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Protocol on aquaculture data collection at very local level (Marche Region)

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Background and goals of the ARGOS Protocols for fisheries and fisheries related data collection at very local level

The ARGOS project WP4 aims to strengthen the knowledge-based decision-making process by the development of a common approach based on scientific evidence and combining social, economic and environmental data for the Adriatic area.

To this, the WP foresees activities towards a general harmonisation in the assessment of fisheries and aquaculture data in the Adriatic partnership area by the establishment of a common approach to fish stocks consistency and trend data, eco-biological status of marine resources. Starting from the survey and comparison of the official fisheries and fisheries related database, the Act. 4.2 was oriented to identify a common scheme for the definition of specific protocols for data collection at very local level (i.e. landing harbour level), for the proposal of local management measures for sustainable fisheries and aquaculture, in the framework of national policies and EU Directives. The common scheme for the Protocols at very local level was discussed and agreed by the ARGOS Adriatic Advisory Committee.

The Protocol for aquaculture data collection at Marche Region (IT) level

Background and goals of the Protocol

Marche Region was responsible for the development of one of the expected Protocols for fisheries and fisheries related data collection at very local level. To maximise the impact of this project activity at regional level as well as the synergies and complementarities of competences and tasks of the Regional Authority and the CNR-IRBIM, PP3 focused on the development of the Protocol for collecting data on the mariculture sector for its territory level. This Protocol intends to give continuity both to the DORY project that delivered a Report on the state of play of the aquaculture sector in 2018 and to the aquaculture stakeholder consultation and engagement process started under the ARIEL project. The Protocol aims, in fact, address not only the regional data collection but also the data elaboration into an updated Report on the aquaculture sector of Marche Region that may contribute also to the implementation of the EMAFAF 2021/2027. In defining the key issues of the Protocol, the transferability potential of the tool to other regions was considered too. Giving the relevance of the aquaculture for the development of a sustainable blue economy at regional and transnational level, a better understanding of the sector's state of play in terms of needs, challenges and attitude towards innovation and sustainability can help public administrations in shaping and implementing policies and programmes, fostering the cooperation between enterprises, policy makers and academia.

Target Group of the Protocol

- > Mariculture enterprises and Associations at local, national and transnational level
- > EMFAF implementation bodies
- > Regional and national policy makers
- > Research centres and academia

The tool for data collection at very local level

Marche Region cooperated with the Department of Life and Environment sciences of the Polytechnic University of Marche (DiSVA – UNIVPM) that was also appointed as AAC member to develop the Protocol. In 2021-2022, the PP3 AAC member worked with PP3 staff

to draft the Protocol for the aquaculture data collection, making the best use of the stock of knowledge from previous research and cooperation projects and deliverable on the mentioned sector.

The Protocol consisted in a questionnaires template enabling the collection of the following key data from the aquaculture (mariculture) enterprises:

1. **MAIN CHARACTERISTICS OF THE FARM:** all the characteristics of the enterprise (farmed species and quantity, facilities, boat...)
2. **SOCIO-ECONOMIC DATA:** characteristics of the employees (gender, age, instruction)
3. **IMPORTANCE FOR THE LOCAL COMMUNITY:** opinion of the local community of the farming procedure and of the farmed product, how to improve that?
4. **ENGAGEMENT AND COOPERATION:** multi-stakeholder groups, committee, clusters. Which are the benefits?
5. **INFORMATION AND KNOWLEDGE SHARING:** What are main sources of information for the sector, are they interested in improving it, how to improve it
6. **MARKETING:** Who are the clients, problems in the distribution, promotion of the activity
7. **INNOVATION AND SUSTAINABILITY:** recently adopted innovation, future need to adopt innovation, what is the main motivation for the adoption of innovation, good practices adopted to improve sustainability, future need to adopt good practices
8. **POLICY AND FUNDING:** Awareness of EU, National and local policy, evaluation of the effectiveness of the existing policy funding/subsidies received

The questionnaires items were presented at the 3rd AAC meeting (Opatjia, 1st December 2021).

The effective application of the Protocol for data collection has started in 2022 and ended in March 2023. A survey of the regional aquaculture enterprises was carried out by PP3 in cooperation with DiSVA- UNIVPM (scientific support in developing the Protocol and monitoring its implementation under the ARGOS project) and M.A.R.E. Soc. Coop. (external expertise hired for testing the aquaculture diversification and labelling protocol in the framework of ARGOS Act.5.3). The first step consisted in the identification of the aquaculture enterprises in Marche Region, followed by the submission of the common questionnaire. Results have been then elaborated into a Regional Report.

Data collection at very local level: defining the status quo and development trajectories of the regional mollusk farming sector of Marche

The Report has been prepared by M.A.R.E Soc. Coop, the external expertise of Marche Region appointed for supporting the implementation of the ARGOS pilot actions at local level as integral part of the present Protocol. The document has the following goals:

- to define the state of play of mariculture in Marche Region for a better understanding of regional needs and challenges according to a coordinated methodology agreed at Adriatic regions level
- to identify strategies for the development and valorization of local production, encouraging a conscious and responsible consumption of seafood products

To achieve this objective, a study on the current state of regional shellfish farming was carried out, placed in the national and European context, taking into account the number and the types of enterprises, the species reared, the production methods and equipment used in the production process, the marketing methods of the products reared and sales channels, the employees, the propensity of enterprises toward innovation and opportunities for production valorisation, the relationship with the sector's financial instruments and the relationship with the European aquaculture development policy. This was accompanied by the examination of the various forms of certification aimed at identifying and enhancing the productions.

The update of information on the status of shellfish enterprises operating in the waters facing the coast of the Marche region was carried out in February-March 2023, with reference to the year 2022.

For this purpose, a highly articulated questionnaire, fully reproduced in Annex 1, created with the active collaboration of professors from Marche Polytechnic University and experts in the field, was prepared and submitted to the owners or managers of shellfish enterprises through telephone interviews or direct contact, so that the requests contained therein could be set out in the best possible way.

For the identification of shellfish enterprises operating in regional waters, considering that in order to carry out the activity of shellfish farming in the open sea, it is necessary to have a maritime state concession, first of all, information was acquired from the regional offices in charge of the administrative management of this type of concession, also making use of the data reported in the specially prepared site "Cartografia Concessioni Demaniali Regione Marche"

The data relating to the structure of European production were found in the "Eurostat" information system. Information on trade flows and consumption at the European level is derived from the EUMOFA Report - The EU Fish Market – 2022 Edition. Import and export data concerning Italy are taken from the ISTAT Coeweb website - <https://www.coeweb.istat.it/>.

Background on shellfish production at the European and national levels

In 2020, production from aquaculture relative to all European countries, EU and non-EU, was over 2,600,000 T, about 534,000 T of this was shellfish, of which about 410,000 T was mussels. If we stay within EU countries, shellfish production is equivalent to about 50 percent of the total value and about 38 percent if only mussels are considered. In this context, Italy contributes 4.7 percent of the total value, 14 percent if we consider only shellfish, and 12.3 percent if we consider only mussels (Table 1).

Table 1 – European production from aquaculture (year 2020)

Country	All the species		Shellfish		Mussels	
	Ton.	%	Ton.	%	Ton.	%
Spain	272,097.690	10.4%	206,754.79	38.7%	204,466.12	50.0%
France	191,051.629	7.3%	143,948.72	27.0%	61,219.49	15.0%
Italy	122,742.159	4.7%	74,971.97	14.0%	50,337.65	12.3%
Netherlands	39,467.600	1.5%	34,770.60	6.5%	32,419.60	7.9%
Greece	130,792.562	5.0%	19,030.90	3.6%	18,956.80	4.6%
Ireland	35,152.000	1.3%	21,634.00	4.1%	14,729.00	3.6%
Germany	32,127.700	1.2%	13,490.10	2.5%	13,430.10	3.3%
Denmark	37,839.320	1.4%	5,923.29	1.1%	5,923.29	1.4%
Sweden	12,089.300	0.5%	2,297.00	0.4%	2,297.00	0.6%
Portugal	13,647.680	0.5%	6,596.15	1.2%	1,012.25	0.2%
Norway	1,490,412.045	57.0%	2,070.72	0.4%	2,033.17	0.5%
Bulgaria	8,859.875	0.3%	1,233.13	0.2%	1,233.12	0.3%
Croatia	21,770.690	0.8%	517.18	0.1%	502.81	0.1%
Slovenia	1,674.100	0.1%	405.20	0.1%	383.20	0.1%
Albania	9,084.000	0.3%	285.00	0.1%	285.00	0.1%
Poland	45,417.828	1.7%		0.0%		0.0%
Iceland	40,595.000	1.6%		0.0%		0.0%
Czechia	20,402.000	0.8%		0.0%		0.0%
Malta	19,829.435	0.8%		0.0%		0.0%
Hungary	18,385.118	0.7%		0.0%		0.0%
Finland	15,053.000	0.6%		0.0%		0.0%
Romania	11,793.000	0.5%		0.0%		0.0%
Cyprus	7,342.699	0.3%		0.0%		0.0%
Serbia	6,010.260	0.2%		0.0%		0.0%
Austria	4,526.915	0.2%		0.0%		0.0%
Lithuania	3,974.770	0.2%		0.0%		0.0%
Slovakia	2,151.670	0.1%		0.0%		0.0%
Estonia	1,039.888	0.0%		0.0%		0.0%
Latvia	727.400	0.0%		0.0%		0.0%
Belgium	209.000	0.0%		0.0%		0.0%
Total UE + Extra UE	2,616,266.333	100.0%	533,928.756	100.0%	409,228.60	100.0%
Total UE	1,070,165.028		531,573.036		406,910.43	
Total Extra UE	1,546,101.305		2,355.720		2,318.170	

Regarding the ratio to production from fisheries, which in 2020 was about 6,800,000 T, or about 3,500,000 T if only EU countries are considered (source: Eurostat), aquaculture products account for 39 percent or 30 percent, respectively, Values still far from achieving that parity long desired and promoted through European sector policies.

