The Mussel Value Chain (France)
SUCCESS project - WP4 - Task4.1. Description of value chains for fishery and aquaculture products in the EU- “Mussel case study”

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Abstract

This working document starts with an overview on the French mussel market through the analysis of the global trends in supply (production, import/exports) and demand. On the demand side, a particular attention is paid to the main features of fresh mussel consumption, at home and out of home. The second part is dedicated to the description of the French value chain, focusing on the fresh, live mussel market which represents the major outlets for the French production. For the drawing up of the value-chain map, 4 stages are identified: 1) the domestic production and import sectors, 2) the supply grouping through shellfish trading companies, 3) the wholesale market and 4) the retail and the catering sectors. Their description is completed by first insights into the “price transmission” along the value chain. The document concludes with some issues at stakes for the co-ordination of the French mussel value-chain, especially as regard the development of quality/labelling approaches and product innovation.

Context of the study and main source of data

<u>Context</u>: The description of the Mussel value chain in France was carried out in the framework of the SUCCESS project, co-funded by the European Commission within the Horizon 2020 programme. The work-package 4 was dedicated to the analysis of seafood value-chains for fisheries and aquaculture case-studies, including the “mussel case-study”. The first version of this deliverable was prepared in 2016 (data processing and interviews with actors of the value-chain) and finalized in November 2016 to meet the SUCCESS WP4 agenda. It was slightly updated in 2020 to include 2014 production data (not available at the moment of the study) for the description of the value-chain.

<u>Source of data</u>: The overview of the French mussel market relied on available data series including, on the supply side, FAO production data (aquaculture and capture fisheries) and EUROSTAT COMEXT data for the period 2001-2013. They are secondary sources documented by national statistics as primary sources, namely the French aquaculture survey (DPMA/BSPA) and import/export data from French customs. On the demand side, the main quantitative data came from the consumer panel survey Kantar Worldpanel and were provided by FranceAgriMer in the framework of the SUCCESS project for the period 2005-2014. The second part of the document, dedicated to the description of the value-chain, required seeking further information on the economic actors at the different stages, notably the intermediaries. It benefited from the contribution of an engineer internship of 6 months recruited for this purpose. During this short period, about 20 interviews were conducted with different actors, mainly focusing on the stage of supply grouping, but also the wholesale in general (traditional or central buying offices).

1. Global trends in supply and demand on the French mussel market

The analysis of the value chain starts with an overview of the French mussel market through the analysis of production and import-export data series on the supply side, and on quantitative and qualitative results from consumer panel surveys and other qualitative studies on the demand side.

1.1. Global evolution of the French mussel markets

Over the period 2001-2013, the supply of mussels on the French market registered a slight upward trend until 2010, followed by a decrease from 2010 to 2013 (Table 1). This general evolution mostly resulted from the fresh, live market segment, supplied mainly by domestic production (**95% from aquaculture**), the stagnation of which was not balanced by an increase of net imports[1] of fresh, live mussels. On the other hand, the net imports of canned mussels continued to grow till 2011, and just began to decrease at the end of the period.

Table 1. Evolution of the global mussel supply: French Production (sales from aquaculture and fisheries) and net imports (Import – Exports) of mussels (Net weight in Tons)

	French mussel production	Net imports of fresh mussels	Total Fresh mussel supply	Net imports of frozen mussels	Net imports of canned mussels	Total mussel supply
2001	81 839	41617	123 456	2621	8804	134 881
2002	73 001	32173	105 174	2376	8419	115 969
2003	66 050	39816	105 866	2611	8842	117 319
2004	69 227	42286	111 513	3357	10316	125 186
2005	76 291	40858	117 149	2965	11351	131 465
2006	78 724	41370	120 094	2908	11027	134 029
2007	76 032	35959	111 991	3530	13942	129 463
2008	81 697	29933	111 630	2296	15393	129 319
2009	79 235	35626	114 861	2029	13316	130 206
2010	77 960	41661	119 621	2089	14589	136 299
2011	78 827	37118	115 944	3160	15923	135 027
2012	79 421	34799	114 220	2846	14122	131 188
2013	78 720	33981	112 701	2467	12265	127 433
% yearly evolution 2010/ 2001	**0,9%**	**-0,7%**	**0,4%**	**-2,2%**	**7,2%**	**0,9%**
% yearly evolution 2013/ 2010	**0,4%**	**-6,5%**	**-1,9%**	**4,0%**	**-6,2%**	**-2,3%**
% yearly evolution 2013/ 2001	**0,8%**	**-1,0%**	**0,2%**	**-0,6%**	**4,9%**	**0,6%**

Sources: FAO aquaculture and fisheries production data, COMEXT Eurostat data

Remark: It should be mentioned that, until 2013, national production data for mussel farming, based on sales for final consumption, were overestimated because they included mussel imports by French producers for trade (in particular Mediterranean mussels). The gap could be evaluated thanks to more detailed information provided by the two national census of shellfish farming carried out in 2001 and 2012 (Agreste/CASD). The comparison between the total sales and production by French

[1] Net imports are very similar to imports as export markets represent a marginal outlet for the French mussel production

enterprises showed a difference amounting to 16,000 tons in 2001 and 17,000 tons in 2012 (including respectively 10,000 tons and 9,000 tons of imports by Mediterranean enterprises).

Imports of fresh, live mussels: between one half and two thirds (in volume) of French imports come from the Netherlands and Spain. The main striking evolutions during the period 2001-2013 are related to the progressive decline of imports from Ireland[2] and conversely the growth of Spanish imports. The increase of Italian imports in 2012-2013 is also noticeable (Figure 1).

