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WHAT IS THE DEMAND FOR FARMED FISH ON THE EUROPEAN MARKETS?

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ABSTRACT

This paper analyses what are the potential outlets on European markets for _new_ farmed fish. In the first part, the main striking features about the structure and evolution of the European fish trade over the last decade are presented. The analysis of fish imports and exports provides comprehensive data to characterize the EU fish demand per commodity categories, per species groups, per country, and to estimate price trends for both wild and farmed fish imports. The second part is dedicated to an in-depth analysis of the fresh fish trade, as the main outlet for farmed fish. The evolution of the balance of trade for the main species groups showing a deficit (salmon, gadoid and other demersal fish species), completed by an analysis of the price segmentation of fish imports, highlights the substitution phenomena between farmed and wild fish which has occurred over the last decade, while providing an assessment of the fish demand for the different market segments. These results are used to analyse the potential outlets on European markets for new farmed species issued from an aquaculture diversification, taking into account the increasing competition from well-established and concentrated fish farming industries (salmon, sea bass and sea bream), as well as the more recent introduction of low-priced freshwater tropical fish (ex. pangasius). Particular attention is paid to the red drum (*Sciaenops ocellatus*), a tropical marine fish farmed in the French overseas territories. Future prospects for farmed fish diversification are also discussed as regards the main market trends and consumer expectations towards farmed fish.

Keywords: EU fish trade, market segmentation, fish farming diversification, consumer expectations

INTRODUCTION

The European Union is one of the main seafood markets worldwide and indeed one of the most lucrative. During the two past decades its increasing demand for fish, combined with decreasing domestic landings, have led to further growth of imports and trade deficit strengthening. Although this context is globally favourable to the market of aquaculture based products, European fish farming production has been faced in recent years with a dwindling output growth, due to a number of factors ranging from the supply to the demand side. The European production of farmed fish which relied on traditional activities of fresh water fish farming in ponds and trout farming during the 1960s and the 1970s, topped at around 200,000 tons. From the beginning of the 1980s, it soared with the development of large scale intensive farming. Initially, the fast development of Atlantic salmon farming substantially contributed to the increase of the total farmed fish output which reached 950,000 tons in 1990 (FAO data). Subsequently, the continuing rise in salmon production and the additional development of European seabass and gilthead seabream farming maintained a high growth level, leading to a total production estimated at 1.3 million tons in 2000 (FAO data). Since then, the European fish farming has continued to grow, albeit at a lower rate, and according to FAO data is levelling off at around 1.5 million tons, representing 5% of the world-wide production (2004-2005 figures). Finally, the European production of fish farming mainly relies on salmonid species (72% in volume versus 17% for freshwater fish and 11% for marine fish according in 2005), compared with the world fish aquaculture which is focused on freshwater fish species (86%). Latest developments in farming diversification in Europe mostly concern marine fish, but these new productions of farmed fish are low to establish themselves in the market¹ and hitherto only target specialised markets. With this in mind, the main issue that is addressed in this paper is related to the evolution of the conditions of competitiveness in EU fish markets for the European aquaculture sector. Particular attention should be paid to market related issues, emphasized in the Commission strategic plan

about the sustainable development of European aquaculture, which recommended that the market should be the driving force of aquaculture development in order that “production and demand would be finely balanced and would not encourage any production in excess”².

This article presents the main results of a study dedicated to the analysis of the European trade of fish over the period 1996-2006 in order to accurately characterize the needs of fish on European markets. This study was carried out in the framework of a research project dealing with the feasibility assessment of the development of tropical fish farming in French overseas territories. The analysis covers the EU15 countries imports and exports (which represent more than 90% of the EU25 trade), using data from the Eurostat database COMEXT which monitors the trade flows in volume and value (net weight) for each member state³. The overall approach of the fish intra and extra-UE trade provides first insights into the structure, evolution and geographic breakdown of fish demand within the European markets. The approach is then focused on the fresh fish trade, with the aim of highlighting the market segmentation. Main findings are finally analysed in the context of market trends and consumer expectations towards farmed fish, with a view of assessing the expected positioning and constraints for the emerging farming industry of marine tropical fish in the French overseas territories.

STRUCTURE AND EVOLUTION OF THE EUROPEAN FISH TRADE

The development of fish imports and exports during the 1996-2006 period (for final consumption, processing industry or trading) resulted in the increase of the EU15 fish deficit from 1.2 to 2 million tons (net weight) and from 3.7 to 6.1 billion Euros (COMEXT Eurostat). This corresponds to an average yearly growth rate of +3% in volume and +6% and value.

The EU15 market is a net importer of fish for all types of resources⁴, except for small pelagic fish credited with a positive trade balance of around 400,000 tons on average. Marine resources from fisheries always represent the main demand for supplying the European markets, with gadoids species ranking first (around 900,000 tons of net imports), although showing a slightly downward trend (-1%/year), ahead of tuna and other demersal fish species (a 390,000 and 330,000 tons deficit in 2006). On the other hand, the contribution of farmed fish to offset the wild fish shortage has been increasing over the last decade. As for salmonids, the deficit of which has regularly grown from 240,000 up to 400,000 tons, reaching 22% of the fish deficit in value in 2006 (versus 42% for gadoids, 15% for other demersal fish, 14% for tuna).