Quite different situation is what appears if we look at what is presented in Table 2, which shows the fishery and aquaculture production related to the top 15 countries worldwide, published by EUMOFA in 2022, from which most of the Southeast Asian countries production from aquaculture is higher, in some cases even very significantly so, than that from fisheries.

Table 2 – Top 15 world producers in the year 2020 (1,000 TONS) - Source: Eurostat and FAO .¹

	Catches	Aquaculture	Total production	% of total
China	13.446	70.483	83.929	39%
Indonesia	6.989	14.845	21.834	10%
India	5.523	8.641	14.164	7%
Vietnam	3.422	4.615	8.037	4%
Peru	5.675	144	5.819	3%
Russian Federation	5.081	291	5.372	3%
EU-27	3.869	1.088	4.957	2%
United States	4.253	449	4.702	2%
Bangladesh	1.920	2.584	4.503	2%
Philippines	1.912	2.323	4.235	2%
Japan	3.215	996	4.211	2%
Norway	2.604	1.490	4.094	2%
Republic of Korea	1.375	2.328	3.703	2%
Chile	2.183	1.505	3.688	2%
Myanmar	1.854	1.145	2.999	1%
Others	27.940	9.645	37.584	18%
Total	91.260	122.573	213.832	100%

This means that Europe, and our country, are heavily dependent on import of fish products from non-European countries, including many Asian countries.

This can be deduced from what is present in Figure 1, where the apparent consumption is reported, with relative flows of origin, of aquaculture products in EU countries, corresponding

¹ Rapporto EUMOFA – Il mercato ittico della UE – Edizione 2022

to 2.90 million T, of which 2.11 million T, equal to about 73% of the total, come from imports from non-EU countries.

It follows that self-sufficiency, understood as the ability of EU member states to meet demand through their own production, net of exports, is about 27 percent.

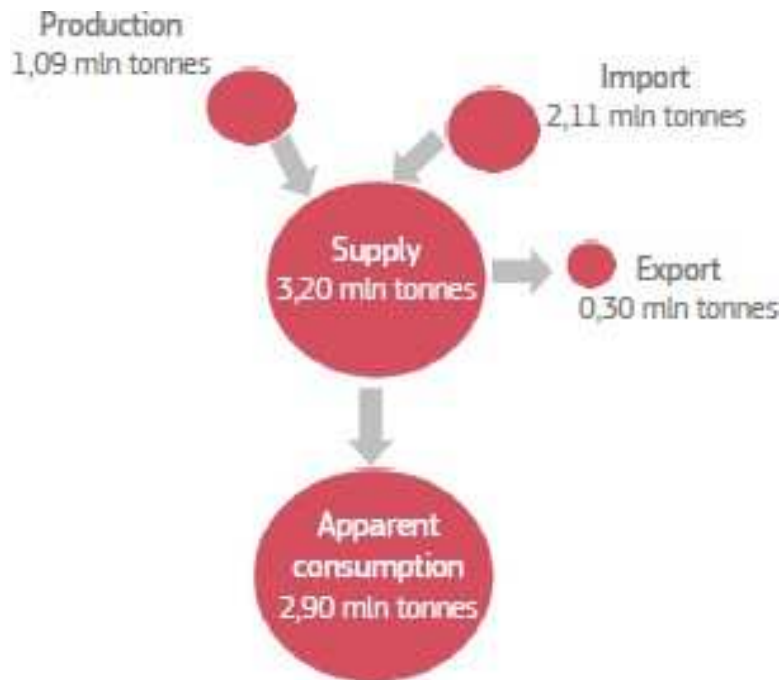


Figure 1 – Flow and apparent consumption of aquaculture products in the EU²

If we evaluate the grouping of bivalve molluscs, gastropods, and other invertebrates, as shown in Table 3, this the self-sufficiency index increases to 73 percent (EUMOFA, 2022), a value exceeded only by small pelagic. While for mussels alone the self-sufficiency rate reaches 80%. Given that a significant share of bivalve mollusc production comes from aquaculture, with more than 530,000 T, compared to about 114,000 T from fishing (Eurostat data), the shellfish farming represents at the European level one of the pivotal sectors of aquaculture, to which our country, after Spain and France, contributes significantly, above all with its production of clams and mussels.

² Report EUMOFA – THE EU FISH MARKET – Edition 2022

Table 3 - Self-sufficiency rates by commodity group (Source: EUMOFA processing of Eurostat, FAO, FEAP and national government data)

Commodity groups and share of total apparent consumption in 2020	Self-sufficiency rates									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Groundfish (23%)	19%	20%	21%	24%	25%	22%	25%	23%	23%	22%
Tuna and tuna-like species (14%)	20%	32%	34%	39%	31%	33%	31%	30%	33%	28%
Salmonids (13%)	21%	19%	19%	17%	17%	18%	18%	17%	17%	17%
Small pelagics (12%)	111%	121%	115%	130%	121%	107%	108%	107%	102%	96%
Bivalves and other molluscs and aquatic invertebrates (9%)	57%	63%	58%	59%	65%	68%	77%	78%	82%	73%
Crustaceans (7%)	17%	17%	18%	18%	18%	17%	17%	20%	18%	16%
Other marine fish ³⁷ (7%)	57%	69%	69%	66%	64%	62%	62%	57%	56%	59%
Cephalopods (6%)	18%	19%	20%	21%	18%	15%	13%	12%	12%	13%
Freshwater fish (4%)	25%	28%	30%	33%	36%	30%	42%	39%	39%	45%
Miscellaneous aquatic products (3%)	14%	13%	20%	17%	6%	16%	14%	13%	23%	17%
Flatfish (2%)	93%	71%	73%	69%	70%	66%	67%	64%	63%	67%
Total	41,8%	43,5%	43,7%	45,9%	44,4%	43,6%	44,5%	43,4%	41,6%	38,9%

Mussels are among the most consumed farmed products in the EU, second only to salmon, and their apparent consumption in 2020 was 1.19 kg per capita. Of these, about 94 percent were from aquaculture. As for clams, the per capita consumption was about 0.32 kg, of which only about 33 percent came from aquaculture (Table 4).

Table 4 - Apparent consumption of the most consumed products (2020) - Source: EUMOFA processing of Eurostat and FAO data.

Products	Per capita consumption (kg, LWE)	Consumption evolution 2020/2019	% wild	% farmed
Tuna	3,06	-3%	98,65%	1,35%
Salmon	2,44	+4%	6%	94%
Alaska pollock	1,72	-1%	100%	0%
Cod	1,72	-13%	99,93%	0,07%
Shrimps	1,46	-1%	45,06%	54,94%
Mussel	1,19	+2%	6,21%	93,79%
Herring	1,10	+3%	100%	0%
Hake	1,03	-11%	100%	0%
Surimi	0,64	-3%	100%	0%
Squid	0,62	-11%	100%	0%
Mackerel	0,59	-4%	100%	0%
Sardine	0,56	-7%	100%	0%
Trout	0,49	+3%	1,63%	98,37%
Saithe (=Coalfish)	0,35	-10%	100%	0%
Clam	0,32	-3%	66,82%	33,18%
Other products	5,97	-15%	72,71%	27,29%
Total	23,28	-7%	72,18%	27,82%

As for the national situation, the production from shellfish farming referring to the year 2021 is presented in Table 5, based on the latest available data, for individual Italian regions.

The species farmed are mussels (*Mytilus galloprovincialis*), clams (*Ruditapes philippinarum* and *Ruditapes decussatus*), pacific oyster (*Crassostrea gigas*) and flat oyster (*Ostrea edulis*).

Out of a total production of about 85,000 T, mussels, with 62,300 T, make up about 73 percent of the total volume, followed by clams with 22,600 T, or about 26.5 percent of the total. With significantly smaller quantities, the pacific oyster follows with 311 T (0.4 percent) and the flat oyster with about 5 T (0.005 percent).

