sales price premium	Extra margin
Norway	0,98	0,94	-0,04
Ireland	1,75	1,64	-0,11
UK	0,73	1,26	0,53

Source : EUMOFA based on elaboration of OrAqua results

- Results of EUMOFA case study

Detailed economic performance information of the interviewed organic salmon company was regarded as confidential information.

3.2.2 Production costs and price premiums

- Results of OrAqua study

The OrAqua study shows a mixed picture: the margin is lower for organic salmon than for conventional in Ireland and Norway, but bigger in the United Kingdom.

Table 21. Margin of conventional and organic salmon in Norway, Ireland and the UK

Margin per kg	Norway		Ireland		UK	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Margin	0,70	0,66	0,12	0,01	1,03	1,56
Margin - excluding subsidies	0,54	0,50	0,07	-0,04	1,02	1,55

Source : OrAqua

- Results of EUMOFA case study

ISPG farms only organic Atlantic salmon and consequently no comparison between organic and conventional farmed salmon is available.

However, in the interview discussion related to cost and margins, ISPG agreed that Oraqua findings were realistic, notably those introduced by the University of Wageningen, presented at Aquaculture Europe in Edinburg in September 2016. Findings in the study suggested that cost of production for farmed organic salmon in Ireland was 7,08 euro/kg. According to ISPG, this cost level could be used as a proxy.

For salmon, which is the farmed species most widely distributed, organic can be in competition with quality labels. For instance the Label Rouge is quite developed on the French market and attracts those among organic consumers who rank organoleptic quality before environmental aspects. Label Rouge can have a higher price premium than organic salmon, as can be seen in the table below.

Table 22. Fresh salmon offer of a major French wholesaler (wholesale prices, EUR/kg) in October 2016

Presentation	Product	Unit	Price (EUR/kg)
Whole	Superior, Norway, 1-2 kg	20 kg	5,25
	Superior, Norway, 2-3 kg	20 kg	6,65
	Superior, Norway, 3-4 kg	20 kg	6,85
	Superior, Norway, 4-5 kg	20 kg	7,10
	Superior, Norway, 5-6 kg	20 kg	7,25
	Superior, Norway, 6-7 kg	20 kg	8,10
	Superior, Norway, 7-8 kg	20 kg	8,10
	Label Rouge, Scotland, 4-5 kg	20 kg	10,90
	Label Rouge, Scotland, 5-6 kg	20 kg	10,90
	Label Rouge, Scotland, 6-7 kg	20 kg	11,00
	Organic, Scotland, 6-8 kg	20 kg	10,45
Fillet, Trim D	1-1,8 kg	10 kg	11,00
	1,3-1,9 kg	12 kg	11,45
	2-2,6 kg	12 kg	12,95
	1-2,2 kg	10 kg	13,45
	Organic	5 kg	15,99

3.2.3 *Breakdown of revenues in the supply chain*

- Results of OrAqua study

In the conventional supply chain for salmon fillet, the farmer's price represents 19% of the retail price of the final product, while it is 16% for organic. The processing margin is bigger for conventional (24%) than for organic (20%), while the large-scale retailer's margin is greater for organic salmon fillet (42% of consumer price) than for conventional (31%).

Table 23. Costs and margins in the supply chain for conventional and organic salmon fillet

Supply chain	Conventional	Organic
Farmer's price	3,90	5,00
Cost of gutting	0,60	0,60
Gutting loss (10%)	0,50	0,70
Price of gutted fish	5,00	6,30
Filleting yield 55%		
Price per kg fillet	9,10	11,50
Processing margin	4,90	6,20
LSR purchase price	14,00	17,70
LSR margin	6,20	12,80
Consumer price (excl. VAT)	20,20	30,50
VAT	1,30	1,50
Consumer price	21,50	32,00

Source : OrAqua

- Results of EUMOFA case study

Detailed cost of production was regarded as confidential information by interviewed stakeholder. However, over the last years the profit margin has been around 2,50 EUR/kg.