In terms of product categories, the breakdown of the EU15 fish deficit shows the prevalence of the demand for fish fillets, which mainly corresponds to a commodity market (frozen fillets and meat) dedicated to the processing industry. The fish fillet deficit which amounted to 563,000 tons in 1996 worsened to one million tons in 2006 (+5%/year), equivalent to over two million tons on a live weight basis. The EU balance of trade also shows a deficit in fresh whole fish which increased from 400,000 to 500,000 tons between 1996 and 2006 (+3%/year), and is characterised by a growing reliance on salmon. Main outlets for fresh whole fish imports are fresh retailing or catering, plus the smoking industry as regards salmon. European markets are also buyers of already processed products, such as cured fish (albeit with a downward trend), and above all canned fish, the deficit of which doubled during the last decade, up to 540,000 tons in 2006. The latter deficit partly results from the outsourcing of the European tuna canning industry in developing countries. Conversely, the EU15 market is a net exporter of frozen whole fish in volume (small pelagic fish, tuna...), fluctuating between 200,000 and 600,000 tons. In terms of value, the EU fish balance trade shows a deficit for all the categories of fish products, including frozen whole fish. The structure of the deficit has been significantly modified during the past decade. On the one hand, the share of the deficit related to first-processed products (fish fillets) rose substantially, from 31% to 42% in value. On the other hand, the share of the fresh whole fish in the overall deficit decreased from 28% to 19%, while the share of secondary-processed fish (cured and canned) held steady.

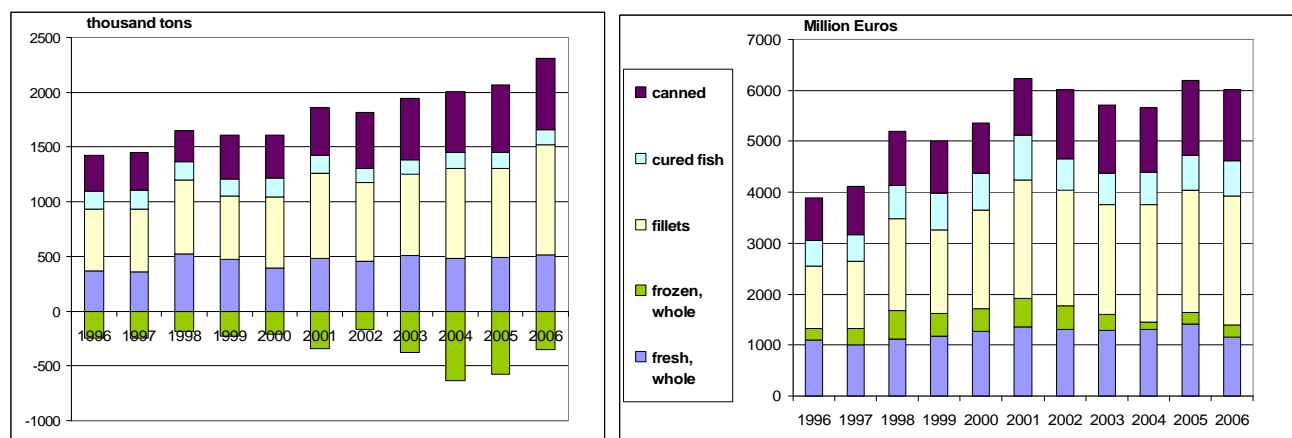


Figure 1. Structure of the EU15 deficit of fish trade by category of products (COMEXT Eurostat data)

The evolution of the EU15 fish trade during the 1996-2006 period was characterized by a general upward trend in import price in nominal terms (+2.2% per year for all aggregated fish products), which finally resulted in almost steady prices in real terms. This global trend can be divided into a first stage of marked growth till 2002 (+4%/year), followed by a slight decline in 2003-2004 and then a recovery of the initial upward trend. Moreover, price trend analysis by type of product distinguishes high growth rate products, such as fresh fillets (+7%/year), frozen fillets (+4%), cured fish (id.) from middle growth rate products, such as fresh whole fish.

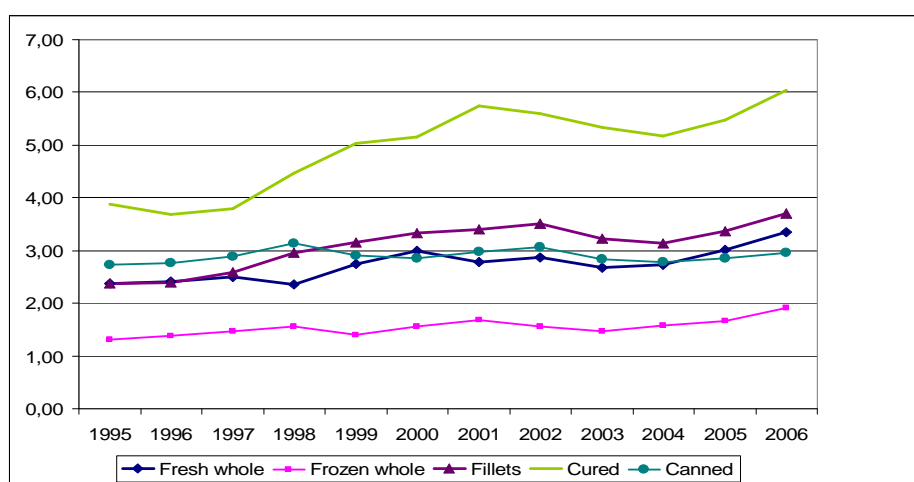


Figure 2. Import price indicators (Euro/kg net weight) per category of fish products (COMEXT Eurostat)