Table 5 - Domestic production from shellfish farming - 2021

Region	<i>M. galloprovincialis</i>	<i>R. philippinarum</i>	<i>R. decussatus</i>	<i>C. gigas</i>	<i>O. edulis</i>	Total
Emilia-Romagna	21,709.90	14,183.80		20.30		35,914.00
Veneto	10,390.70	8,356.90		34.30		18,781.90
Marche	7,966.80			2.20	0.80	7,969.80
Sardegna	5,579.90	21.30	29.20	228.70		5,859.10
Puglia	5,364.60			1.00	4.10	5,369.70
Campania	2,221.80					2,221.80
Friuli-V. G.	1,961.10	10.00				1,971.10
Abruzzo	1,840.00			1.50		1,841.50
Sicilia	1,719.00	79.50		17.80		1,816.30
Lazio	1,569.10					1,569.10
Liguria	1,427.70			5.50		1,433.20
Molise	543.00					543.00
Calabria	29.50					29.50
TOTAL	62,323.10	22,651.50	29.20	311.30	4.90	85,320.00

The Marche region, with a total production of about 7,800 T, ranks third place, after Emilia-Romagna and Veneto. Mussels, as at the national level, make up almost all of the product raised, while oyster farming, although present, is very limited.

With a look at mussels, Figure 2 shows the import value referred to 2020 and the relative countries of origin. A total of 25,602 T was imported, the bulk of which, about 15,200 T from Spain (Galicia), from Greece 4,580 T and from Bulgaria 3,343 T.

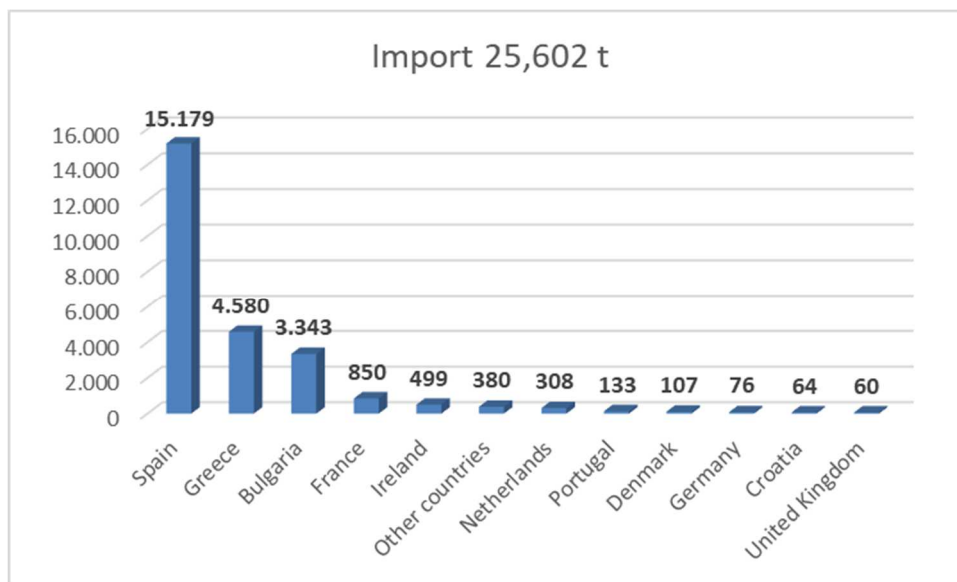


Figure 2 – Import of mussels into Italy – year 2020 – Source istat Coeweb

The exports of mussels, on the other hand, stand at 4,364 T, directed mainly to France, 2,101 T, and Spain, 649 T. With respect to these two countries, it can be stated that in France, on the Mediterranean coast, it is mainly product with organic certification that is sent and largely destined for re-immersion. Mussels sent to Spain are also destined for farming facilities located in Mediterranean waters, to be resold as they mature.

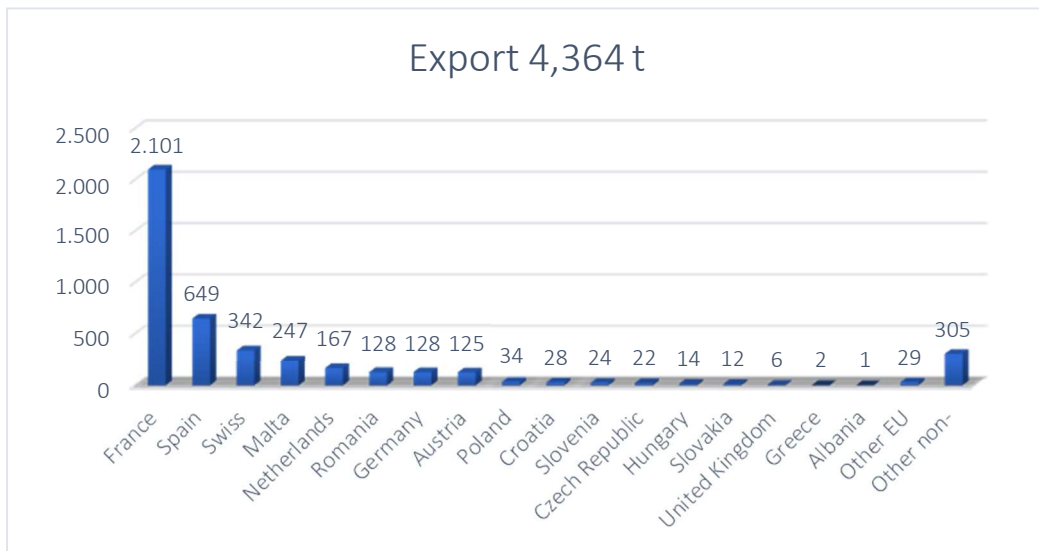


Figure 3 – Export of mussels from Italy - year 2020 - Source istat Coeweb

Based on the production data and import-export flow as shown in Figure 4, the apparent consumption of mussels for the year 2020 can be identified as 71,576 T.

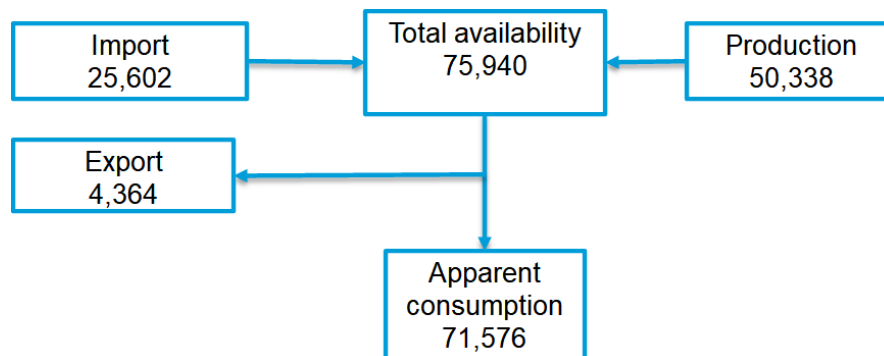


Figure 4 – Apparent consumption of mussels - year 2020 - ISTAT Coeweb e Eurostat data processed

In 2020, the import of oysters, both pacific and flat, amounted to 5,135, more than 80 percent of which came from France (Figure 5). While 317 are instead the tons exported, of which about 50 percent went to Spain (Figure 6). Considering the production data and import-export flows, the apparent consumption of oysters in Italy in 2020 was 5,000 T (Figure 7). Although ISTAT statistics do not discriminate between the two species, given the domestic production values, it is believed that most of the imported quantities are to be attributed to concave oyster, and most of the exported product refers to flat oyster.