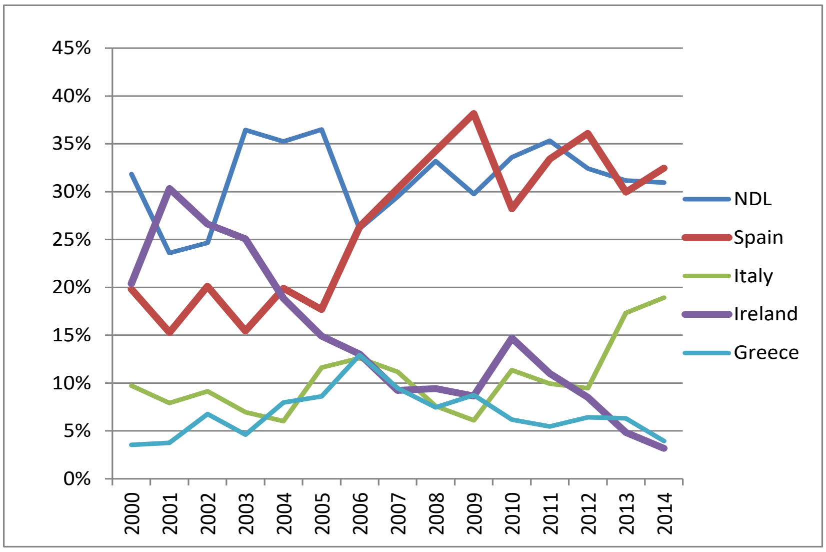

Figure 1. French imports of fresh mussels by main "provenance" (% of total imports in volume)

Imports of canned mussels: Since the beginning of the 2000s, the change in import breakdown has been outstanding. The development of imports from Chile evolved from a 2% market share in 2001 to about 70% in 2013 (Figure 2). Chile substituted to former suppliers led by Denmark, the Netherlands and Ireland.

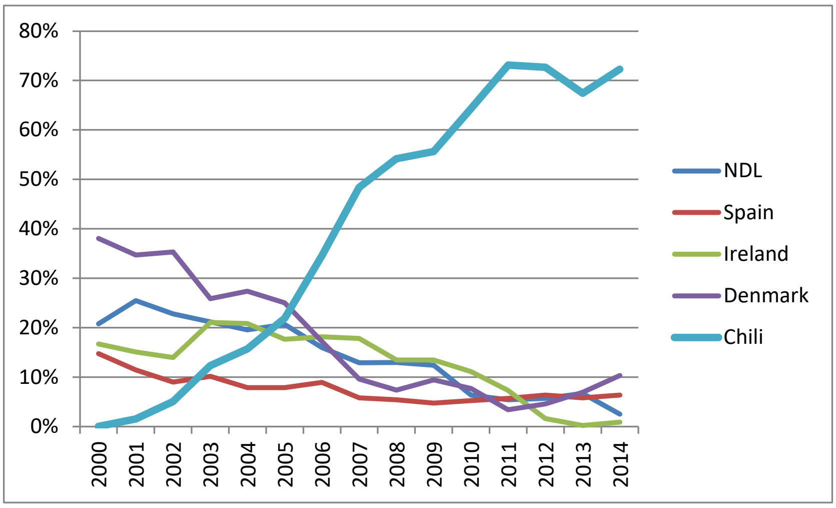

Figure 2. French imports of canned mussels by main "provenance" (% of total imports in volume)

[2] at least direct imports, as Irish mussels could have continued to supply the French market by passing through the Netherlands

The market of canned mussels, mainly depending on imports, will not be further included in the value-chain analysis as far as it concerns a separate market than fresh mussels and does not involve French producers and French processors (or very few).

1.2. Evolution of the apparent consumption of mussels in France

Mussel is mainly purchased and consumed as a fresh, live product in France even if the market for canned mussels (mainly imported) is not negligible. On the other hand, the imports of frozen mussels remain limited. By applying EUMOFA conversion ratios, the whole apparent consumption was estimated at 155,000 tons in live weight equivalent (LWE) in 2013, leading to a yearly consumption of mussels of 2.4 kg per capita in live weight, all product forms included (versus 1,9 kg in net weight). French apparent consumption of mussels in LWE fluctuated between 140,000 and 165,000 tons during the period 2001-2013, and the corresponding yearly consumption per capita varied from 2.4 to 2.6 kg.

As concerns fresh mussel, the indicator of apparent consumption reached 1.8 kg per capita in 2013, which represents a minimum level (as a result of a shortage of imports) for the whole period. However, because of low variability in yearly consumption (from 1.8 to 2 kg per capita), and existing fluctuations due to product availability, there is no clear evidence of demand slowdown for the fresh product.

1.3. The characteristics of fresh mussels consumption (quantitative panel data)

The market for mussels in France is dominated by the market of live, fresh products to be consumed at home and out of home. Main data to characterise the French mussel consumption comes from the KantarWordpanel survey (funded by FranceAgrimer) which details the household purchases of fresh mussels for at home consumption and their breakdown per socio-demographic criteria and purchasing places. However, due to the significant role played by away from home consumption as regards fresh mussels, we must keep in mind that findings coming from the analysis of consumer panel data are not fully representative of the whole consumption of fresh mussel in France.

1.3.1. <u>Main determining factors of consumption at home</u>

Mussel is considered as a popular fresh aquatic product in France. The share of French households who purchase fresh mussels was 35% in 2014, to be compared with a ratio of 42% for fresh salmon and 41% for fresh cod as the top 2 fresh fish products eaten at home (FranceAgriMer/Kantar World panel). The consumer panel survey provides comprehensive data for analysing the main determining factor of fresh mussel purchases for home consumption in France: socio-demographic and regional criteria, seasonality of retail purchases, market segmentation. It also contributes to highlight the main features and recent trends in fresh mussel consumption at home.

Regional criteria: Mussel purchaser profiles show a certain specialisation with respect to the region of residence. The highest volume consumption indexes (superior to 150 versus index 100 for national average) are registered in the North of France, the lowest in the Parisian Region and Eastern regions, while these consumption indexes are comprised between 110 and 125 in the West and South-East regions (2014 Kantar panel data). However, in absolute terms, the first region for mussel consumption at home is the West of France, one of the biggest regions defined by the consumer panel survey (Figure 4).