3.3 Seabass/seabream

3.3.1 *Comparative economic performance of organic and conventional seabass/seabream*

- Results of OrAqua study

In the three countries analysed, the production cost of organic seabream and seabass is substantially higher than the production cost of conventionally produced fish, from 2,50 EUR/kg in France to 3,44 EUR/kg in Italy, that is an extra cost of 40% in France and 46% in Italy.

The main differences are for juveniles (almost the double in the countries under review) and feed (+65%).

Table 24. Cost price of conventional and organic seabass/seabream in France, Italy and Spain

Cost items	France		Italy		Spain	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Subsidies & other income	-0,44	-0,65	-0,14	-0,20	-0,45	-0,66
Livestock (juveniles)	0,35	0,66	2,36	4,43	1,09	2,04
Feed	2,65	4,38	1,70	2,81	2,21	3,65
Energy	0,14	0,14	0,35	0,35	0,08	0,08
Repair and maintenance	0,00	0,00	0,18	0,18	0,11	0,11
Other operational costs	0,92	0,93	1,74	1,75	1,36	1,43
Wages and salaries	1,79	2,06	0,86	0,99	0,68	0,78
Depreciation	0,64	0,93	0,30	0,44	0,28	0,41
Financial costs	0,22	0,32	0,09	0,13	0,17	0,25
Cost of production per kg - excluding subsidies	6,71	9,42	7,58	11,08	5,98	8,75
Cost of production per kg	6,27	8,77	7,44	10,88	5,53	8,09
Sales price per kg	6,78	8,81	7,87	10,23	5,28	6,87
Cost difference organic/conventional		2,50		3,44		2,56

Source : OrAqua

For organic seabass/seabream the margin (sales price minus cost price) is negative in Italy and Spain, and slightly positive in France. If we withdraw the subsidies, the margin is negative in all three countries. The biggest deficit (-1,22 EUR/kg) is registered in Spain, where conventional is also unprofitable (-0,25 EUR/kg) according to OrAqua.

Table 25. Margin of conventional and organic seabass/seabream in France, Italy and Spain

Margin per kg	France		Italy		Spain	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Margin	0,51	0,04	0,43	-0,65	-0,25	-1,22
Margin - excluding subsidies	0,07	-0,61	0,29	-0,85	-0,70	-1,88

Source : OrAqua

In Spain a distinction has to be made between the Canary Islands, where costs of production are much lower, and the rest of Spain. The cost of production of organic seabass in the Canary Islands is lower than the cost of production of conventional carp in the rest of Spain.

Table 26. First sale prices of seabass/seabream in the Canary Islands and in the rest of Spain in 2015

Species	Conventional		Organic	
	Canary Islands	Rest of Spain	Canary Islands	Rest of Spain
SEABREAM				
Volume (tonnes)	2 056	13 303	-	233
Value (1000 EUR)	7 187	69 391	-	1 676
First sale price (EUR/kg)	3,50	5,22	-	7,19
SEABASS				
Volume (tonnes)	5 587	15 055	117	41
Value (1000 EUR)	26 774	88 282	595	298
First sale price (EUR/kg)	4,79	5,86	5,09	7,27

Source : MAPAMA/JACUMAR

- Results of EUMOFA case study

In **France**, according to interviews, major extra costs attributable to the conversion to organic production are the purchase of specific nets (without chemicals) and organic feed cost (+30% compared to conventional one). Increase in labor cost has not been significant as already relatively high when production was under conventional standards (high-range products).

In **Greece**, the main differences in economic performance between organic and conventional products are provided in the table below.

Table 27. Compared breakdown of production cost and selling price for seabream between conventional and organic production in Greece (EUR/kg)

EUR/kg	Organic	Conventional
Purchasing of supplies		
juveniles	1,60	1,00
feed	3,00	2,00
Labour	1,90	1,90
Depreciation		
Insurance		
Financial cost		
Other costs		
PRODUCTION COST	6,50	4,90
Packaging	0,80	0,70
Distribution		
Certification cost	0,03	-
Operating cost	0,67	0,50
Margin		
SELLING PRICE	8,00	6,10

Source: EUMOFA investigations

The major extra costs are juveniles (+60%) and feed (+50%). The overall production cost of organic seabream is 33% above conventional.