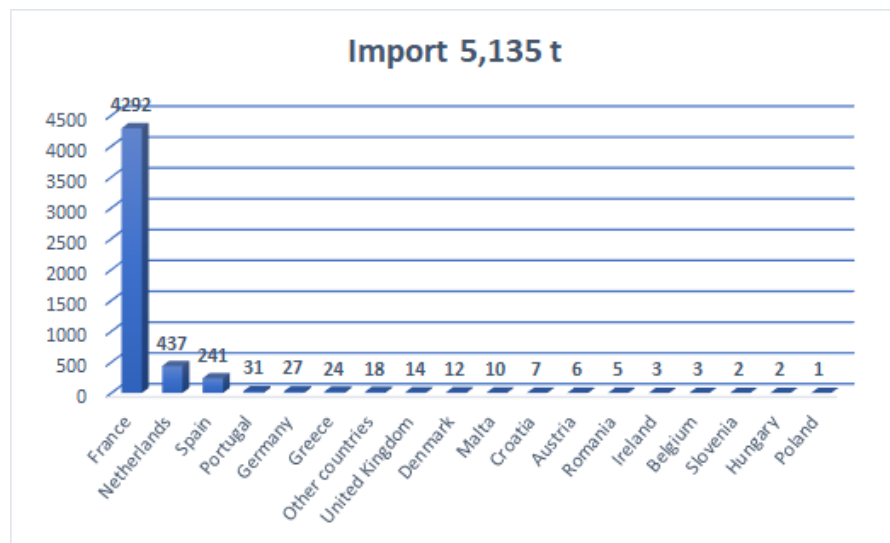


Figure 5 – Import of oyster – year 2020 – ISTAT Coeweb e Eurostat data processed

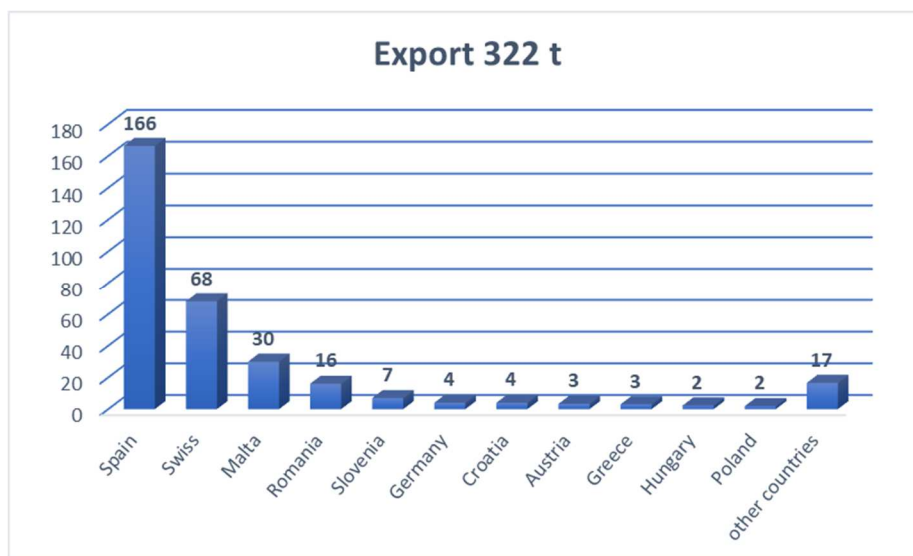


Figure 6 – Export of oyster – year 2020 – ISTAT Coeweb e Eurostat data processed

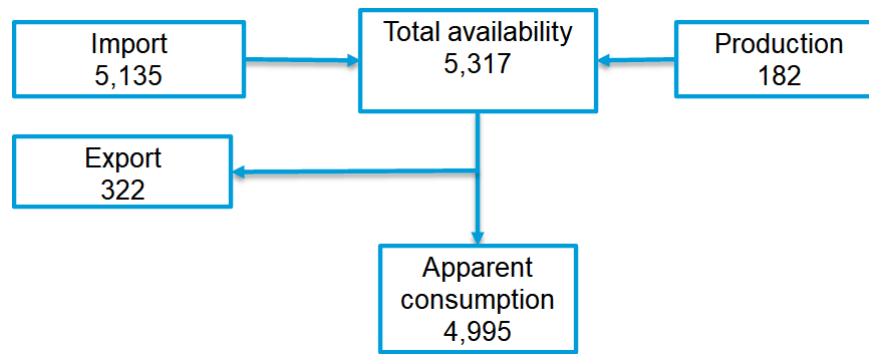


Figure 7 – Apparent consumption of oysters - year 2020 - ISTAT Coeweb and Eurostat data processed

As for the flat oyster alone, of which ISTAT statistics consider only those weighing < 40 g, an amount of about 439 T of imports and about 5 T of exports was recorded in 2020, with 99% of trade occurring between EU countries.

Current status of shellfish farms

Structure of enterprises

Of the 19 surveyed enterprises that contribute to regional mussel production, one harvest mussels from natural beds, while the remaining have shellfish farms. The data presented in this discussion are only for the latter 18 companies. Of these, two did not make themselves available to fill out the questionnaire submitted, while one has recently taken over a licensed body of water and has not yet started to work.

As can be seen from a reading of Table 6, the most widespread form of enterprise is the Cooperative Society or Cooperative Society Ltd, followed by Limited Company and Limited Company unipersonal, Simple Companies, and sole proprietorships, Limited partnership company and General partnership.

Table 6 – Type of enterprises in shellfish farming

Type of enterprises	Number of enterprises	%
Sole proprietorships	2	11%
Limited partnership company	1	5%
General partnership	1	5%
Limited Company	3	16%
Limited Company unipersonal	1	5%

Cooperative Society	2	11%
Cooperative Society Ltd	6	37%
Simple company	2	11%
Grand total	18	100%

Of the 18 companies present, 7 have their registered offices outside the regional borders, of these four are in Emilia-Romagna region, in the province of Rimini, two in Puglia region, province of Foggia, and one in Sardinia region, province of Oristano. The remaining enterprises are distributed among the province of Macerata, four enterprises, Ancona, three enterprises, Pesaro-Urbino, two enterprises, and Ascoli Piceno and Fermo, with one enterprise each (Table 7).

Table 7 – Legal headquarters of shellfish enterprises by provincial scope

Province registered office	Number of enterprises	%
Ancona	3	17%
Ascoli Piceno	1	6%
Fermo	1	6%
Macerata	4	22%
Pesaro-Urbino	2	11%
Foggia	2	11%
Oristano	1	6%
Rimini	4	22%
Total amount	18	100%

As shown in Table 8, the years of activity of the enterprises are spread between 23 years of the longest-lived and 1 year of the newest.

Table 8 – Number of enterprises by years of activity

Years of activity	Number of enterprises	%
1	1	6%
4	2	11%
5	1	6%
7	2	11%
8	2	11%
9	1	6%
10	1	6%
15	2	11%
16	1	6%
20	2	11%

23	1	6%
NC	2	11%
Grand total	18	100%

Only three enterprises, accounting for 17 percent of the total, are equipped with a shellfish purification centre, while one is equipped with a sea relaying area adjacent to the farming facility. The remaining 14 enterprises lack one (Table 9).

Table 9 – Number of enterprises with purification centre or housing area

Purification centre	Number of enterprises	%
no	14	78%
yes	3	17%
Livestock area	1	6%
Grand total	18	100%

There are 6 enterprises with shellfish shipping centre located ashore, accounting for one-third of the total (Table 10). There are no enterprises with shipping centres on board service vessels.

Table 10 – Number of enterprises with dispatch centre

Shipping centre	Number of enterprises	%
no	12	67%
on ground	6	33%
Grand total	18	100%

The majority of enterprises, 12 out of 18, correspond to a single farm. Five enterprises associate two farms and only one has three farms (Table 11). Two enterprises also have an additional farm located in the waters facing Emilia-Romagna.

Table 11 – Number of facilities associated with the enterprise

Facilities associated	Number of enterprises	%
1	12	61%
2	5	28%
3	1	11%
Grand total	18	100%

Looking at the individual enterprises, only three of them sold only bulk product to the market, with quantities ranging from 47.4 to 173 T. The rest of the enterprises sold both on rope and bulk with varying percentages.

Table 14 – Mussel production by enterprise, broken down by product type (year 2022)

Enterprise	Total		On rope			Bulk		
	Ton.	%	Ton.	% on tot.	% on company	Ton.	%	% on company
1	423.0	7%	401.9	10%	95%	21.2	1%	5%
2	250.0	4%	25.0	1%	10%	225.0	12%	90%
3	47.4	1%	0.0	0%	0%	47.4	2%	100%
4	300.0	5%	210.0	5%	70%	90.0	5%	30%
5	380.0	6%	95.0	2%	25%	285.0	15%	75%
6*								
7	260.0	4%	234.0	6%	90%	26.0	1%	10%
8	250.0	4%	225.0	5%	90%	25.0	1%	10%
9	1,800.0	30%	1,710.0	42%	95%	90.0	5%	5%
10					NC			
11	500.0	8%	200.0	5%	40%	300.0	14%	60%
12					NC			
13	170.0	3%	0.0	0%	0%	170.0	9%	100%
14	568.0	9%	374.9	9%	66%	193.1	10%	34%
15					NC			
16	900.0	15%	630.0	15%	70%	270.0	14%	30%
17*								
18	173.5	3%	0.0	0%	0%	173.5	9%	100%
Total	6,021.9	100%	4,105.8	100%	68%	1,916.2	100%	32%

* Farm not yet in production

Regarding the selling price, on rope product was sold at values ranging from a minimum of 0.75 €/Kg to a maximum of 0.95 €/Kg, while the price of bulk mussels ranged from 1.10 €/Kg to 1.60 €/Kg (Table 15). Due to the lack of sufficient information, it is not possible to calculate the average value for the two commercial categories.

Table 15 – Average sales price by product type (year 2022)

Enterprise	Average price (€/Kg)	
	On rope	Bulk
1	€ 0.85	
2		€ 1.50
3		€ 1.00
4	€ 0.85	
5		€ 1.10
6*		
7	€ 0.80	
8	€ 0.95	€ 1.50

9	€ 0.75	€ 1.40
10	NC	
11	€ 0.80	€ 1.00
12	NC	
13		€ 1.60
14		€ 1.60
15	€ 0.80	
16	€ 0.75	€ 1.40
17*		
18		€ 1.60

* Farms not yet in production

As shown in Table 16, 46% of the mussels were sold to wholesalers, with values per individual enterprise ranging from a minimum of 10% to a maximum of 100%. On the other hand, 41.5% was sold to other farms and destined for re-immersion, with minimum values of 50% and maximum values of 80%.