In absolute value, 2006 import price indicators ranged from around 2 Euros/kg for whole frozen fish (mainly small pelagic species) to 6 Euros/kg for cured fish (smoked, dried, salted fish). When focusing on the fresh and frozen fish markets, the price differential between the two types of commodities is apparent. Fresh fish imports target the upper market segment (3.3 euros/kg on average for imports of “whole” fish, around 2.4 euros/kg for filleted fish – after price conversion on a live weight basis) while imports of frozen fish which are mainly dedicated to seafood processors rely on low price species (less than 2 Euros/kg on average for frozen whole fish, 1.4 euros/kg equivalent for species used for frozen fillets, e.g. Alaskan Pollock).

To complete this overview of the EU15 fish trade, the regional dimension of fish demand is worth emphasising. Main consumption markets for fish are basically located in the biggest countries in population terms, i.e. Germany, France, Italy, the UK and Spain. However their respective needs for imports turn out to be rather different, according to their levels of fish consumption per capita, self-supply rates, consumer habits and preferences as regards fish products and species...In value, the Italian fish trade deficit ranks first (1,895 million Euro in 2006), ahead of the French (1,704 million), the German (1,381 million), the British (1,374 million) and the Spanish (1,023 million). In addition, the structure of fish imports indicates what the main attributes of fish demand are in the different countries. It especially highlights the higher level of demand for fresh fish in Spain, Italy and France, compared with the German or British fish imports which are dominated by first and secondary-processed fish (frozen fillets, canned fish). Intermediate net importers, such as Portugal and Belgium (respectively 585 and 363 million Euro deficits), also appear to be less dependant on fresh fish imports (Portugal for instance favours both frozen whole fish and salted fish). On the other hand, net exporters of fish (Denmark, the Netherlands, Ireland and Greece) play a significant role in supplying the EU market thanks to their producing, processing and trading activities. As far as EU25 is concerned, Poland should be identified as the main additional EU player on the fish trade board, with imports of fresh fish mainly comprising of salmon for processing and re-exporting.

FOCUS ON THE EUROPEAN FRESH FISH DEMAND

Fresh fish trade which represents the most remunerative outlet for farmed marine fish mainly operates at a regional scale. EU15 countries imports are required for completing the domestic fresh fish landings where they are too low or do not correspond to consumer demand in terms of species, price, products...The main sources of supplying are located in Northern European countries (intra-EU trade or with EFTA countries), while the biggest consumption markets are located in the Southern EU countries, thereby trade flows are mainly orientated from North to South. The development of Mediterranean seabass and seabream aquaculture has also generated South-South trade flows, but to a lesser extent.

Supplying trends by type of resources (and regional preferences)

In a first approach the analysis of the EU fresh fish demand is focused on “whole” fish, as the prevalent form in which fresh fish is traded, and even more if considering valuable species, such as marine fish produced in aquaculture. The EU deficit of fresh whole fish relies on three main types of resources (salmon, gadoids and other demersal fish) which have evolved differently in terms of availability in the past.

As concerns the supplying in fresh whole gadoids, the slowing down of the EU15 trade is apparent and has led to the decline of net imports, from 170,000 tons in 1996 to 120,000 tons in 2006 (-4%/year). The decrease in gadoid imports has mainly resulted from the fall in cod and saithe landings in North-East Atlantic. Main sources of import diversification over the period have relied on hake imports, with increasing purchases of Cape hake and Austral hake from South Africa, Namibia and Chile. The lower prices of these hake species, compared to European hake, have favoured the shift of imports, in spite of higher transport costs. Finally, the volume share of cod in the deficit decreased from 39% to 23% between 1996 and 2006, while the volume share of hake rose substantially (from 23% to 47%).

Conversely, fresh whole salmon trade registered very positive trends in the past 10 years (+6%/year for imports, +7%/year for exports). The EU15 trade deficit which accounted for around 150,000 tons in 1996 increased to 230,000 tons in 2006 (+4%/year). EU15 imports of fresh whole salmon mainly come from Norway, directly, or pass through Sweden and Denmark. On the other hand, the market share of EU salmon producers and exporters (the UK, Ireland), in supplying European markets has been declining.

Imports of fresh whole salmon are dedicated to both final fresh fish consumption and to the processing industry (mainly smoking). France is by far the main net importer of fresh whole salmon in Europe, concentrating 37% of the EU15 deficit in volume in 2006. Other main players are Denmark (22%), Spain (12%) and Germany (9%).

The balance of trade for “other demersal” fish species also shows a deficit, which fluctuated at around 110,000 tons, and slightly declined at the end of the 1996-2006 period (90,000 tons in 2006). The development of the seabass and seabream farming production in Mediterranean countries could have helped to reduce the EU deficit on this market segment. The two species contribution to “other demersal” fish imports markedly increased from 7% to 23% in volume (as concerns exports, the market share grew from 9% to 27%). Moreover, the other main species groups in this category are mostly traded between EU countries, such as sole, halibut and other flatfish, monkfish, redfish, and a significant share of non identified fish.