3.3.2 *Production costs and price premiums*

- Results of OrAqua study

In none of the countries reviewed the extra cost can be fully covered by an equivalent sales price premium.

Table 28. Extra cost and price premium of organic seabass/seabream

EUR/kg	Extra cost	Sales price premium	Extra margin
France	2,50	2,03	-0,47
Italy	3,44	2,36	-1,08
Spain	2,56	1,59	-0,97

Source : EUMOFA based on elaboration of OrAqua results

- Results of EUMOFA case study

In **Spain**, the average first sale value of organic seabream in 2015 is 7,19 EUR/kg, i.e. 44% more than the first sale value of conventional seabream (4,99 EUR/kg).

The premium at first sale level is much more limited in the case of seabass: 5,68 EUR/kg for organic compared to 5,57 EUR/kg for conventional, i.e. only 2% more. This can be explained by the situation in the Canary Islands (see table 26), which is the main region for the production of organic seabass (74% of total Spanish production in 2015) and where the average first sale price for organic seabass (5,09 EUR/kg vs. 4,79 EUR/kg for conventional fish) is far below the average price in the rest of Spain for conventional seabass (5,86 EUR/kg).

In **France**, according to interviews, the price premium of organic seabass (fresh, whole) is around 25%: prices obtained by farms are about 6,50-7,50 EUR/kg for conventional and 9,50-11,00 EUR/kg for organic. The main extra cost is attributable to organic feed and is estimated at +30%.

At wholesale level we can observe much bigger price differences, especially for larger fish. In Rungis in 2016, the price of the organic seabream of 600-800 gr remained all year long at 13,00-13,50 EUR/kg, while the price of conventional was around 6,00 EUR/kg.

Table 29. Wholesale price of farmed Gilthead seabream 600-800 grams in Rungis (EUR/kg) in 2016

Product	01-2016	02-2016	03-2016	04-2016	05-2016	06-2016	07-2016	08-2016	09-2016	10-2016	11-2016	12-2016
Conventional Gilthead seabream (France)	6,00	6,00	6,00	6,00	6,20	6,28	6,30	6,30	6,30	6,30	6,30	6,30
Conventional Gilthead seabream (EU)	5,90	5,90	5,90	5,90	6,00	6,08	6,10	6,10	6,10	6,10	6,10	5,90
Organic Gilthead seabream (Import)	13,00	13,00	13,00	13,00	13,06	13,20	13,20	13,20	13,25	13,50	13,50	13,50

Source: RNM-FranceAgriMer

In **Greece**, the level of price premium typically achieved for organic over conventional is estimated at 25-30%. Production extra cost of organic production is about +30% and mainly attributable to feed cost (+33%) and juveniles (+60%).

3.3.3 Breakdown of revenues in the supply chain

- Results of OrAqua study

In the conventional supply chain for whole seabass/seabream, the farmer's price represents 47% of the consumer price, while it is only 42% in the organic supply chain. The downstream margin (processing, trade and retail) is thus higher in the organic supply chain than in the conventional: 49% vs. 42%

Table 30. Costs and margins in the supply chain for conventional and organic seabass/seabream (whole)

Supply chain	Conventional	Organic
Farmer's price	6,40	8,60
Cost of gutting and gutting loss	1,40	1,70
Price of gutted fish	7,80	10,30
Processing, trade & retail margin	5,70	10,00
Consumer price	13,50	20,30

Source : OrAqua

The same situation exists in the fillet market: the farmer's price represents 25% of the retail price of the conventional fish when it is only 22% for organic. On the opposite, the downstream margin is higher in the organic supply chain (35% of the consumer price) than in the conventional chain (27%).

Table 31. Costs and margins in the supply chain for conventional and organic fresh/frozen seabass/seabream fillets

Supply chain	Conventional	Organic
Farmer's price	6,40	8,60
Price of gutted fish	7,80	10,30
Price per kg fillet	18,50	24,90
Processing, trade & retail margin	7,00	13,40
Consumer price	25,50	38,30

Source : OrAqua

3.4 Trout

3.4.1 Comparative economic performance of organic and conventional trout

- Results of OrAqua study

In the three countries analysed the cost of organic trout is substantially higher than the cost of conventionally produced trout, from 0,34 EUR/kg in Italy to 0,58 EUR/kg in France, that is an extra cost of 18% in Italy and 16% in France. In the third country under review, Denmark, the extra cost is 15%.