The remaining 12.5 percent was sold to retailers or directly to consumers by firms with a shipping centre, with percentages ranging from 20 percent to 90 percent of an individual firm's output.

Table 16 – Type of buyer by enterprise

Enterprise	Buyer		
	Wholesaler	Retailer	Other farms
1	50%	0%	50%
2	100%	0%	0%
3	85%	15%	0%
4	40%	0%	60%
5	100%	0%	0%
6*			
7	100%	0%	0%
8	0%	20%	80%
9	40%	0%	60%
10	20%	0%	80%
11	40%	60%	0%
12	NC	NC	NC
13	70%	30%	0%
14	0%	34%	66%
15	50%	50%	0%
16	50%	0%	50%
17*			
18	10%	90%	0%

Average value	46%	12.5%	41.5%
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* Farms not yet in production

The market was both domestic and foreign. The former was allocated about 71% of sales, with values ranging from 40% to 100% of individual productions. The foreign market, on the other hand, absorbed about 29% of the total volume, with values ranging from a minimum of 10% to a maximum of 60% (Table 17). The foreign market consists largely of Spain, Mediterranean area, and to a lesser extent southern France.

Table 17 – Destination of the product

Enterprise	Destination	
	International	National
1	10.0%	90.0%
2	0.0%	100.0%
3	0.0%	100.0%
4	10.0%	90.0%
5	0.0%	100.0%
6*		
7	0.0%	100.0%
8	20.0%	80.0%
9	50.0%	50.0%
10	40.0%	60.0%
11	35.0%	65.0%
12	NC	NC
13	0.0%	100.0%
14	0.0%	100.0%
15	0.0%	100.0%
16	60.0%	40.0%
17*		
18	0.0%	100.0%
Average value	28.8%	71.2%

* Farms not yet in production

Only a small portion of production, about 10.7 percent of the total destined for the national market, it is sold locally or provincially. A similar share of 10.9 percent remains in the region, while 78.4 percent is distributed throughout our country (Table 18).

Table 18 – Destination of the product domestically

Enterprise	National Destination		
	Provincial	Regional	National

1	5.0%	0.0%	95.0%
2	0.0%	20.0%	80.0%
3	100.0%	0.0%	0.0%
4	0.0%	0.0%	100.0%
5	0.0%	70.0%	30.0%
6*			
7	0.0%	10.0%	90.0%
8	5.0%	0.0%	95.0%
9	0.0%	0.0%	100.0%
10	0.0%	0.0%	100.0%
11	20.0%	30.0%	50.0%
12	NC	NC	NC
13	100.0%	0.0%	0.0%
14	17.0%	17.0%	66.0%
15		50.0%	50.0%
16	10.0%	0.0%	90.0%
17*			
18	60.0%	40.0%	0.0%
Average value	10.7%	10.9%	78.4%

* Farms not yet in production

In 2022, a total production loss of about 2,429 T was declared, equivalent to more than 30 percent of the production sold, the causes of which were largely attributed to high summer temperatures and storm surges (Table 19).

Table 19 – Estimated product lost in 2022 and its justification

Enterprise	Amount of product lost	
	Ton.	Reason
1	300.00	Storm surge
2	200.00	temperature
3		
4	300.00	Storm surge
5	160.00	temperature, Storm surge
6*		
7	200.00	temperature
8	250.00	temperature
9	500.00	Storm surge
10		NC
11	4.00	temperature
12		NC

13	300.00	temperature
14		
15	0.05	Storm surge
16	200.00	Storm surge
17*		
18	15.00	temperature
Total	2,429.05	

Farms not yet in production

Regarding production diversification, analysis of Table 20 shows that only three enterprises have attempted pacific oyster (*Crassostrea gigas*) farming in the past, with one continuing production until 2022. For the future, six companies declared that they have no interest in species other than mussels, the remaining were interested in undertaking oyster farming, both pacific and flat oyster (*Ostrea edulis*), while only one enterprise expressed interest in seaweed farming.

Table 20 – Other species farmed in the past or of future interest other than mussels

Enterprise	Other species farmed in the past		Interest in farming a second species in the future	
		Which species		Which species
1	no		no	
2	no		no	
3	yes	<i>Crassostrea gigas</i>	yes	<i>Ostrea edulis</i>
4	no		yes	<i>Crassostrea gigas</i> , Alge
5	no		yes	<i>Crassostrea gigas</i> e <i>Ostrea edulis</i>
6*				
7	no		yes	Ostriche
8	yes	<i>Crassostrea gigas</i>	yes	<i>Ostrea edulis</i>
9				
10	NC			
11	no		no	
12	NC			
13	no		no	
14	yes	<i>Crassostrea gigas</i>	no	
15	no		yes	<i>Crassostrea gigas</i> , <i>Ostrea edulis</i>
16	no		no	
17*	no		yes	Ostriche
18	no		yes	<i>Crassostrea gigas</i> , <i>Ostrea edulis</i>

Farms not yet in production

Breeding plant

The 18 companies covered by the survey manage 29 farms, four of which are located outside the borders of the Marche region: one in Abruzzo region, in the province of Teramo, and three in Emilia-Romagna region, in the province of Rimini (Table 21). The remaining shellfish farms are distributed as follows: eight in the province of Pesaro-Urbino, five in the province of Ancona, five in the province of Fermo, four in the province of Macerata, and three in the province of Ascoli Piceno.

Given the purpose of this survey, data display will be limited only to the 25 plants located in the sea facing the Marche region.

Table 21 – Provincial area location of breeding facilities

Province	Number
Pesaro-Urbino	8
Ancona	5
Fermo	5
Macerata	4
Ascoli Piceno	3
Teramo	1
Rimini	3
Total	29

Breeding facilities are located at a distance from the coast between 1 and 3 nautical miles, of which 11 are located between 1 and 1.9 nm, 11 between 2 and 2.8 nm, and three at 3 nm (Table 22).

Distance to port shows greater variability than distance to shore and falls within the range of 1.7 nm to 9.0 nm (Table 22).

The average depth is between 11 m and 14 m, with one facility with 11 m depth, six facilities with 12 m, 15 facilities between 13 and 13.5 m, and three with 14 m (Table 22).

Table 22 – Distance from the coast, harbour, and average depth of breeding facilities

Enterprise	Distance from the coast	Distance to port	Average depth
	nautical miles		meters
1	1.0	3.5	12.0
2	2.2	2.8	13.0
2	2.0	2.9	12.0

3	2.8	7.0	13.0
4	2.3	5.0	13.0
5	2.7	6.0	13.5
5	2.5	3.0	13.5
6	2.6	9.0	13.0
7	2.3	4.5	13.0
8	1.2	2.5	12.0
9	1.1	4.0	12.0
9	1.5	5.5	11.0
10	1.5	4.5	14.0
10	1.5	4.5	14.0
11	3.0	6.0	13.0
11	1.7	3.4	13.0
11	3.0	6.0	14.0
12	1.7	3.5	13.0
13	2.5	2.6	13.0
13	2.0	2.0	13.5
14	1.6	1.7	13.0
15	1.9	5.7	12.0
16	3.0	4.5	12.0
17	2.5	4.5	13.0
18	1.5	2.5	13.0
Min.	1.0	1.7	11.0
Max.	3.0	9.0	14.0

Regarding the size of shellfish plants, considered as linear meters of long line, the total length is 381,700 m, with a minimum value of 3,000 m and a maximum of 34,000 m (Table 23). Of these, six farms have lengths less than or equal to 10,000 m, nine plants have lengths between 12,000 m and 20,000 m, six plants have lengths between 21,000 m and 30,000, and only one plant has 34,000 m of long line. As for the remaining three plants, one is under renovation, one consists of poles placed at the bottom, and the third did not provide information.

Table 23 – Total length of rows and area under state concession

Enterprise	Overall row length	Surface water mirror
	Meters	sqm
1	25,000	1,325,780
2	6,000	317,616
2	14,000	795,500
3	8,800	1,127,500

4	19,300	1,000,000
5	10,000	1,500,000
5	18,000	1,000,000
6*		3,300,570
7	19,000	1,102,500
8	16,000	2,192,000
9	34,000	1,700,418
9	14,000	1,126,689
10	28,000	1,499,166
10	28,000	1,500,000
11	12,000	1,500,000
11	5,600	216,000
11	26,000	1,500,000
12	NC	1,490,000
13	6,000	360,000
13	28,000	1,500,000
14	20,000	2,000,000
15	21,000	1,102,500
16	20,000	1,312,500
17**		170,000
18	3,000	150,000
Total	381,700	30,788,739
Min,	3,000	150,000
Max,	34,000	3,300,570

* Farm under renovation; ** Farm with poles

The total area on which farms are located is approximately 30,789,000 square meters, with individual values ranging from 150,000 square meters to 3,300,570 square meters (Table 23). Of these, six areas have an area of less than 1,000,000 square meters, ten have an area between 1,000,000 and 1,499,000, seven are between 1,500,000 square meters and 2,000,000 square meters, and two areas exceed 2,000,000 square meters.