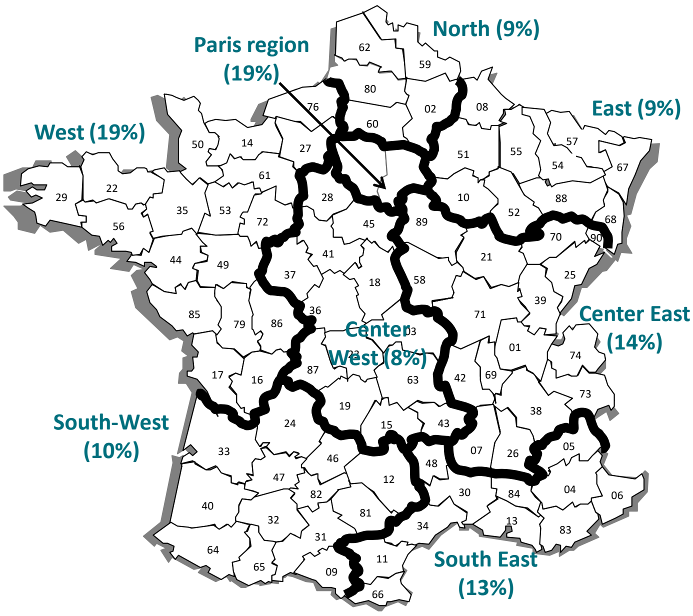

Figure 3. Breakdown of French households in 2014 (%) according to Kantar Regions (Map from FranceAgriMer annual reports on seafood consumption)

The region of residence not only impacts the level of mussel consumption at home but also its structure. For example, the household purchases in the region West are more dependent on bouchot mussels than the national average (77% against 52% in 2014). Other example: the share of Dutch mussels in the purchases made in the East and North regions is proportionally double that the national average (31% versus 14%).

Socio-demographic criteria: Fresh mussel appears to be an affordable product, if considering that purchaser profiles show few differences according to income classes (Figure 4). Comparatively, the purchasers of fresh fish in general present more marked economic profile, with the highest consumption indexes associated to the upper income class (and conversely lower level of consumption than average for the lower income classes).

Figure 4. Purchasing indexes (in volume) for fresh mussels and fresh fish according to income classes (FAM/Kantar Wordpanel 2014)

As regards demographics, the categories of purchasers over 50 years are over-consumer of fresh mussels (index near 150 for 50-64 year-old purchasers) while the youngest, in particular below 35 years, are small purchasers (index around 50). However this does not prejudge the level of consumption of the young households away from home, in restaurants.

In terms of purchasing places, fresh mussels are mainly bought in large multiple retailers[3], the market share of which continued to increase between 2005 and 2014 (from 75% to 81% in volume). Specialised retailers such as fishmongers, open-market stalls and (little) direct sales to consumers only represented 19% in volume of the total purchases for home consumption (23% in value).

In terms of buying habits, the purchases of packed live mussels under modified atmosphere (MAP) with extended deadline of 7 days have been soaring since the beginning of the 2000s. For the retail sector as a whole, the market share (volume) of packed mussels, which was 11% in 2003 (TNS SECODIP report), 20% in 2005, continued to grow up till 30% in 2008 and 43% in 2014 (FAM/ Kantar Worldpanel). If focussing on large retailers, as the quasi-exclusive retail outlet for this type of product, this volume market share amounted to around 50% in 2014.

Seasonality of at home consumption: The retail purchases of fresh mussels are seasonal, with the opening of the "French mussel season" starting with the "early" mussels (long-line mussels from Charente-Maritime) in April-May, followed by the first "bouchot" mussel harvest from Charente-Maritime in May-June. The bulk of mussel purchases occur during the July-November months (60% of yearly purchases). Conversely, the purchases of mussel from import origin are more developed at the beginning of the year, corresponding to the end of the harvest of the French mussel productions, which confirms the complementary role played by imports for supplying the market for at home consumption (Figure 5). **Globally, the volume share of French mussels on the retail market represented 72% on average in 2012-2014 according to consumer panel data, which is a little higher than the estimation resulting from the apparent consumption (68%).** By deduction, this indicates that the reliance on imports for supplying the catering sector is higher than for the retailing sector.

[3] The aggregate "Large general retailers" of the Kantar panel survey includes hypermarkets, supermarkets, "*superette*" (mini-markets) and hard-discounters. The aggregate "specialised retailers" includes fishmongers, open-market stalls and other specific circuits like direct sales.

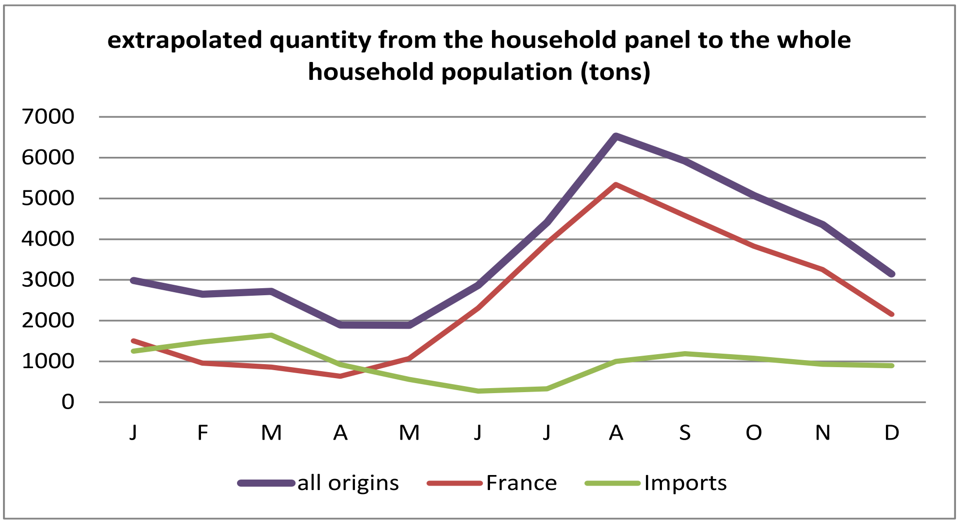

Figure 5. Seasonality of the purchases of fresh mussels for at home consumption (Kantar consumer panel surveys for FranceAgrimer; average 2012-2014)