In a second approach the analysis of the fresh fish deficit is extended in order to include the trade of fresh fish fillets, which expanded in the past decade. Converted into live weight equivalent (lwe), the EU15 trade deficit of fresh fish (whole and fillets) rose from 450,000 tons in 1996 up to 710,000 tons in 2006, and at the same time has increasingly relied on fish fillets (approx. 28% in equivalent live weight in 2006 versus 10% in 1996). As salmon is fewer traded in fillet form than other categories of fish, its contribution to the supplying of the EU15 market in fresh fish is a little reduced, compared to its market share on the fresh whole fish trade.

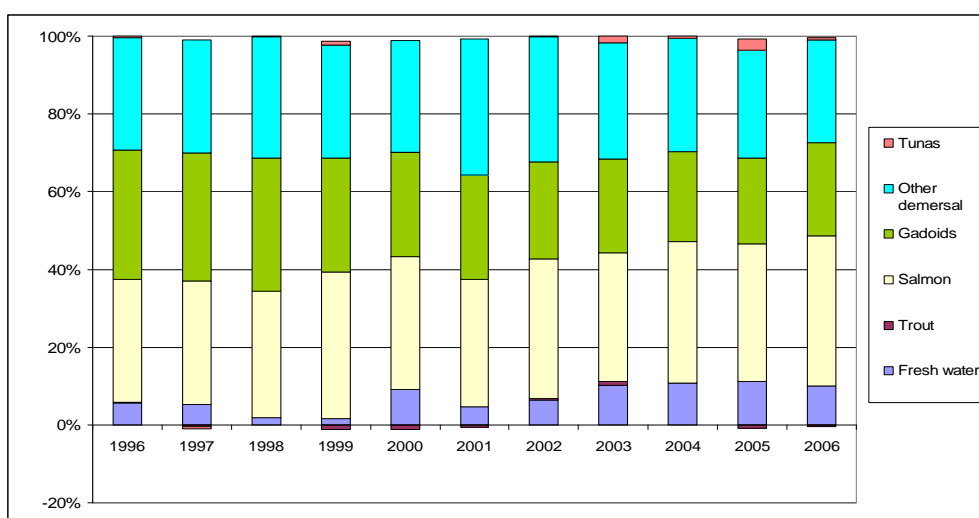


Figure 3. Structure of the EU15 trade deficit for fresh fish (except small pelagics) by main category of resources (estimations in lwe, from COMEXT Eurostat data)

Notwithstanding, the increasing role of salmon in trade and conversely the declining role of white fish species like gadoids is apparent. With respect to the fresh fish deficit (except small pelagics), salmon share in volume rose from 32% in 1996 up to 39% in 2006. On the other hand, the volume share of gadoids fell from 33% to 24%. These opposite trends highlight the move of the EU market supplying towards aquaculture products. Another interesting fact to be pointed out is the emergence of freshwater fish in the deficit, which reached a 10% market share in 2006.

Trade analysis per country clearly emphasizes national preferences in terms of fresh fish demand. Firstly, the differences in the way fish are supplied are worth mentioning. The demand for first processed

products (fresh fillets) is already dominant in Germany (62% of its volume deficit in 2006), represents nearly half in Italy (49%), but is still surpassed by the demand for whole fish in Spain (only a 15% volume share for fillets), the UK (33%), France (36%). Secondly, the breakdown of the deficit of fresh fish by category of resources varies according to the countries. The French deficit turns out to be very dependant on salmon (43% in volume in 2006), then on gadoids (22%) and other demersal fish (19%). Comparatively, the Italian deficit appears to be strongly reliant on the “other demersal” fish category (59% of the deficit) while the British demand for fresh fish mainly relies on gadoid species (57% of the deficit). The profile of the Spanish market is also characterised by a marked preference for gadoid species (39% of the deficit, mainly hake), followed by “other demersal” fish (29%) and salmon (19%).

Beyond regional and cultural specificities, the evolutions of the past decade as regards the EU15 supplying in fresh fish are in keeping with general consumption trends on European markets. Fast growing demand for chilled processed products has provided increasing outlets for salmon (e.g. smoked salmon). As concerns the demand for fresh fish, consumer preferences tend towards fillets against whole fish and this has also driven the retail sector supplying, which has offset the shortage in fish to be filleted (e.g. gadoid species) by switching to more available and affordable resources, such as farmed salmon and also tropical fresh water fish. Finally, the downward trend in the whole fish consumption which is observed in most markets (albeit to a lesser extent in traditional markets such as in Spain and Italy), is likely to diminish the potential outlets for new valuable farmed fish.

Supplying price trends and segmentation of the fresh fish market

The development of the aquaculture fish trade on European markets has been favoured by the differential of price growth rates between farmed and wild fish. During the 1996-2006 period, indicators of import price showed an upward trend for fresh wild fish (+3%/year in nominal terms) while they remained steady for fresh farmed fish. Globally, these general trends are related to the supply changes which have occurred as regards the two types of resources.

A first case study is provided by taking a parallel between the depletion of wild cod supply (which led to a 9% average yearly growth rate of import price) and conversely the increasing availability of farmed salmon on European markets. Opposite trends in import prices for the two species (except at the end of the period where the two price series became aligned), could have favoured substitutability between cod and salmon, all the more because they present common profiles in terms of outlets. In this respect, the rise in salmon price in 2005 and 2006, which had very few repercussions on the level of import flows, confirms that a strong demand exists on European markets for middle range fresh fish, suitable for processing and well adapted to current distribution networks.