All farms are inside the maritime domain, with state concession. As shown in Table 24, two companies have been entrusted with part of the shellfish farming activity by two of the concessionaires. On the other hand, four enterprises also operate on state-owned concessions located outside the region.

Table 24 – Number of areas under concession or entrusted

Enterprise	N. Concession	
	Inside Marche region	Outside Marche region
1	1	

2		2	
3		1	
4		1	1
5		2	
6		1	
7		1	
8		1	
9		2	1
10		2	
11		3	1
12		1	
13		2	
14		1	
15		1	
16		1	1
Total		23	4
17	Entrusted		
18	Entrusted		
Total		2	

Vessels

There are 22 vessels serving shellfish farms. Of these, 14 are registered in the Minor and Floating Vessel Register as special service own-account use and eight have category V fishing licenses (Table 25).

In short, vessels in own-account use differ from those with V category licenses in that they have no crew register and can also be operated with non-professional licenses. They retain, like those of category V, the possibility of employment of processing personnel even those not registered with seafarers (excluding 'maritime' tasks) and the use of diesel fuel without excise duty (so-called "subsidized").

Table 25 – Type and number of vessels subservient to shellfish farm

Enterprise	Own account use	Category V	Grand total
1	1		1
2	1		1
3		1	1
4	1		1
5		1	1
6*	inactive		

7		1	1
8	1	1	2
9	3		3
10	3		3
11	1		1
12	NC		
13		1	1
14		1	1
15	1		1
16	2		2
17		1	1
18		1	1
Total	14	8	22

Seven of the 22 vessels are stationed outside the region, at the port of Cattolica, four in the port of Civitanova Marche, four in Porto San Giorgio, two in Numana, two in Senigallia, one in Fano, one in Pesaro and one in San Benedetto del Tronto (Table 26)

Table 26 – Port of stationing of boats subservient to shellfish farm

Port of stationing	Number of vessels
Cattolica	7
Civitanova Marche	4
Porto San Giorgio	4
Numana	2
Senigallia	2
Fano	1
Pesaro	1
San Benedetto del Tronto	1
Grand total	22

Table 27 shows the year of construction of the boats, from which it can be seen that three of them are less than or equal to 10 years old, nine are between 12 and 20 years old, and ten are between 21 and 32 years old.

Table 27 – Year of construction of vessels subservient to shellfish farm

Year of construction	Number of vessels
1991	1

1993	1
1996	2
1997	2
1998	1
1999	1
2000	1
2002	1
2003	2
2004	2
2007	1
2008	1
2009	1
2010	1
2011	1
2013	1
2015	1
2018	1
Total	22

Twelve vessels have fiberglass as their hull construction material, six have stainless steel, three have marine plywood and one is made of wood planking (Table 28).

Table 28 – Construction material of vessels subservient to shellfish farm

Construction material	Number
fiberglass	12
stainless steel	6
marine plywood	3
wood	1
Total	22

Regarding the size of the overall length, or maximum length, as shown in Table 29, there are three vessels with lengths less than 15 m, four between 15 and 15.9 m, five between 16 and 17.9 m, five between 18 and 18.9 m, three between 19 and 19.9 m, and two equal to or greater than 20 m. The minimum size is 12.46 m, while the largest is 21 m.

Table 29 – Overall length of vessels subservient to breeding facilities

Maximum length	Number
<15 m	3
≥15 <16 m	4
≥16 <18 m	5

Enterprise	N° annual boarders:	N° seasonal boarders
16	1	4
17	3	0
18	2	2
Total	80	31
Media	4.2	1.7
Min.	1	1
Max.	6	5

Processing Equipment

Two enterprises did not provide information. One is not yet active and one is equipped only with sorter and mussel socking machine on rope. The remaining companies are equipped with harvesting belt, ginning machine, sorter, and conveyor belts. Washing tunnel is present on only seven vessels. Only one vessel does not have a re-tubing belt machine, while two ginning machines are present on one vessel (Table 31).

Generally, when enterprises are dated by more than one boat one or two of them do not have equipment that is however present in the remaining boats, such as the washing tunnel or socking machine.

Two boats are also equipped with trans pallets for on-board handling of mussel pallets. Two boats are also equipped with cranes.

Table 31 – Processing equipment present on vessels slaved to breeding facilities

Enterprise	Harvesting belt	Ginning machine	Sorter	Conveyor belts	Washing tunnel	re-tubing belt machine	Other:
1	1	1	1	1	1	1	
2	1	1	1	1	no	2	
3	1	1	1	1	no	1	
4	1	1	1	1	1	1	crane
5	1	1	1	1	1	1	
6*							
7	1	1	1	1	no	1	
8	1	1	1	1	no	2	
8	1	1	1	1	no	no	
9	1	1	1	1	1	2	trans pallet
9	1	1	1	1		1	
9	1	1	1	1		1	
10	NC						
10							
10							
11	2	1	1	1	no	1	
12	NC						
13	1	1	1	1	no	1	

Enterprise	Harvesting belt	Ginning machine	Sorter	Conveyor belts	Washing tunnel	re-tubing belt machine	Other:
14	1	2	1	1	1	3	
15	1	1	1	1	no	1	
16	1	1	1	1	1	2	trans pallet
16	NC						
17	no	1	no	no	no		socking machine on rope, crane
18	1	1	1	1	no	no	
Total	18	19	18	18	6	21	

As for the number of employees, out of a total of 87 people, only one enterprise reported a female worker; the rest were male staff (Table 32).

The number of employees per enterprise ranged from a minimum of two to a maximum of 16, while the overall average value was 5.8 employees.

Table 32 – Number of employees per enterprise

Enterprise	Women workers	Men workers
1	0	6
2	1	2
3	0	5
4	0	6
5	0	5
6*		
7	0	5
8	0	5
9	0	16
10	NC	
11	0	5
12	NC	
13	0	4
14	0	6
15	0	3
16	0	10
17	0	4
18	0	4
Total	1	84
Average	5,8	
Min.	1	2
Max.	1	16

The only female employee is between 41 and 50 years old. Male employees are largely distributed between the ages of 21 and 60. Considering the total number, with age below 21 there is only one female employee, accounting for 1.1 percent of the total, and above 60 we have 4 employees, accounting for 4.7 percent of the total (Table 33 - Figure 8). About 54% are under 40 years of age.

Table 33 – Distribution of employees by age group

	< 21	21-30	31-40	41-50	51-60	> 60
Male	1.2%	23.5%	29.4%	18.8%	22.4%	4.7%
Female				100.0%		
Overall	1.1%	22.5%	28.1%	19.1%	21.3%	4.5%

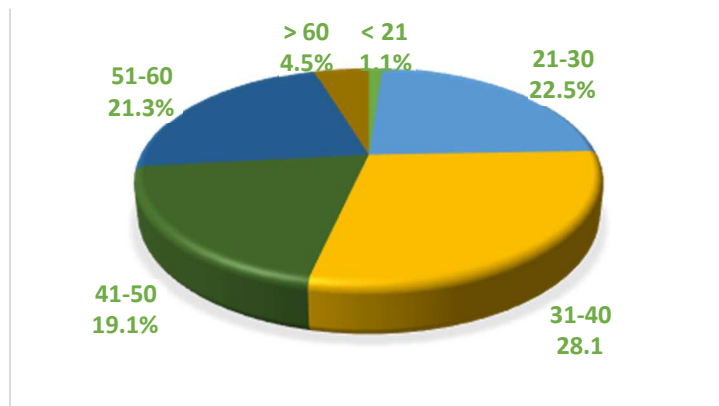


Figure 8 – Graphical representation of the distribution of employees by age group

As shown in Table 34 and Figure 9, 55.3 percent are from Italy, 38.8 percent are from outside the EU, and 5.9 percent are from EU countries.

Table 34 – Nationality of employees

Italian	UE	Extra UE
55.3%	5.9%	38.8%

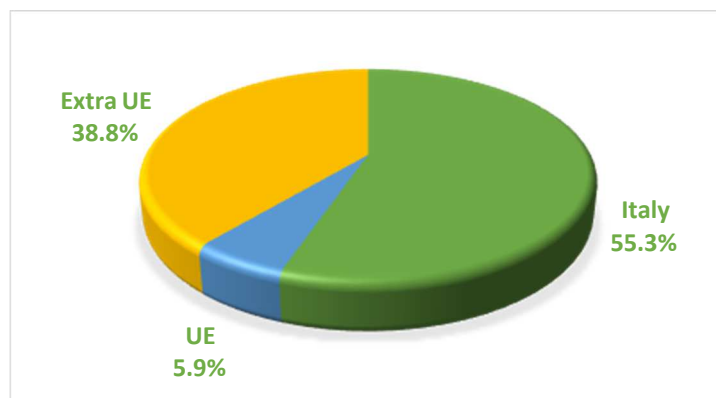


Figure 9 – Graphical representation of the composition of employees by nationality

Four of the businesses surveyed, or about 26 percent, claimed to be family-owned, employing two family members in two businesses and three family members in the remaining two businesses.