1.3.2. Main criteria of segmentation of the French retail market of fresh mussels

Further details of Kantar panel as regards the species, geographical origin and cultivation technique of mussels also provide valuable information on the characteristics of the market (Figure 6). However, these data should be considered with appropriate precautions, bearing in mind the potential reporting bias for disaggregated product items in relation to the level of information delivered to consumers (especially for purchases in bulk) and consumer knowledge about the product.

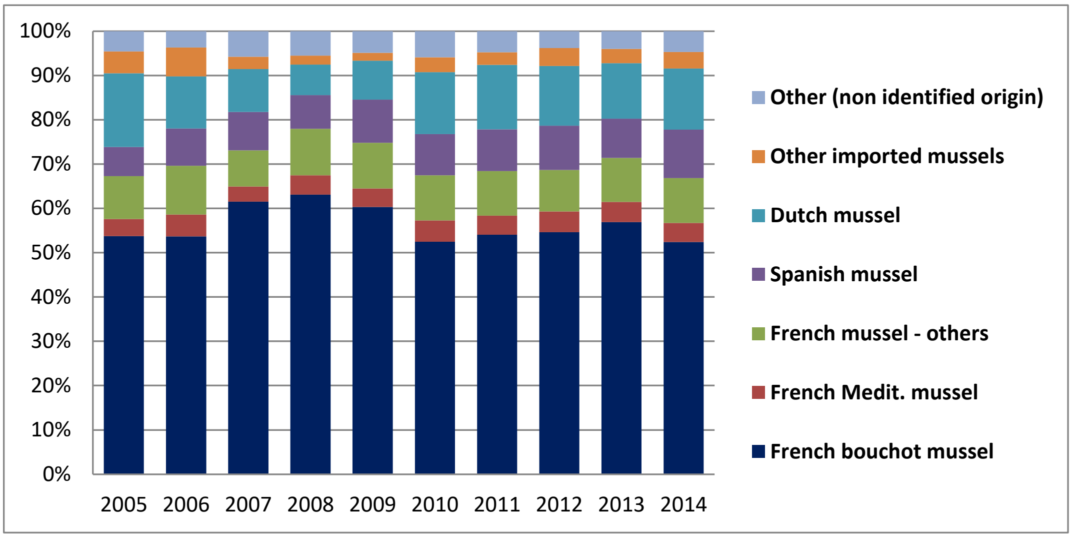

Figure 6. Breakdown of the fresh mussel purchases by geographical origin/cultivation technique (Kantar consumer panel surveys for FranceAgriMer)

At a national scale, the retail market is largely dominated blue mussels (80-85% in volume), in particular mussels sold under the "bouchot" designation (50-60%), which is protected by the

European label TSG since 2013[4]. The remaining market share (15-20%) concerns the Mediterranean mussels, either from Spain and France, or other origins not specified by the Kantar product nomenclature.

The market for Mytilus *galloprovincialis* is more specific as far as the Mediterranean mussel is mostly purchased in the South of France: 55% in volume in the South-East region; nearly 80% in volume for the aggregated South-East, Centre-East and South West regions.

Finally, the segmentation of the fresh mussel market appears to rely first on the species, based on different consumer preferences and habits according to the French regions. Other factors of differentiation combine the country of origin with the cultivation mode, the "bouchot" mussel being the most valued product on the French retail market.

The evolution of retail prices (all distribution circuits) by mussel category (Figure 7) shows that price differentiation was consolidated from 2005 to 2014 with a growing gap between the "bouchot" mussel at the top of the range (3.7-4 €/kg in 2013-2014) and the mussel from Dutch origin at the bottom (2.6 €/kg). The price positioning of Mediterranean mussels (either French or Spanish) is in between and just slightly behind the price of other French mussels (i.e. long-lines farmed mussels).

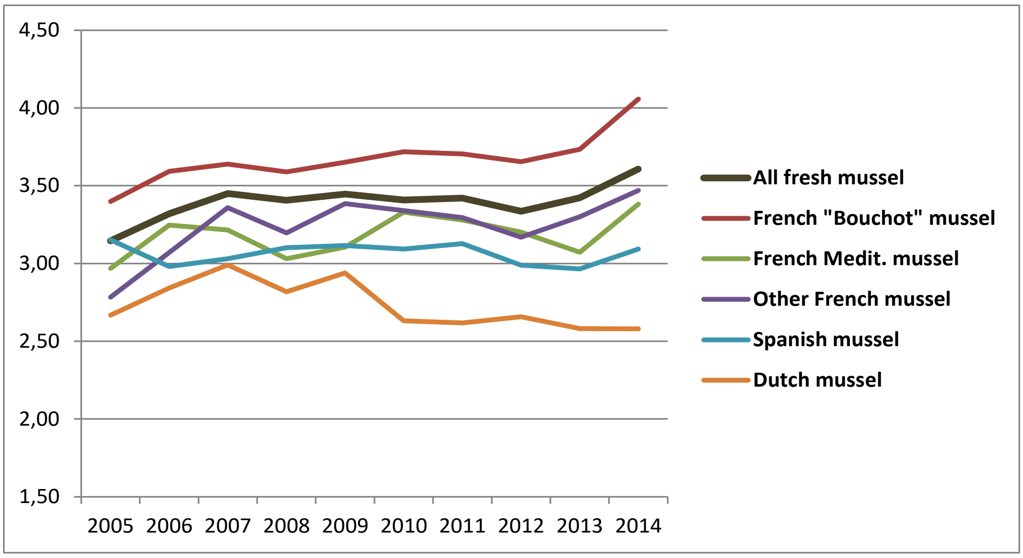

Figure 7. Evolution of fresh mussel retail prices (€/kg) according to the geographical origin/cultivation technique (KantarWordpanel for FranceAgrimer)