A second case study is reported from the development of the Mediterranean fish farming industry (seabass and seabream), which enabled the diversification of fish supply likely to meet the demand on fresh “whole” fish markets. The general downward trend of seabass and seabream import prices in the past decade has favoured the growth of their consumption, especially in countries where the demand for fresh whole fish remains high. If we bear in mind that the majority of wild fish positioned on the same market segment has registered opposite import price trends, this has led to further differentiate valuable species according to their origin (wild, farmed). The implementation of compulsory labelling of aquaculture products through regulation EC 2065/2001 as well as some valorisation strategies carried out by small scale fisheries sector⁵ are indeed other factors to be considered, but which are more difficult to assess in the frame of this study.

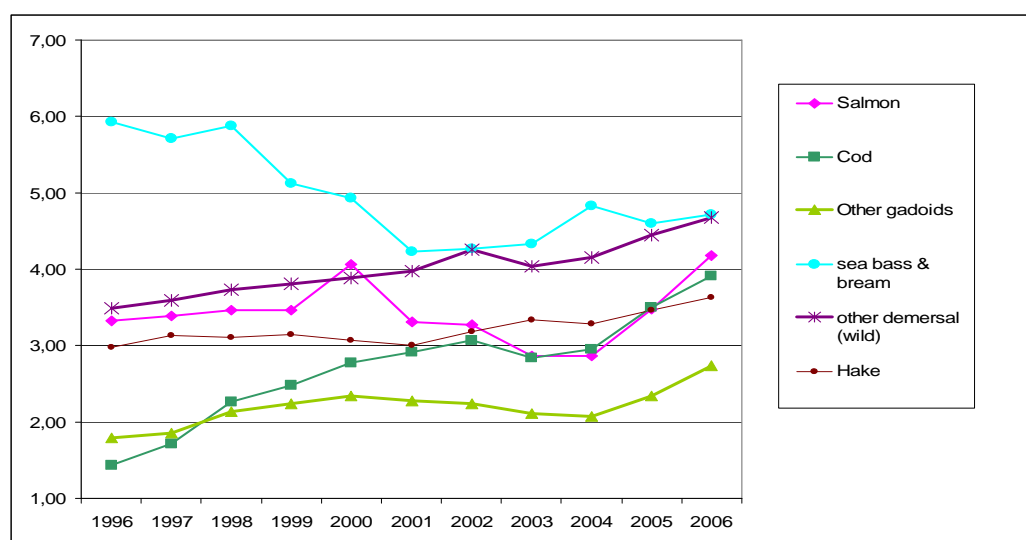


Figure 4. Evolution of average prices (Euro/kg) for EU15 imports of fresh whole fish for the main species or species groups (COMEXT Eurostat)

Beyond these two representative cases of European aquaculture development, the analysis of price segmentation of fresh whole fish trade provides an additional tool to specify the current need for fresh fish on the European markets. Three price classes have been defined in relation to the main outlets in order to characterize and assess the size of the different market segments. Low price species segment (import price inferior to 2.5 euros/kg) comprises small pelagics (sardine, herring, mackerel...) and cheap white fish species to be filleted (mainly gadoids, e.g. saithe, haddock, ling, whiting and other demersal species, such as redfish, plaice...). Middle price species segment (2.5-4.5 Euros/kg) again is composed of white fish to be filleted or sold in whole form (cod, hake), of albacore, trout... and above all salmon which targets similar outlets, plus the processing industry for smoked salmon production and other chilled value-added products. High price species segment (superior to 4.5 Euros/kg) covers a broader variety of fish (a significant part of which belongs to an “unidentified” species group) mainly dedicated to supply specialised fresh whole fish markets. Actually, this latter category encompasses luxury wild fish such as sole, other expensive flatfish, monkfish, swordfish, as well as more affordable fish, notably farmed sea bass and sea bream, cardine, halibut, bluefin tuna...

The analysis of the trade data of fresh whole fish over the 1996-2006 period clearly shows that the bulk of the EU15 demand relies on low price and middle price species, used for filleting or further processing, while the demand for high price species for supplying fresh whole fish markets is more limited. The upper segment represented around 14% of the total fresh whole fish imports on average 2005-2006, but only 5% if considering net imports (deficit), which amounted to around 27,000 ton at the European level (versus 360,000 tons of middle price species and 120,000 tons of low price fish). Main outlets for valuable species are localized in the markets of Southern countries, whereas they only concern small markets in Northern countries with high purchasing power. Italy ranks first with a deficit of high value species estimated to reach 55,000 tons from average 2005-2006 data, followed by Spain (around 20,000 tons), Germany (9,000 tons), France and Belgium (5,000 tons each). On the other hand, the UK, Greece, the Netherlands, Denmark and Sweden are net exporters of fresh whole fish on the upper price segment.