The main differences are for feed (+30%), buildings and installations (18%) and labour (+15%).

Table 32. Cost price of conventional and organic trout in France, Italy and Spain

Cost items	Denmark		France		Italy	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Subsidies & other income	-0,14	-0,17	-0,22	-0,26	-0,05	-0,06
Livestock (juveniles)	0,47	0,47	0,14	0,14	0,20	0,20
Feed	1,00	1,30	1,27	1,65	0,91	1,18
Energy	0,17	0,17	0,12	0,12	0,19	0,19
Repair and maintenance	0,26	0,26	0,00	0,00	0,04	0,04
Other operational costs	0,16	0,17	0,75	0,76	0,08	0,08
Wages and salaries	0,54	0,62	1,13	1,30	0,38	0,44
Depreciation	0,16	0,19	0,22	0,26	0,11	0,13
Financial costs	0,13	0,15	0,13	0,15	0,05	0,05
Cost of production per kg - excluding subsidies	2,89	3,33	3,76	4,38	1,96	2,31
Cost of production per kg	2,75	3,16	3,54	4,12	1,91	2,25
Sales price per kg	2,68	3,49	3,81	4,96	2,34	3,04
Cost difference organic/conventional		0,41		0,58		0,34

Source : OrAqua

In all three countries, the farmers can sell the organic trout with a price premium which is about double the extra cost they have to support. They can thus generate an extra margin of 0,36 to 0,57 EUR/kg.

Table 33. Extra cost and price premium for organic trout

EUR/kg	Extra cost	Sales price premium	Extra margin
Denmark	0,41	0,81	0,40
France	0,58	1,15	0,57
Italy	0,34	0,70	0,36

Source : EUMOFA based on elaboration of OrAqua results

- Results of EUMOFA case study

In **France**, the main costs premium attributable to organic production and affecting profitability are the organic feed cost, the lower growth rate due to no adding of oxygen and the lower fish density.

In **Denmark** organic farmers say they can reach a price premium of 50% as they sell little on the limited domestic market but export to stronger markets such as Germany, Austria and Switzerland.

3.4.2 *Production costs and price premiums*

- Results of OrAqua study

The OrAqua study shows that trout conventional farming is unprofitable in Denmark, even with subsidies, and hardly profitable in France (where margins are very small). In contrast organic farming provides positive and more substantial margins.

Table 34. Margin of conventional and organic trout in Denmark, France and Italy

Margin per kg	Denmark		France		Italy	
	Conventional	Organic	Conventional	Organic	Conventional	Organic
Margin	-0,07	0,33	0,27	0,84	0,43	0,79
Margin - excluding subsidies	-0,21	0,16	0,05	0,58	0,38	0,73

Source : OrAqua

- Results of EUMOFA case study

In **Spain**, the average first sale value of organic rainbow trout in 2015 is 3,57 EUR/kg, i.e. 73% more than the first sale value of conventional trout (2,06 EUR/kg).

Price levels in **Denmark** vary a lot depending on the retailer. Thus, for fresh trout the prices vary from 89 to 289 DKK per kilo (11,90 to 38,80 EUR/Kg). Volumes of fresh organic trout sold through retail chains are very low and the prices 20-25% higher than for non-organic. Export price premiums for organic trout are some 50% over conventional trout and for organic mussels the level is 20% extra.

In **France**, according to interviews, production extra cost for organic trout production is estimated at +35% compared to conventional. Regarding price premium: average price for conventional trout products is 4,50 EUR/kg, while average price for organic products (fresh and frozen, mainly fillets) is 8,16 EUR/kg. So, the apparent price premium is 80% in average but products are different.