Schooling

The level of schooling of the employees is shown in Figure 10, where it can be seen that 61.3 percent have a middle school license, 21.3 percent have an elementary school license, and 17.3 percent have a high school diploma.

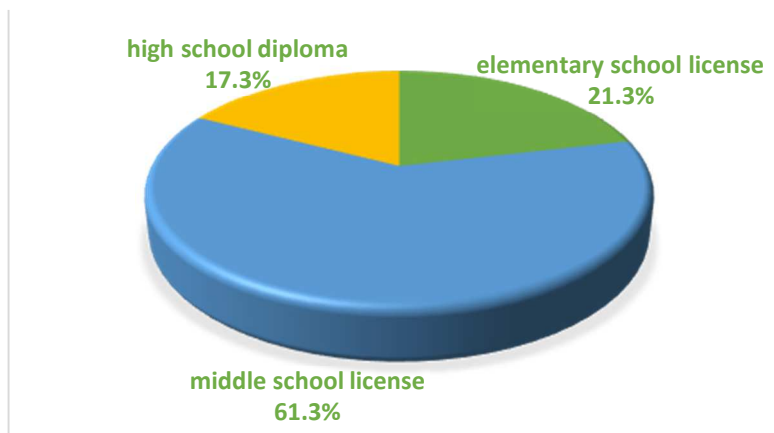


Figure 10 – Degree of schooling of employees

Acceptability of aquaculture

All but one of the companies stated that their aquaculture activity is perceived positively or very positively in the area, and they found no reason for friction with other activities or the local community. Only one enterprise stated that it perceived some hostility toward it.

The product, according to all interviewees, also meets with favour among customers and is appreciated by consumers, but, according to one producer, is not yet adequately known.

Regarding the benefits that aquaculture enterprises are believed to have brought to the area, 11 out of 15 respondents believe that their activity has helped to bring jobs and provide a quality 0 Km product, while in three cases reference is made to a contribution toward improving the quality of the marine environment.

Among the negative consequences that could result from their activity, only two respondents refer to the possible pollution produced by plastic nets abandoned in the sea. The rest believes with no negative consequences.

Regarding the possible interest turned to also undertake a fish tourism activity ten said they were interested in considering this activity and three of these farmers said they already practice fishing tourism and/or fish tourism. Five enterprises stated that they had no interest in this form of diversification.

Aggregation

Eleven of the 15 enterprises that provided information reported being or joining cooperative structures, while the remaining four are not part of the cooperative system.

Five enterprises, although part of cooperatives, carry out their activities independently and disentangled from cooperatives (they are dealers in their own right and adhere to service coops).

Three enterprises attempted forms of collaboration with other producers but failed. The reasons given for the failure are diverse and lie in reasons of friction between farmers, to the unwillingness to cooperate attributed to the rest of the farmers, and to the failure and change of management of some enterprises.

Only one enterprise states that it participates, albeit indirectly through the trade association to which it belongs, in international industry committees. Only one respondent does not join to farmers association.

When asked what the benefits of integrated business management with other firms might be, most respondents see benefits, including knowledge sharing, increased protection, reduced production costs, increased ability to manage the market and influence industry policy, and increased ability to influence policies to support the industry through grants and incentives. Only two respondents expressed no opinion on this issue.

All of the respondents also said that collaboration among livestock farmers fosters the possibility of innovation in the sector, and as many as ten enterprises said they have collaborated with facilities involved in scientific research.

None of the enterprises are members of producer organizations, but with the exception of a single respondent, the remaining breeders all said they would be interested in positively considering a membership if the conditions for one were in place.

Training

Regarding the acquisition of information pertaining to the industry most respondents say they learn it through the farmers' association, to a lesser extent the cooperative they belong to, dialogue with other farmers and research institutes are cited as sources. For all respondents these are considered reliable sources. However, all operators state that they maintain constant dialogue with other operators.

Regarding participation in training courses, seven of the respondents answered positively, while eight did not attend any courses.

With regard to employees, the number of enterprises that have not conducted courses increases to 11, while those that have submitted training courses to employees is limited to four. However, the vast majority of enterprises, 11 out of 15, are satisfied with the preparation of their workers. The rest say they are not very satisfied.

As for the suggested topics that should be part of the training programs, these cover: basics of aquaculture, safety at work, environmental and sanitation notions, business management and marketing, diving notions, and the acquisition of seafaring skills. It is also suggested to encourage the attendance of training internships at farming facilities.

Investments

From a business management perspective, eight of the 15 respondents said they follow their own business plan.

In terms of investment, 11 enterprises state that they invest in their business at least annually or more frequently. The remainder state that they do so only when they have sufficient economic resources or when opportunities for financial support from the public arise.

In general, investments are largely for equipment purchase, safety and, to a lesser extent, expansion of livestock facilities.

Nine enterprises stated that they invest most of the annual income in their farm, one invests more than 50 percent, the remaining values ranging from 30 percent to 3 percent.

Product distribution

Regarding the ability to distribute their products in the market, the surveyed enterprises are equally divided between those that have encountered or are encountering problems in marketing and those that do not have this problem. The main customers consist mostly of

wholesalers, followed by other farms and retailers. Two businesses have catering as their main customers.

All respondents stated that they have a percentage, more or less high, of regular customers. Of these, ten have more than 70 percent regular customers, two about 50 percent, and two less than or equal to 30 percent.

Only one enterprise stated that it was unclear about consumer preferences, while the remainder believed that these corresponded primarily to product quality characteristics and secondarily to the possibility of having a clean, ready-to-use product available.

Only three companies have been involved in promotional activities for their products, consisting of participation in local festivals or information events by farmers associations, while the remainder have never participated in these types of initiatives.

The major problems related to product marketing and customer relations consist mainly of customer solvency and strong competition among producers, while to a lesser extent the need to enhance production, loss of harvested product due to poor shelf life, in the case of retail sales reconciling production and marketing activities on their own (packaging and delivery to customers), and bureaucratic procedures related to the various stages of production and marketing were highlighted.

Innovation

Recent innovation adoption

Regarding the adoption of innovations in recent times, 12 enterprises said they had adopted technological innovations, four innovations in the environmental field and three innovations in the social field (Table 35).

Table 35 – Innovation adopted by enterprise

Enterprise	Innovation adopted		
	Technology	Environmental	Social
1	no	no	no
2	yes	no	no
3	yes	no	no
4	no	no	no
5	yes	no	yes
6	NON ATTIVO		
7	no	no	no
8	yes	yes	no
9	yes	no	no
10	NC		

Enterprise	Innovation adopted		
	Technology	Environmental	Social
11	yes	no	no
12	NC		
13	yes	no	no
14	yes	no	yes
15	yes	yes	yes
16	yes	no	no
17	yes	yes	
18	yes	yes	no
Total yes	12	4	3
Total no	3	11	11

Future needs in terms of innovation

Boat

Five enterprises expressed the need to make changes to their boat or have new innovative boats. These included having boats of larger size and greater carrying capacity, more sustainable and with lower environmental impact, suitable and structured for oyster farming.

On-board processing equipment

Nine companies expressed a need for innovation in on-board processing equipment. In addition to a generic request for innovative machinery, the need for machinery that provides more thorough cleaning of the product without damaging it and for machinery to use non-plastic mussel nets was highlighted. There is also a need for equipment to facilitate oyster processing operations on board.

Shellfish farm

In this case, the major need, highlighted by four enterprises, was to strengthen the tightness of shellfish farms. Added to this, by one enterprise, was the need to overcome the use of plastic nets. The rest of the respondents have no opinion on this issue.

Breeding techniques

Seven companies were favourable toward new breeding techniques or improvement of existing ones. Two respondents would like to test systems without the use of plastic nets, such as New Zealand continuous rope or in biodegradable materials. There is also a general interest in unspecified innovative techniques.

Trademarks and product certifications

Only five respondents expressed interest in adopting product brands or certifications. Only one of these makes explicit their intention to adopt organic certification. The rest do not comment on the type.

Professional training

Seven enterprises express the need for training aimed at staff. The rest of the respondents do not believe there is a need for innovation in this area.

Financial instruments

Only one company believes it would be useful to introduce new financial instruments to support business.

Environmental Sustainability

Eleven respondents believe it is necessary to introduce innovation aimed at improving the sustainability of the production process. Of these, eight would like solutions to reduce the use of plastics.

Effectiveness of existing measures in adopting innovation

Seven out of 15 firms rate the current policy on adopting innovations as wholly inadequate to achieve the goal. In contrast, six firms believe it is adequate, although the view is expressed that more could be done and with fewer bureaucratic constraints.

All respondents expressed willingness to participate in a pilot application prior to adoption of the innovation.

Only one stated that he did not need to acquire substantial skills and knowledge before adopting a technological innovation. While the rest felt it was necessary to acquire more knowledge about it.