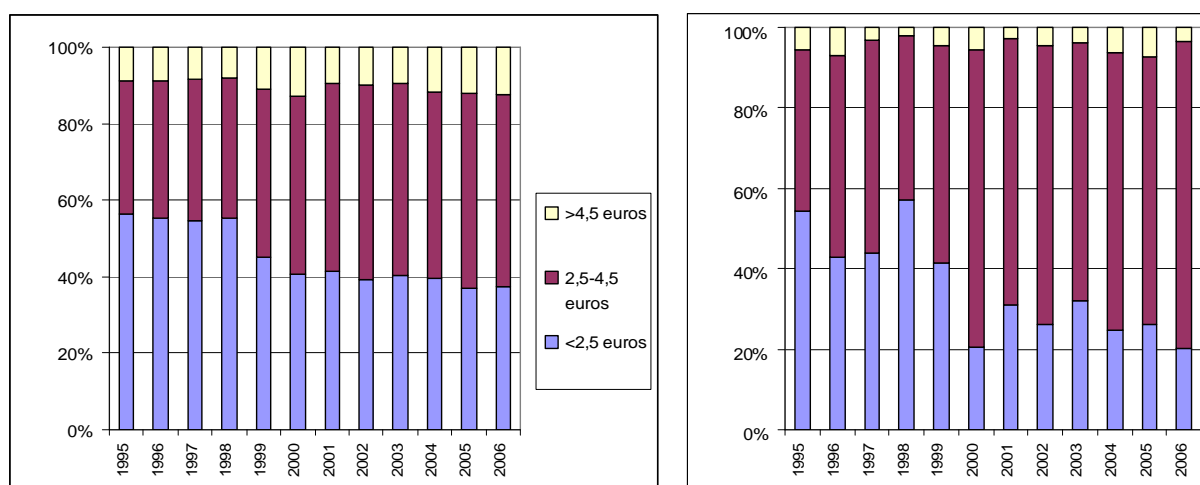


Figure 5. Breakdown of fresh whole fish imports (left) and fresh whole fish trade deficit (right) of the EU15 by price segment (from COMEXT Eurostat data)

Although these first elements to assess the level and the regional breakdown of the demand for valuable fish species on the EU15 market could have been completed by the analysis of the segmentation of the fresh fish fillet deficit, this would not have in fact changed the main conclusions as regards the price structure on European fresh fish markets. Actually the demand for fresh fillets is even more focused on cheap species than that of whole fish, and accordingly does not appear to be in a position to provide further significant outlets for new valuable farmed fish.

MAIN EVOLUTIONS FOR THE EUROPEAN AQUACULTURE SECTOR

A strong demand of European markets for cheap or middle price fresh fish is likely to curb the development of marine fish farming and its related process of species diversification. Natural comparative advantages provided by favourable rearing conditions and high availability in farming sites, and even technological advances are losing ground to more regulatory, marketing and economic issues: access to both rearing sites and distribution channels, and cost of feed, are today the key competitive factors.

The increasing competition within the aquaculture industry

As concerns the lower price segment, the decrease in supply of cheap demersal marine fish for filleting has provided the opportune conditions for the growth of tropical freshwater fish imports on the EU15 markets. Net imports of freshwater fish (FWF) fillets which fluctuated at around 20,000-30,000 tons during the 1996-2002 period dramatically increased from 2003 to 2006. In 2006 they amounted to nearly 120,000 tons. At first stage the imports were mainly sourced from Africa (Tanzania, Uganda, Kenya), corresponding to the trade of the Nile Perch in fresh or frozen fillets, the price of which ranged from 4 euros/kg to 4.5 euros/kg according to the origin in 2006⁶. More recently, from 2003, the EU 15 imports of freshwater fish fillets from Vietnam (pangasius, mainly in frozen form) have soared, and accounted for 54% of the total FWF fillet extra-UE15 imports in 2006. The introduction of pangasius in European fish markets, as a consequence of North American anti-dumping measures, marks a further step as regards fish farming competitiveness. Pangasius fillets which are mostly imported in frozen form are positioned approx. at the same price level as Alaskan Pollock fillets (2.4 euros/kg in 2006 versus 2.1 euros/kg), so definitely out of the range for marine farmed fish. Main European markets for pangasius fillets are within EU15, Spain and the Netherlands (partly for re-exporting), and out of EU15, Russia and Poland⁷. It is too early at this time to predict whether pangasius farming could constitute a real threat to marine fish farming diversification or not. The answer will depend on the future use of this product as a substitute for

fresh fish fillets at wet counters (where pangasius fillets can be sold as defrosted products) or as a raw material for the processing industry. Moreover, the outcome will be influenced by the evolution of the perception of European consumers towards marine farmed fish and to what extent it could modify their preference and purchase criteria as concerns fish. In this respect, the capacity of Vietnamese farmers to meet the European demand for organic or eco-labelled fish could provide them with an extra-competitive advantage in the future. However, at least in the short term, it may be speculated that the main species pangasius is likely to compete with are cheap white fish from capture fisheries, or other farmed fresh water fish, such as tilapia, which have not significantly penetrated the European markets as yet.