3.4.3 Breakdown of revenues in the supply chain

- Results of OrAqua study

In the conventional supply chain for whole trout, the farmer's price represents 43% of the consumer price, while it is only 27% in the organic supply chain. The downstream margin (processing, trade and retail) is thus much higher in the organic supply chain than in the conventional: 65% vs. 44%

Table 35. Costs and margins in the supply chain for conventional and organic trout (whole)

Supply chain	Conventional	Organic
Farmer's price	3,20	4,10
Cost of gutting	0,60	0,60
Gutting loss (10%)	0,40	0,60
Price of gutted fish	4,20	5,30
Processing, trade & retail margin	3,30	9,70
Consumer price	7,50	15,00

Source : OrAqua

The same situation exists in the fillet market: the farmer's price represents 18% of the retail price of the conventional fish when it is only 16% for organic. On the opposite, the downstream margin is higher in the organic supply chain (62% of the consumer price) than in the conventional chain (55%).

Table 36. Costs and margins in the supply chain for conventional and organic fresh/frozen trout fillets

Supply chain	Conventional	Organic
Farmer's price	3,20	4,10
Price of gutted fish	4,20	5,30
Price per kg fillet	7,80	9,90
Processing, trade & retail margin	9,70	16,30
Consumer price	17,50	26,30

Source : OrAqua

3.5 Mussels

3.5.1 Production costs and price premiums

In **Spain**, the average first sale value of organic mussel in 2015 is 0,500 EUR/kg, i.e. 13% more than the first sale value of conventional mussels (0,444 EUR/kg). At consumption level, the price premium is more substantial: in October 2016 El Corte Inglés was proposing conventional cooked mussels in 400g packs at 3,50 EUR/unit (i.e. 8,75 EUR/kg) and organic cooked mussels in the same 400g pack and under the same producer brand at 4,50 EUR/unit (i.e. 11,25 EUR/kg). The price premium is thus around +30% at consumption level for cooked mussels.

In **France**, the organic activity is recent in shellfish farming and data allowing to compare the economic performance of organic and conventional are still lacking. In 2016 the ex-farm price of organic mussel in Thau lagoon is 20% higher than conventional mussels.

In **Bulgaria**, average price for conventional mussels in the retail sector is 3 BGN/Kg (1,53 EUR/Kg) and for organic mussels the price range is 3,50-3,60 BGN/Kg (1,79-1,84 EUR/Kg).

Price levels in **Denmark** vary a lot depending on the retailer. Thus for live mussels the prices vary from 25 to 50 DKK per kilo (3,40 to 6,80 EUR/Kg). Volumes of live organic mussels sold through retail chains are very low and the prices 20-25% higher than for non-organic.

Export price premiums for organic mussels are some 20% over conventional mussels.

3.6 Synthesis table

Species produced under organic standards	Production extra cost compared to conventional production	Main extra cost items	Price-premium compared to conventional production	Other inputs/comments
Salmon	23% in UK 32% in IE	- Feed (from +13% in UK to +30% in IE) - Juveniles (+54% in IE)	30-35%	- Profitable activity - Margin bigger than for conventional in UK but not in Ireland and Norway
Trout	From 15-16% in DK-FR to 18% in IT	- Feed (+30%) - Labor costs (+15%)	30%	- Extra margin for organic trout positive in all MS
Carp	From 15-20% in DE-HU to 43% in RO-PL	- Feed (more than double cost) - Juveniles (especially in RO where older juveniles are bought)	30% in PL-RO Almost no price premium in LT-HU	- Cost premium not fully covered by price premium - Margin lower than for conventional carp - Unprofitable without subsidies
Seabass/seabream	30-45%	- Feed (+65% in IT-FR-ES and +50% in GR) - Juveniles (+85-90% in IT-FR-ES and +60% in GR)	30-35%	- Apparent extra margin negative in all MS except GR.
Mussels			From +13% in ES to +20-25% in DK-FR-BL	- Development of sales in trays (fresh or pre-cooked) in large-scale retails

4 Overview of demand

4.1 Attitude of retailers towards organic seafood

The small number of large-scale retailers met for the survey limits the validity of the conclusions which can be drawn at this stage.