1.3.3. Some quantitative data about out of home consumption

Panel surveys monitoring the seafood purchases by the ho.Re.Ca sector (including different types of restaurant) provide quantitative data on away from home consumption. However, due to the low coverage rate of this type of panel as concern fresh seafood, their results are difficult to use in absolute volume and value even if they may provide indicators for the purchasing price of mussels by restaurants.

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[4] The TSG (Traditional Speciality Guarantee) highlights traditional character, either in the composition or means of production

On the other hand, more in depth panel surveys about the out of home consumption of seafood products were conducted beforehand by GIRA (2009 data) and by the CREDOC (2010 data). By cross-checking the data of these two comprehensive surveys with other sources of data, we estimated the weight of away from home consumption at 45%-50% of the whole fresh mussel consumption in volume. This result shows that the consumption at restaurants and other away from home consumption places represents a significant share of the whole consumption of fresh mussels in France (higher than for aquatic products in general).

2. Elements of description and analysis of the French value chain of fresh mussels

The description of the French value chain focuses on the fresh, live mussel market, which represents the major outlets for the French production and involves different players from producers to retailers or restaurants, through shellfish trading companies. The French processing industry is almost absent of the value chain as regards fresh, live mussels (the packaging of live mussels by trading companies does not correspond to a processing activity).

The description of the French Mussel V.C. relies on both quantitative data and qualitative data:

- Most quantitative data (in volume and value) concern the two ends of the value-chain, on the supply and demand sides, while the information related to intermediaries is not easily available.
- As far as possible, the reference year for quantitative data is 2014, except for data collected during interviews in 2016 (data provided for the year 2015 or 2016). Since 2014, aquaculture production data (source DPMA/SSP) have been corrected from imports, and hence are more in line with the reality of the mussel production sector.
- Qualitative data come from literature review (including professional press) and information provided during interviews with different actors of the Mussel value chain.

2.1. Value chain map and brief description at the different stage

For the drawing up of the value-chain map, 4 stages were identified (Figure 8):

1) The domestic production and importation sectors
2) The supply grouping through shellfish trading companies
3) The wholesale market
4) The retail and the catering sectors (approximately home and out of home consumption)

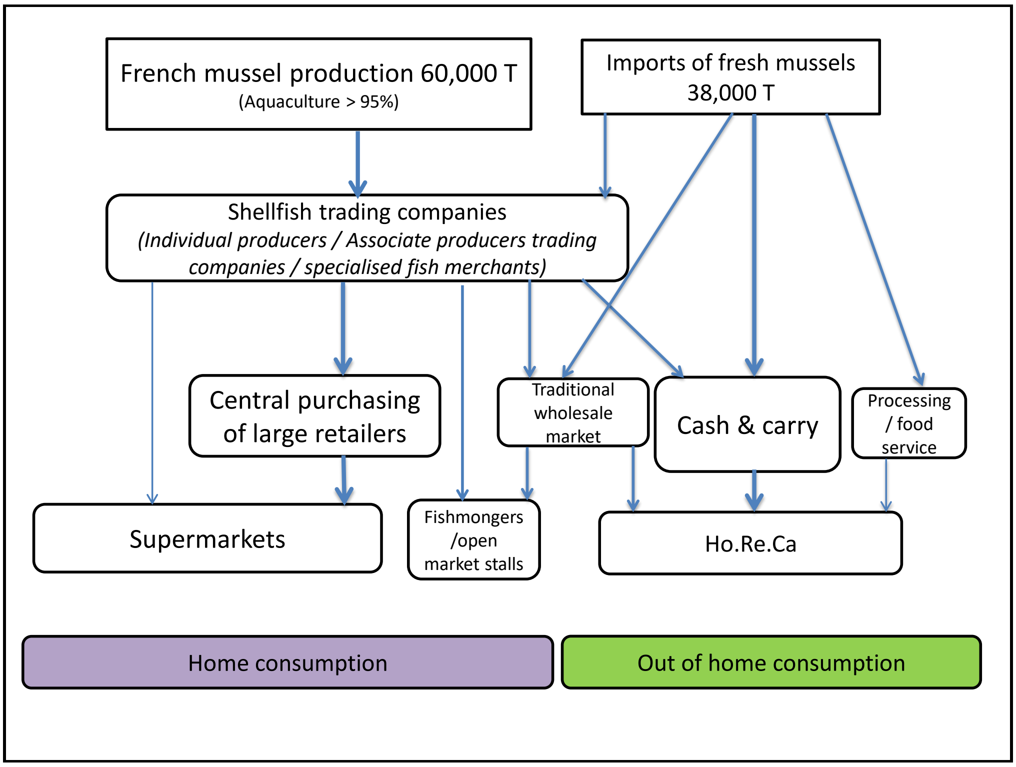

Figure 8. Value-chain map for fresh mussels in France (2014 data)

1) <u>Domestic production and import sectors</u>

The French market of fresh, live mussels is first supplied by domestic production and then imports. In 2014, the market share of French production in the whole supply was 61%, of which at least 95% came from aquaculture (80% blue mussel, 20% Mediterranean mussels). As concerns fresh mussel imports, the aquaculture origin is also dominant. Exportations (including re-export) are marginal (2,500 tons in 2014) and not decisive for the value chain analysis.