As concerns the middle and upper price segments representing the main targets for marine fish farming diversification, the different dimensions of competitiveness should be clearly taken into account. The success of salmon farming has successively relied on the fast growth of production, frequent technology innovations and productivity gains which enabled a delivery of significant amounts of fish at decreasing prices both to the processing industry, retailing and catering sectors, in a context of declining white fish supply. The subsequent concentration of the salmon farming industry led to consolidate the market share of the main players. In some European countries, salmon has become an incontrovertible commodity for seafood customers and has reached a dominant position, strengthened by increasing vertical co-ordination along the supply chain (notably through contractual relationship between major retailers and farmers). Furthermore, the wide scope of salmon in terms of prices, ranging from standard to premium products (in relation to geographical origin, organic farming, label rouge and other quality labels), makes it a tough competitor for new farmed fish candidates on different market segments. The most recent development of seabass and seabream farming in Mediterranean countries has also contributed to providing the European markets with an extra-supply of fresh fish, albeit of higher commercial value and dedicated to more specialised markets (i.e. for fresh whole fish consumption). The Mediterranean marine fish farming industry has not been established for as long as the salmon industry, but is mature enough to have already experienced an overproduction crisis which resulted in depressed prices in 2001 and 2002, and was followed by a first phase of economic restructuring of the sector. The seabass and seabream aquaculture industry has become highly concentrated (as in Greece), more globalized, and recently has only experienced further development in Spain, in order to come closer to the end consumer, while less integrated sectors (such as Italian small producers) have suffered from highly competitive imports from Greece and Turkey (representing respectively 57% and 16% of EU15 imports in 2006). The leading market for fresh whole seabass and seabream in Europe is Italy, which accounted for 40% of the total EU15 imported volumes in 2006, followed by Spain (18%), France (12%), Portugal (11%) and the UK (7%). Future outlooks for further expansion appears to be limited⁸, as far as the size of the seabass and seabream market is mostly European and, moreover, concentrated in Southern countries, with first signs of saturation appearing on the leading Italian market and expected low potential of development in Northern and Eastern countries (but for the UK). Potential for differentiating and diversifying the production (large size fish, quality labelling, emerging farming of meagre) in order to face the increasing competition within the seabass and seabream industry, also turns out to be narrow, since they are expected to target even more specialized, even “niche” markets. On the other hand, it is worth mentioning that new competitor species for seabass are also likely to target the European market in the near future (such as Asian seabass).

Customers' expectations towards farmed fish

Through the retrospective analysis of the French market, some trends of the EU15 fish markets are highlighted. One of the striking changes that occurred in the distribution channels of fresh fish since the beginning of the 1990s was the increasing role played by large retailers and, conversely, the declining share of specialised fishmongers in the final sales to consumers. This has accelerated, on the one hand, the adaptation of distributors to new conditions in terms of fish availability, and on the other hand, the evolution of consumer behaviour and purchasing habits. In particular, the share of whole fish in the

consumer expenses of total fresh fish has continuously fallen, from 53% in 1990 to 27% in 2006⁹. At the same time, technological advances in processing, notably innovation processes for chilled value-added products have favoured the switch from fresh raw fish to further processed and convenient seafood. Farmed salmon has been the winner species on the French market, and till the mid 1990s has superseded cod as the leading fish for the consumption of both fresh and chilled products (smoked salmon). In 2005-2006 the volume market share of salmon on the fresh whole fish segment was 8.2% (versus for 5.5% for farmed trout, 6.5% for seabass and 9.7% for seabream either farmed or wild). It reached 23% as concerns the fresh fillet segment (versus 4% for seabass and seabream, 3% for trout) and 58% of the smoked, salted, dried fish segment.

Upward trends in retail price of fresh fish, and the increasing sensitivity of consumers to food prices in the recent years, are other factors to take into account with respect to fish farming diversification as far as they could have contributed to slow down the French consumption of fresh fish. Data provided by the TNS panel survey covering the French home consumption of seafood show that from 2001 to 2006 the household purchases of fresh fish in volume declined by a 3% yearly rate while retail prices rose by 3.7%/year in nominal terms (2% in real terms). At the same time, the purchases of chilled fish products, such as smoked fish (mainly salmon) and other chilled value-added products (including surimi based products) have registered significant yearly growth (respectively +3% and +9% in volume), favoured by downward trends in price.

The French retailers have fully supported the “salmon industry” model of development for fish farming as far as it has contributed to provide regular and mass supply of fish, to streamline the commercialisation, and has enabled contractual purchases to Norwegian farms via their central purchasing agencies. Contractual relationships not only enable retailers to reduce transaction costs and to secure purchases in volume and price, but also to exercise greater control over the rearing conditions and quality of inputs in order to set up and to promote their own retailer brand. Comparatively the main domestic fish farming industry (trout farming) is considered too scattered, and less reactive for meeting the retailer’s expectations, while the supply of farmed seabass and seabream is for the most part sourced from Greece and Turkey (most competitive products). Indeed, the fish purchasing strategies of other operators, such as the catering sector, are likely to provide alternative outlets for high commercial farmed fish, but the share of these outlets is much more limited.

Finally, the case study of the French market points out to the fact that large retailers have contributed to the globalisation and standardisation of aquaculture products by giving the advantages to controlled, organised and large scale fish farming operations. Even if the trends observed in other European fish markets are not totally similar, all evidence suggests that the access to fish distribution channel is a key factor to consider, in addition to price and convenience attributes, when assessing the feasibility of fish farming diversification.

The resulting positioning/constraints for emerging overseas territories fish farming industry

The involvement of the French aquaculture sector in tropical marine fish farming started till the mid-1980s in La Martinique (Caribbean island) with red drum (*Scianops ocellatus*) and later on was expanded to La Reunion and Mayotte (Indian Ocean islands) at the end of the 1990s. The different conditions of development of this new fish farming activity in the three regions have been accurately described in another presentation of the present conference (Mariojouis et al., 2008). Here the main purpose is just to emphasise that in spite of obvious natural comparative advantages (especially in Mayotte where fish farming potentialities are really high from the production point of view), and globally a quite good acceptability on local markets (albeit with still limited outlets), economic constraints are a stumbling block for further significant development of red drum on export markets. The aquaculture sector in

Mayotte appears to be the best positioned among the three regions to face competition on European markets, thanks to lowest production costs provided by smallest feed conversion ratio, lowest wages, economy of scales¹⁰...But these production costs are nearly doubled at export level due to the prohibitive cost of airfreight required to reach the European markets. This results in a final price for European importers of 6-6.5 Euro/kg (in whole form) which positions red drum on the upper segment of the fresh fish market, in competition with wild fish of high commercial value or premium farmed products. Finally, potential outlets for red drum turn out to be restricted to niche markets, within the specialised market of large size, valuable, whole fresh fish (mostly the Italian market).