However it appears that:

- organic operations have not yet emerged at significant scale for large-scale retailers, who are more concerned about finding a regular supply of aquaculture products in general than about proposing some organic fish offer;
- organic fish is not either necessarily a key priority for specialized organic retailers, who may prefer sourcing wild fish coming from 'responsible fisheries' or aquaculture fish 'farmed responsibly', both with recognised labels (MSC, ASC...), rather than organically-certified aquaculture products. For instance a major French organic supermarket chain buys three times more wild fish than organic fish and purchases about 30 different wild species (cod, haddock, monkfish, squid, sardine, mackerel, sardine, horse mackerel, Dover sole, albacore, Norway lobster, ...) and 4 organic species AB-certified (salmon, trout, seabass, seabream).
- some large-scale retailers who buy organic fish do not source it in the EU because of the absence of guarantee on availability and prefer to buy a limited number of products from extra-EU suppliers more likely to provide regular supply (in both quantity and price). Hence a retailer interviewed prefers to focus on salmon from Norway and shrimp from South America, both sold prepacked, and considers that, for example for organic trout, EU production is too limited to secure a regular supply at competitive prices.
- environmental sustainability and social responsibility can be more interesting cards to play than organic farming for large-scale retailers whose purchasing policy is permanently scrutinized by NGOs.
- retailers' reluctance towards organic fish is also based on the observation that, in the consumers' mind, organic is not clearly differentiated from environmental-friendly. And the large number of ecolabels and organic logos can be confusing for the consumer.
- specialized organic retailers often do not have fresh fish counters, which limits their capacity to buy organic fish.
- large-scale retailers take higher margins for organic fish than for conventional. There are several reasons:
 - smaller volumes, which means extra cost per unit;
 - lower turnover rate, higher losses, higher risks;

Due to lower demand than for conventional, the turnover rate is lower and the risk of unsold items and losses is higher;

As demand and supply do not always match, producers/processors also sometimes have to sell organic fish as a conventional product (with a conventional price);
 - margins calculated in relative terms (percentage) and not in absolute terms.

As purchasing prices of retailers are higher for organic fish than for conventional, the mode of calculation of the margin in percentage entails a higher absolute value for the organic margin and increases the final price accordingly.

Organic products, especially when processed, may be sold as luxury products destined for affluent consumers and entail "luxury" margins.

4.2 Needs and expectations

- Retailers' needs focus first on availability all-year long, second on competitive prices.
- Large-scale retailers also stress that their needs relate to aquaculture in general before referring to organic aquaculture. As an example, the Portuguese large-scale retailer Jerónimo Martins, who achieved sales of EUR 13,7 billion in 2015 (in Portugal and Poland), has created a subsidiary, JMA (Jerónimo Martins Agro-Alimentar), whose main objective is to have direct access to the supply of certain food products considered to be strategic, thereby guaranteeing the group's internal needs, most specifically in the areas of dairy products, beef and fish. The Group seek to choose local suppliers. In Portugal 84% of the products sold were sourced from local suppliers in 2015. In Poland this ratio stood at 93%. Regarding fish, JM maintained a direct relationship with Portuguese vessels, in particular through a partnership with a cooperative of fishermen in the area of Sesimbra. For Jerónimo Martins the issue of organic farmed fish will be addressed later on. The current need is the supply of fish, independently from its organic or conventional characteristics, as fish is essential in the Portuguese diet. This is why the company has started to invest in fish farming companies (one company breeding seabass in Madeira and another one farming seabass in Sinisa) and is looking for other aquaculture possibilities in the Mediterranean or somewhere else.
- For operators who supply the foodservice sector and generally list three organic species (salmon, seabass, seabream), the origin is still the first purchasing criterion, especially for aquaculture products (for salmon: Ireland and Scotland rather than Norway, which is considered as a mass producer; likewise for seabass/seabream : Greece and Croatia rather than Turkey).
- For a retailer interviewed, one important challenge for the future of aquaculture is the use of animal meal in the diet of fish which are not used to eating 'animals'. For this retailer this is a big issue for animal welfare.

4.3 Market perspectives

- EU organic fish production has experienced a fast increasing trend for the major species in the last years: +24% for salmon, doubling for rainbow trout, tripling for seabass/seabream.