Mussel farming in France is practiced either as a main activity or in diversification with oyster production, thus making difficult to evaluate the number of specialized mussel producers against combined shellfish producers. On the other hand, the DCF segment “mussel Bottom” provides an indicator of the number of mussel producers specialized in bouchot farming. This segment comprised 287 enterprises in 2014, employed 1079 people (FTE), and was characterised by a very high specialisation rate (96% of mussel sales on the total sales in value according to STECF data 16-19). Specialised Bouchot mussel farms are mainly family-owned companies with an average employment rate of 3.8 FTE according to DCF aquaculture data 2014.

Compared to the two main import countries, mussel farming is present in the different coastlines of France (but with 50% of the production coming from the enterprises located in the Channel and North seas) while it is only developed in one region in Spain (Galicia) and in the Netherlands (Zeeland). About 80% of the French shellfish farmers own a dispatch establishment[5] (with

[5]According to the EC regulation « dispatch centre » means any on-shore or off-shore establishment for the reception, conditioning, washing, cleaning, grading, wrapping and packaging of live bivalve molluscs fit for human consumption.

purification equipment if necessary) which allows them to place on the market live bivalve molluscs in agreement with the European regulations (EC) n° 853/2004 and n° 854/2004. Some large producers diversified in trade have created their commercial company for selling their own production and also mussels from other producers; conversely others opted for giving up their commercial activities and delegating them to specialized shellfish trading companies (see below).

Almost all the French production of mussels is dedicated to the fresh domestic market, segmented according to the species and the production techniques. Blue mussels are mainly cultivated on “bouchot” (wooden stakes) in intertidal areas (or else with long lines at sea) while Mediterranean mussels are produced either on ropes under tables in Mediterranean lagoons or with long-lines in open sea. Furthermore, the French mussel market is segmented according to the origin (France/import) with a clear price differentiation when comparing average French sales price at the “dispatch” level and average import price (1.78 €/kg versus 1.00 €/kg in 2014).

2) Supply grouping

Companies specialised in the trade of mussel and bivalve molluscs have emerged from the 1990s. They were created by shellfish farmers who diversified in trade activities or on the initiative of shellfish producer associates[6] to compensate for the lack of supply concentration places like auction fish markets for farmed shellfish and to adapt to the evolution of distribution channels (increasing role of the large retail). The biggest players mainly supply the supermarket chains, and the catering sector to a lesser extent. Along with shellfish merchants they have contributed to meet the demand of “service” products (packed mussels under modified atmosphere) of the large retail sector.

From data collected on websites, press review and direct interviews conducted in 2016, it appeared that shellfish trading companies for blue mussels and Mediterranean mussels are almost separate and that trade is much more dependent on imports for the latter species. Preliminary concentration indicators calculated from the biggest companies commercialising either *Edulis* or *Galloprovincialis* are presented in Table 2. They are indicative values based on data provided by these companies (mainly for 2015) and 2014 data on the whole supply side (in the absence of production data for the year 2015).

Blue mussels: the 3 leading companies, established in the main production area in Normandy and North-Brittany, commercialised around one third of the total French production of mussels in 2015 (indicator 1), including mainly “bouchot” mussels. Compared to the production of blue mussels only, this ratio reached 43%. On the other hand, as these companies are little dependent on imports, their weight in the total fresh mussel supply was lower, with an estimation of a 23% market share (indicator 2).

Mediterranean mussels: collected information only concerns the two leading companies located in the South of France. It shows that the grouping of production is much lower than for companies specialised in blue mussels, representing barely 2% of the total French mussel production (indicator 1), and 9% in relation to the production of M. *galloprovincialis*. As these large shellfish trading companies[7] involved in purification, cleaning and packaging activities mainly works with imported

[6] Like Kermarée (kermaree.com) created in 1991, Cultimer (www.cultimer.com) in 1998 and Mytilimer in 2003.
[7] As the leading company Medithau (www.**medithau**.com)

mussels, their whole mussel market share was estimated at 6% (indicator 2). Their commercial outlets are more balanced between large retail, wholesalers and the catering sector, but more specialised in geographical terms (southern regions of France).

Table 2. Preliminary indicators of supply grouping for fresh mussels in France (synthesis of data collected through interviews in 2016 and official statistics on production and external trade)

	Characterisation of mussel sales				Market share	
	Total mussel sales (tons)	% packed mussels	% imports	% bouchot mussels	Concentration ratio 1*	Concentration ratio 2**
Top 3 companies *edulis*	21500	41%	9%	79%	33%	23%
Top 2 companies *galloprovincialis*	6200	62%	83%	-	2%	6%

** Concentration ratio 1: % of French mussel sales compared to the French mussel production*

***Concentration ratio 2: % of total mussel sales compared to the total mussel supply (production - exports + imports)*

3) <u>The wholesale market</u>

The two major players of the mussel "wholesale market" are i) central buying offices of large retailers and ii) "traditional" wholesalers for supplying the catering sector and specialised retailers (fishmongers…). The latter have remained significant intermediaries due to the importance of the catering sector for the fresh mussel market in France.

To supply large retailers, most of the supermarket chains have their central buying offices for seafood with strategies of sourcing which are set up at national or more decentralized levels. In the first case, contractual relationships with suppliers are mainly defined at a national scale, while in case of decentralised organisations, regional buying offices can benefit from more autonomy for contracting and allow direct supplying of supermarkets with mussel producers (in particular in coastal areas).

To supply the catering sector and the specialised retail sector (like fishmongers, open-market stalls, local stores…), traditional wholesalers remains key actors. Among major wholesalers involved in mussel trade, there are specialists of seafood or food generalist, which are located in wholesale market places (like Rungis market) or not. As for shellfish trading companies, some wholesalers operate at national scale while others could be more specialised in terms of catchment area (especially for the commercialisation of Mediterranean mussels). Based on the interviews conducted with wholesalers, it appeared clearly that traditional wholesalers, which are significantly dependent on catering sector outlets, are more sourcing on imported mussels than central buying offices of large retailers.