As a matter of discussion, advantages from the production side are confronted with constraints from the marketing side. In terms of food security, feed conversion ratio (FCR) and filleting yield basically remain the key factors for fish farming diversification. In this respect, it is assumed that red drum could be potentially a candidate for fish farming diversification, with better performances of rearing and resulting lower production costs than the French seabass farming (in semi-industrial conditions of production). On the other hand, marketing and other economic aspects have been underestimated in the Research and Development process, such as the issue related to the notoriety of a new farmed fish species on the markets and the access to distribution channels (in particular access costs to reach export markets). Retrospectively, it is also apparent that more attention should have been paid to the general trends in the consumer demand for fresh fish in terms of price and convenience. Furthermore, the new consumer expectations which are emerging, in particular the increasing role played by environmental attributes (e.g. carbon balance), are likely to hamper the development of fish farming in the French overseas territories, at least for the part of the sector which is highly reliant on fresh fish exports.

CONCLUSION

As and when the situation of competition within the aquaculture sector is increasing, barriers to entry for new comers are raising. Fish farming diversification is becoming further more risky, and the expected profitability of the activity more and more dependant on non productive factors (such as marketing factors). In a context of seafood market globalisation, and retail market concentration, only major and integrated farming companies seem able to bear the costs of diversification, from farming to distribution operations.

The popularisation of farmed fish, as a result of more affordable, more regularly supplied and more convenient products than wild fish, in return could have had a depreciative effect on the aquaculture products image. Apart from luxury and well-know species, the demand of which could exceed the supply from fisheries (ex. sole, turbot...), the scope for marine species diversification on the upper market segment have become restricted. The situation of the seabass and seabream industry shows that to a certain extent over capacities have already been reached, since access costs to gain new markets are high or would require further cut in production costs. How to achieve this requirement is actually a main challenge for marine fish farming diversification in a context of increasing costs of feed and rising energy price.

The increasing sensitivity to environmental concerns from consumers is also a factor to be considered to broaden the analysis of competitive advantages in aquaculture. Main issues raised by NGOs and consumer associations have successively covered the use of antibiotics, the use of fish meal and fish oil in feed, farming pollution, escapees of farmed fish, airfreight... They resulted de facto in economic stakes for the overall fish farming supply chain, with the rising price of inputs, the strengthening of the regulation about water quality, the increasing pressure from consumers ... The issue raised by the transport of fresh seafood by air is also becoming acute for both economic and environmental reasons and

questions the sustainability of export-oriented farmed fish productions in remote regions, especially if targeting fresh fish markets.

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ENDNOTES

¹ As for instance Atlantic cod (around 8,000 tons in 2005), turbot (7,000 tons). Blue fin tuna is considered apart since it is a capture-based aquaculture activity, the output of which is mainly dedicated to export markets (Japan).

² COM(2002) 511 final - Communication from the Commission to the Council and the European Parliament

³ The import and export data of the 10 new member states following the EU enlargement of 2003 have only been included in the Eurostat database since this year.

⁴ The resource categories used in the study are based on the main FAO groups which have been slightly adapted to fit in with the market context. Salmonids (salmon, trout) have been identified apart from other fresh water and diadromous fish. Pelagic marine fish have been divided into tunas and small pelagics, while demersal marine fish distinguishes between gadoids and other demersal fish (including also non specified demersal fish species).

⁵ As for instance, the labelling process of seabass caught by French liners in order to further differentiate their product from that of trawlers or netters.

⁶ The differential of import price between fresh and frozen fillets is estimated to reach around 1 euro/kg for the Uganda origin (a little less for the Tanzania origin).

⁷ The breakdown of pangasius imports within the European market is not directly available through Eurostat data, since the species is only identifiable thanks to its country of origin, the latter being likely to be modified in case of re-exporting. Another source of data from Vietnamese exports confirms that the European market has become the main destination of pangasius, with some differences as regards the volume of fish exports.

⁸ According to the latest FAO Globefish reports dedicated to seabass and seabream market (May & September 2007)

⁹ Data come from the French TNS panel survey which monitors the purchases of households dedicated to home consumption. Purchases of fresh fish totalised 37% of the overall household expenses of fish in 2005 (versus 26% for chilled fish, 19% for frozen fish and 18% for canned). The other market for fish consumption, away from home (restaurants), represents around 30% of the French consumption of fish.

¹⁰ The French metropolitan company of seabass and seabream farming which diversified its activity to tropical marine aquaculture decided to localized its subsidiary farm in Mayotte on the basis of very favourable rearing conditions (large availability and access to sea farming sites) and lowest cost of manpower provided by the particular status of this Comoro island which is not yet a French overseas department. The production level of this farm in Mayotte remains currently below 200 tons (semi-industrial), for lack of further outlets on European markets.