Table 37. EU organic aquaculture – Evolution of production 2012-2015 (tonnes)

	Salmon	Rainbow trout	Seabass/seabream	Source
2012	12 540	1 617	1 614	EAS
2015	15 400	5 400	3 400	EUMOFA

This production, which is mostly destined for the EU market, should continue to grow in the next years, but at a slower pace.

- Price is the key factor likely to limit demand for organic product in the countries or regions where organic fish is known and already accepted. But in many markets quite new for fresh fish (e.g. Poland), the demand for organic products is non-existent or extremely limited as marine fish is still a new product (especially salmon). It will take more time for these areas to request for certified products. To develop substantially,

organic fish must be seen there not as high-range product but as a new product, and as a result it must be at competitive prices to raise volumes and consequently make risks and margins decrease.

- As already mentioned, the attitude of organic consumers is not as clear towards fish as it is towards land products, which makes market perspectives more difficult to analyse. Consumers' questions are often more related to sustainability aspects than to organic farming conditions and the organic logo can be considered as less satisfactory than well-known ecolabels on this respect. The big challenge for organic is the differentiation from ecolabelled products.

- This skepticism about the relevance of organic fish due its overlap with several available concepts such as sustainable, biological, ecological, fair trade and environmental-friendly aquaculture is a major issue for the future.

- Consumers also show ambivalent impressions about the positioning of organic fish between wild fish and farmed fish.

And they can also be disturbed when they see side by side an organic fish and the same species as conventional, especially for species farmed extensively in ponds. Local consumers do not understand why among carps farmed extensively in rural protected areas some have the organic certification and others not. This is confirmed at the consumers' level in the Netherlands, where a survey carried out by Milieu Centraal and published in October 2016 shows that non-organic environmental labels (MSC, ASC) reach better scores than organic labels, in particular as regards people and work, findability, comprehensibility, testability, transparency⁵.

- Market reactions can be very different according to countries, species and distribution outlets.

The national reputation of organic labels has to be considered, as some of them are indispensable (BIOSUISSE for the Swiss market) or important (AB on the French market, NATURLAND on the German market) to penetrate a market.

- An increase in demand for organic salmon has been recorded lately, not only in some Member states (such as France) but also in Far East markets. But the conditions of this development are fragile. For instance, the positive development of the market in France could be affected by the results of analyses carried out by INC (National Consumption Institute) and published in December 2016 in the magazine "60 million consumers" (front page headline: "Red card for organic") and in the popular television programme Thalassa. The results show that organic salmon are more contaminated than conventional salmon as regards mercury, arsenic, PCB, dioxins, and pesticides. The survey links this result with the utilization of fish meals, made from fish which may come from polluted fishing areas (and while conventional diet is at 70-75% of vegetal origin, organic diet cannot exceed 60% vegetal and thus organic aquaculture has to use more fish meal than conventional farms). Such analyses can urge consumers to question the relevance of organic regulations.

- The response from retailers to organic and the market potential can also be very different within the same Member state. For instance in Portugal the medium-range large-scale retailer Pingo Doce does not offer any organic fish product, while high-range retailer El Corte Inglés appears more open to this kind of products.

- In some major carp-producing countries (in Central-Eastern Europe) producers have doubts about the interest of organic carp farming since they consider that their conventional carp is an ecological product, which could suffer from the development of certified organic carp (depreciation of the conventional product, currently considered as ecological due to farming conditions) and the subsequent confusion in the consumer's mind.

- The success in France of the organic seabream and seabass supplied by the Greek company Galaxidi ('dorade royale bio du Golfe de Corinthe') seems more linked to the reference to the origin (Gulf of

⁵ "Top ecolabels for sustainable food : results of ranking ecolabels and logos 2016" (in Dutch)

Corinth), which is perceived positively by the consumer, than to the organic state of the product. This should invite operators not to consider 'organic' as self-sufficient but to envisage the adding of other characteristics such as the origin.

- The interviews highlight that, even if there is a continuing increasing trend on organic fish, stakeholders are worried about the price premium which is likely to make organic products remain a niche market.

5 General conclusions and recommendations

5.1 Conclusions

- Organic aquaculture represents 4,7% of the total aquaculture production, for the six major species covered in this study. This proportion is slightly inferior to the share of organic agriculture in the total agriculture (total organic area made up 6,2% of total EU-28 utilised agricultural area in 2015).