Other actors to be mentioned at this stage are central buying offices of cash and carry (Metro France, Promocash), supplying more or less the same customers than wholesalers (restaurants, local fishmongers). According to data collected through interviews, they only represented a small market share. In addition, there were few processing companies delivering foodservice solutions for out-of-home consumption. At the time of the study this activity seemed marginal for mussels, but this would deserve further investigation for assessing its relative importance and potential of development.

4) The retailing and the catering sector

The retail market of fresh mussels is largely dominated by supermarket chains (about 80% in volume according to FranceAgriMer/ Kantar Worldpanel). Main large retail chains in France in 2014 were: Carrefour (21.8% of food distribution of large retailers including hard discount), Leclerc (19.9%), Intermarché (14.4%), Casino (11.5%), Auchan (11.3%), System U (10.3%), etc. (Linéaires, 2015). Their weight in the retail sales of fresh mussels should correspond more or less to their global food market share (except the regional specialisation of some distributors).

From Kantar Worldpanel data, it could be estimated that the current supply of large retailers (including hard discount) is shared equally between MAP products (main packaging of 1,4kg and 2kg of live mussels) dedicated to seafood self-service shelves and live mussels in traditional bags of 15 kg for being sold in bulk at the wet fish counter. As concerns the specialised retailers the demand still rely on traditional bags, more in line with the expectations of fishmongers' customers. Differences between the two retail sectors range from sourcing to marketing strategies. While imported mussels represent nearly 30% of the volume purchases in large retailers, they are inferior to 5% in specialised retailers (2014 Kantar panel data). Moreover, mussels are appealing products in large retailers where they are frequently on special offer. Conversely, the supply is found to be more qualitative in specialised retailers than in supermarkets, with origin or quality labels like PDO and Label rouge, or other premium products (individual or collective brands) proportionally more sold.

Mussels are also often consumed out of home, mainly in commercial restaurants or institutional catering and in many sea festivals during summer or other events, like the "Braderie de Lille". As a result of this study, the share of out of home consumption was estimated at around 45-50%[8] of the French consumption of fresh mussels, which is higher compared to seafood in general. Commercial restaurants would represent 75-80% of the fresh mussel purchases of the catering sector as a whole (CREDOC 2011, 2012) and include a large variety of restaurants, including "*brasseries*" and specialised chain like "Leon de Bruxelles". Compared to the retail sector, the demand in terms of packed mussels differs, with a preference for large-size packaging (5kg, 10 kg), mainly supplied by Dutch mussel companies.

2.2. First insights into the price "transmission" along the value chain

Available price information along the French value chain is summarized in Table 3. The reference year is 2014. It is recalled that the information for intermediary stages remains indicative when collected through interviews.

At the supply stage, the price range of fresh mussels is wide, with at the top the French blue mussels cultivated with the "bouchot" technique and at the bottom the imported Mediterranean mussels (from Spain, Italy). Prices presented at the production stage correspond to "dispatch" prices. As concerns imports, the upper import price for Dutch mussels could be partly explained by the level of service provided, through cleaned (byssus-off) and individually packed products, while mussels from Spain (and also Italy) arrive in non-sealed-bags, not properly cleaned (Monfort M.C., 2014).

[8] The range of values results from the application of different coverage rates to the extrapolated household purchases of mussels (data from Kantar Worldpanel).

At the stage of supply grouping, direct interviews with shellfish trading companies provided complementary information to differentiate their purchase prices of French blue mussels according to the main production areas. Interviewed people agreed on a common ranking for "bouchot" mussels which positions at the bottom the regions Normandy and then Charente-Maritime, at the middle-range the Bay of Saint Brieuc (North-Brittany) and at the top the PDO[9] "Baie du Mont Saint Michel" and mussels from Pénestin (South-Brittany). On an indicative basis, the extra-price offered to producers for the PDO bouchot mussel was estimated at about 0.30€/kg compared to the standard TSG bouchot mussels. Comparatively the extra-price for French organic mussels was reported to be lower (Interviews).

At the wholesale stage, the only available data comes from the quotations at the Rungis market place. The survey carried out by the RNM (*Réseau des Nouvelles des Marchés*) in partnership with France-AgriMer includes 3 categories of fresh mussels in bulk: French bouchot mussels, Spanish mussels and Dutch mussels. Wholesale prices appear to be stable all the year round and show little price differentiation between the 3 product categories compared to other stages of the value-chain. This could suggest that the price monitoring set up by the RNM targets standard products only. Low variability of price at this stage should also be analysed with respect to the main outlets of the wholesale market i.e. the catering sector, for which price is the main purchase criteria.

At the catering sector level. The price information provided by the restaurant panel surveys is limited to the average purchase price of fresh, live mussels by all types of restaurant. This price indicator amounted to 3.2€/kg in 2013 (FranceAgriMer, 2014). Unlike wholesale prices given by the RNM which correspond to fresh mussel in bulk, note that the purchases of mussels by restaurants also rely on prepacked mussels in large format (10 kg, or even 5 kg) which come from imports (mainly from Dutch mussel trading companies).

At the retail market level. Average prices calculated from Kantar Worldpanel data confirm the segmentation of the retail market which differentiates bouchot mussels from other French mussels. In addition, the price range of mussels according to their origin remains wide, albeit less than at the production and import stages. On the other hand, the extra-price for French bouchot mussels compared to other French blue mussels seems to be equivalent at the two ends of the value-chain.

[9] The Protected Designation of Origin - PDO includes agricultural products and foodstuffs which are produced, processed and prepared in a given geographical area using recognized know-how.