- EU organic agriculture experienced a strong increase in recent years, at least for the major species: between 2012 and 2015 organic production increased by 24% for salmon, doubled for rainbow trout, and tripled for seabass/seabream. And positive developments are also observed for shellfish (mussels, oysters).

- In some member states, organic aquaculture has acquired a dominant position for some species, like salmon in Ireland, or mussel in Denmark and Ireland.

- The economic performance of EU organic aquaculture is far from being satisfactory everywhere.

Organic salmon provides good sales price premiums, which on average cover the extra costs generated by organic farming, in a context of positive development of international demand. Organic farming of seabass and seabream also allows producers to reach price premiums (around 2 EUR/kg), which however are lower than the additional costs occurred, in a context of limited market expansion. Organic trout farming leads to significant price premiums and extra margins, compared to conventional aquaculture; the demand is good, in particular from the smoking industry. Organic mussel farming, which developed more recently, is benefitting from a strong demand and can provide 20% price premiums. On the opposite, organic carp cannot cover its extra costs with equivalent sales price premiums and would suffer heavy losses without EFF subsidies.

- The part of the downstream margins (processing, trade and retail) is much bigger in the organic supply chain than in the conventional one. Smaller volumes (which means extra costs per unit), lower turnover rates (which mean higher losses and higher risks) explain this situation.

- Top-down strategies can lead to failure, as the example of organic carp in Germany shows.

Organic carp in Upper Lusatia (Saxony) has been supported by a triple development strategy (organic, PGI, biosphere reserve). But this strategy was not initiated by the farmers, it was a top-down initiative, launched by the administration of the UNESCO Biosphere reserve project which attracted the farmers through the subsidies available.

- One of the major economic issues for economic fish farming is the low scale of production and economies of scale are the most obvious way to reduce costs, not only at production level but also at logistics and distribution level. However economies of scale hard to achieve because of the difficulty of access to new farming sites and the limited expansion capacities of the market for some species. The extension of the range of species organically farmed is technically possible but has to face the lack of knowledge and timidity of the market (e.g. meagre).

- The certification is a development driver. Strongly established organic labels speed up the development of the market, like Biosuisse in Switzerland, Naturland in Germany or Soil Association in the UK.
- The big competitor to organic is sustainable. Large-scale retailers sometimes adopt a fish purchasing policy more sustainable-driven than organic-oriented, consumers are sceptical and confused in front of a variety of ecolabels and organic logos. And some stakeholders of the organic fish farming supply chain think that “sustainable” has a brighter future than “organic”.

5.2 Recommendations

These observations and conclusions lead to the following recommendations.

- foster a significant increase of the production of organically-farmed fish, which is the only way to achieve economies of scale and reduce production and distribution costs, and focus on a few major species, likely to meet large-scale retailers’ demands in terms of regularity of supply and price stability;
- to adopt, at the level of the European Commission, a clear position with regard to organic and sustainable;
- strengthen the credibility and readability of organic labels in front of ecolabels: no longer base the communication on organic aquaculture or the definition of organic aquaculture on negative terms (absence, refusal – absence of chemicals, refusal of certain technologies,) but describe it as a positive and dynamic move towards compliance to high-level principles of sustainability and animal welfare (in addition to food quality objectives); clarify and disseminate the specificity of organic labels;
- make sure that organic fish farmers and regulatory authorities in MS have optimal access to information on EU regulations and funds eligibility, so as to avoid that lack of knowledge hampers potential growth;
- inform fish farmers on real costs of organic production, especially certification costs, which are perceived as higher than they really are;
- envisage means to increase retailers’ and consumers’ knowledge of new aquaculture species with high potential (e.g. meagre);
- strengthen the collection, processing and dissemination of statistics on organic aquaculture production; extend and deepen the knowledge of the sector (through species profiles, MS-wide supply chain analyses);
- develop cooperation with stakeholders’ associations (FEAP, EMPA, EAS, national associations) as well as with organic bodies (FiBL, Agence Bio) and promote exchanges of information.

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