Table 3: Synthesis of price information (€/Kg) at the different stage of the value chain (2014 data, 2013 for the catering sector)

		Source of data	French M. *edulis* bouchot	French M. *edulis* other	French M. *gallo.*	Spanish M. *gallo.*	Dutch M. *edulis* other
Supply	French production	French aquaculture survey (DPMA)	1.84	1.56	1.65		
	French imports	FranceAgriMer				0.66	1.56
Supply grouping	Shellfish trading companies	Interviews 2016 (indicative data)	Price premium ~0.30 €/kg for AOP bouchot BMSM				
Wholesale	Traditional wholesale market	RNM - FranceAgriMer	2.10	-	-	2.0	1.8
Demand	Restaurants (commercial and social)	FranceAgriMer (average purchase price by restaurants)	3.2				
	Retail market (80% supermarkets)	Kantar panel data (average purchase price by households)	4.06	3.47	3.38	3.09	2.58

The comparison of prices from the production to the retail stage for the main products supplying the fresh mussel market is indeed subject to the level of detail and reliability of the data sources, notably at the retail stage (e.g. the accuracy of consumer panel data depends on the product information delivered by household). Apart from these reservations, the comparison enables us to emphasize preliminary findings and to raise some questions:

As far as imports are concerned, there is some evidence that global margins along the French value-chain are lower for Dutch mussel imports than for Spanish mussel imports. This may result from the fact that the value-added related to activities of cleaning and packaging is mainly localized in the Netherlands[10] and that the distribution of Dutch mussel products probably involves few intermediaries before arriving in French supermarkets or restaurants. Conversely, the price transmission of Spanish mussels suggests low value-added (from cleaning, packaging operations) in the country of origin, in addition to the lack of market power of Spanish producers along the whole mussel value-chain (this point will be further developed in the final deliverable of the WP3).

Another issue that should be addressed relates to the role and competition played by imports in the retailing and in the catering sectors respectively. Analysis of consumer panel data and interviews with French shellfish trading companies supplying mainly supermarket chains confirmed the persistence of a sourcing pattern based on the seasonality of French mussel productions, the high demand for bouchot mussels, as well as the complementary role played by imports. The same conclusion was already drawn in a former study carried out in 2000 (Daniel, 2000). It would deserve ongoing examination to take into account the increasing price competitiveness of Dutch mussels from 2005 to 2014 (see Figure 7). Is this trend likely to affect the bargaining power of French

[10] Dutch mussel trading companies located in Yerseke like Prins & Dingemanse**,** Delta Mussel, Roem Van Yerseke, Vette & Verhaart BV (Qualimer) etc. were the precursors for supplying the French market with prepacked mussels.

producers with supermarket chains (especially as regards the lesser valued geographical origins in France) and to what extent? The issue is even more acute with the catering sector, the main purchase criteria of which are price and convenience.

3. Identification of potential bottlenecks along the French value chain

A preliminary analysis focusing on the interactions between producers and large retailers along the French mussel value-chain highlights potential bottlenecks/conflicts concerning the development of "quality labelling approaches" and "product innovation".

3.1. Quality labelling approaches

On the production side, the main strategies of product differentiation consisted both to protect the specificity of the French mussel farming of blue mussels (i.e. "bouchot" technique) against EU imports and to promote some geographical origins. The TSG (Traditional Speciality Guaranteed) certification was obtained in 2013 for "bouchot" mussels and became the standard for the whole bouchot production (85% of blue mussel production in France). Beforehand, the mussel farmers established in the bay of Mont Saint Michel bay (North Brittany) were involved in a long labelling process for identifying and protecting the geographical origin of their production. The French label of origin AOC was granted in 2006, followed by the European label PDO in 2011. The production under the PDO label "moules de bouchot de la baie du Mont Saint Michel" amounts to about 10,000 tons yearly (about 20% of the whole "bouchot" mussel production). This label not only guarantees the geographical origin (and related specific attributes) but also provides higher quality standards for bouchot mussels (as for the size and meat rate criteria), resulting in a price premium. The overview of producer labelling strategies should be completed by producer commercial brands, collective or individual, and other French quality labels (ex. Label Rouge for rope mussels in 2015), not to mention organic labelling, although it was also just in the early stages for mussels of French origin at the moment of the study.

On the distribution side, each supermarket chain imposes to its suppliers its own specification, which corresponds at minimum to the TSG specification concerning "bouchot" mussels. Although the PDO mussel is renowned and largely sold in supermarkets, some large retailers would prefer promoting their own label brand instead of the PDO or other voluntary labelling schemes initiated by producers (Interviews). Furthermore, the multiplication of labels is perceived by the distributors as being confusing for the consumers and as a source of increase in retail prices, adding to the extra-cost of packaging (see below). The marketing strategies of the supermarket chains could therefore be conflicting with the setting up of new labels/brands by producers.

3.2. Product innovation and coordination of the value-chain

The consumption of fresh mussels in France remains quite "traditional", based on a natural, live product to be cooked and eaten at home or consumed in restaurants or during sea festival events according to the common recipe "*moules marinières*" and other variants or regional recipes. In this context, the main "innovation" implemented within the French mussel farming industry, on the model of Dutch mussel trading companies, has relied on the development of packaging under controlled atmosphere which keep the mussel live several days while providing ready to cook products. This evolution was driven by the large retailing sector, which required French shellfish trading companies to invest in ad-hoc equipment to meet the demand in terms of logistics, stock management and convenience for the consumers. The issue related to the breakdown of extra-costs for cleaning and packaging operations along the value chain could not be addressed in the framework of this study, but the order threshold to be reached for amortising the required equipment was incidentally mentioned by some shellfish trading companies. Beyond, the potential of further growth of "service" products in the fresh mussel market (incl. other packaging and fresh processed products dedicated to the self-service shelves) must be analysed in the context of current consumer expectations in terms of convenience, quality/origin labels and price.

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