Knowledge of eco-innovation, or environmental innovation, in aquaculture is known by ten respondents, while five state that they are not aware of it.

Eleven respondents do not know the meaning of the principle of "Blue Growth," while three associate it with the principle of sustainability. Once the meaning is exposed, seven respondents believe that their company is included in the "Blue Growth" concept.

Only five respondents said they had attended meetings or events where the topic of innovation and the future of aquaculture was addressed, organized by industry associations or at trade shows.

All participants felt that the main motivations for adopting innovations were, in equal levels of importance, increasing profitability, increasing sustainability and resilience, safeguarding the environment, and facilitating and easing processing operations.

Good practices to be adopted to improve the sustainability of shellfish enterprises by the majority of respondents include proper waste management and reducing the use of plastics. Reducing fuel consumption, staff training and information on environmental issues are also indicated.

Most enterprises, 11 out of 15 respondents, believe that adopting existing quality certificates could benefit their businesses.

Compared to the obstacles limiting the adoption of innovation, financial availability and bureaucracy are mainly mentioned. Added to these are the difficulty of participating in innovation projects and the fear that they will not lead to the expected results.

Among the innovation experiences introduced by the companies interviewed are, the installation of solar panels on a vessel, the adoption of sorters equipped with hydraulic "hands" that alleviate the work of personnel and speed up time, and the adoption of electric pallet trucks on board for handling loads.

On the other hand, activities aimed at the introduction of flat oyster farming and marketing, the farming of white dates (*Pholas dactylus*) and the pacific oyster have been abandoned.

European Union integrated maritime policy and funding tools for its development

The majority, 8 out of 15 respondents, are not aware of EU policy on fisheries and aquaculture, and only four believe that the current management rules of EU maritime policy are effective in supporting aquaculture activity.

The vast majority of firms, 12 out of 15, have participated in calls for access to European funding, generally without encountering major difficulties, although an excess of bureaucracy is reported by one firm and, by another firm, the problematic issue related to the requirement of submitting the document of regularity of contribution (DURC).

The 12 enterprises that participated in European calls all received the requested funding. Seven using the EMFF program, two using the EFF program, and three with access to both programs.

For ten of these enterprises, the funding received was adequate to cover the costs of the actions for which it was intended, while two enterprises stated that it was insufficient.

When asked what are the main challenges of aquaculture enterprises that the European maritime policy should help to overcome, the answers appear to be very mixed: climate change, stagnating growth in the sector, bureaucratic burden, market management, consumption of EU aquaculture products, and rising production costs. A few actions were also indicated in this regard, such as greater consideration for the sector, attention to small producers, and greater protection for the sector and businesses.

Discussion

As also highlighted in previous surveys, the regional shellfish sector is evolving but not in a constant sense. In fact, the analysis of Table 36, which shows some of the most significant parameters of the sector, shows that over the 15-year period from 2008 to 2022, the greatest increase occurred in the transition between 2008 and 2019, from 16 to 22 enterprises, from

20 to 27 state concessions, and from 27 million sq. m. to 33 million sq. m. of area. In the following five years, from 2019 to 2022, however, a decrease in the number of enterprises and the total number and area of water surfaces under concession is observed. Against the decrease in the latter parameters, an increase in production, production capacity, expressed by total long line meters, and average productivity is observed, the latter rising from 13.5 kg per long line meter to 16.0 kg per long line meter. Increase that is most likely higher than the present survey found, given that the regional production figure reported for 2021 was about 8,000 T, and the number and size of enterprises that did not provide the production figure in the present survey is higher than in 2019.

Table 36 – Evolution of some of the main parameters of regional shellfish farming

year	enterprise	concession	sqm	Ton.	Long line meter	Kg/m	€/Kg min	€/Kg max
2008	16	20	27,313,000					
2019	22	27	33,091,165	4,412.44	326,600	13.51	0.59	0.90
2023	19	24	31,050,739	6,102.10	381,700	15.99	0.75	1.60

Another indicative figure is the change in the selling price, where the minimum has gone from € 0.59/kg to € 0.90/kg and the maximum from € 0.90/kg to € 1.60/kg.

This information, together with what emerged in the course of the survey, leads one to believe that a gradual settling of the sector is underway, which followed of an expansion, which occurred a between the late 1990s of the last century and the first decade of the 2000s, unsupported by adequate preparation of operators and most likely stimulated by the availability of financial instruments to support the development of the sector.

A strong contribution to this evolutionary process also came from the participation of companies based outside the regional territory, about 40 percent of the total number, which, in addition to setting up new establishments, on several occasions took over local companies in difficulty.

From what emerges from the general analysis of the European and national shellfish sector, related trade flows and consumption, the prospects for the future, net of environmental variables, suggest that there is still space for further development of this sector. Especially if also oriented towards a diversification of production aimed at species such as oysters, which have good market potential. In fact, our country against a production of about 180 T, in 2020 consumed about 5,000 T of oysters, mostly from France and other European countries. By now, oyster farming is spreading more and more among Italian farmers, reaching remarkable levels of quality that have little to envy to foreign production realities, and companies are springing up that are dedicating themselves to oyster farming alone, even abandoning mussel farming, aware that it is a farming practice that needs care in all its phases.

At present, oyster farming in Italy is aimed exclusively at the pacific oyster (*Crassostrea gigas*), but, especially as far as the Marche region is concerned, there are good prospects for introducing the culture of flat oyster (*Ostrea edulis*), the European oyster par excellence, considering that off the coast of this region there are abundant natural beds of this species, which could be exploited directly or by going through quality improvement practices on long line or by recruiting juveniles with which to start a real breeding cycle.

After all, almost all interviewees expressed interest in introducing oyster farming among their activities, which suggests that there may be positive developments in this regard soon.

Regarding the regional shellfish sector as a whole, the picture that emerges from this survey can be considered positive, not only with reference to structural and production factors, but also, and above all, in relation to the social context in which this takes place and the constructive approach and propensity for collaboration and innovation demonstrated by most of the companies surveyed. This is even though issues related to the loss of some production due to climate warming and intensified storm surges were highlighted.

Shellfish farming is generally positively accepted by the area, and the farmers are aware that they bring a contribution in terms of providing jobs and quality product, although they do not underestimate the aspect related to the possible dispersion of plastic material consisting of sections of mussel nets. Currently, there are no forms of aggregation with broad territorial significance, such as consortia or local associations, in the region. Except for only one enterprise, the remainder all belong to a national trade association (A.M.A. - Associazione Mediterranea Acquacoltori), from which they claim to draw information pertaining to the development of the sector. However, most of the companies see advantages in collaborating with other companies both commercially and in the more political and representative aspects, so much so that almost all of them value a possible establishment of a Producers' Organization (PO). The importance of collaboration with scientific research facilities is also recognized.

Although the preparation of their employees is judged satisfactory, the responses received indicate a lack of training activities on the main issues affecting farm management, including the relationship with the environment, safety, and sanitation issues. The need for first hand training on business management and marketing is also highlighted.

One of the positive aspects for the future of the sector is the constant investment toward their business declared by most respondents, committing their own funds and, when available, accessing sector financing.

From the point of view of marketing their production, the situation of the enterprises is not homogeneous, on the one hand there are realities that encounter problems in distribution and on the other, just as many enterprises that do not encounter this problem, although they have similar ways in their commercial approach. For all of them, in fact, the main customer is

wholesalers, although direct sales to retailers and catering is quite widespread. The latter carried out mainly by smaller firms with reduced production. What emerges, however, is the lack of well-defined business strategies and widespread promotion of their product. There is still a minority interest in product trademarks or certifications and only two enterprises, in fact, have their own trademarks and one of them has started marketing processed product associated with other local products under the "Oro del Conero" trademark (<https://orodelconero.it/>). There is also a need to overcome issues such as excessive competition among producers and the solvency of buyers. Overall, a good inclination toward innovation, especially technological innovation, aimed at processing equipment, vessels, and breeding facilities, is affirmed. So is the need to introduce innovations that can increase the degree of sustainability of the production process, especially regarding the reduction of plastics. There is in fact a widespread awareness that they are part of those activities that fall under "Blue Growth" and that this should also be at value by adhering to quality certifications. The availability of finance and the burden of bureaucracy weigh on the introduction of innovation, but all companies have expressed their willingness to participate in pilot projects to evaluate their real effectiveness.

European sector policy is not well known by the entire sector, but most companies have nonetheless made use of the EU financial instruments made available, considering them adequate for the actions undertaken. There is no shortage of criticism, however, directed at the excessive bureaucratic burden in the preparation of funding applications and the type of requirements.

Regarding the future of European sector policy, the priorities expressed are heterogeneous, but they capture what are now recognized as the main obstacles to be addressed, such as climate change, stagnating growth in the sector, bureaucratic burden, market management, consumption of EU aquaculture products, and rising production costs.

Conclusion

Overall, the picture that emerges from this survey is that of a sector in which, as is natural, different realities coexist, differentiated generally by the size of the farms, which, although on a path not without difficulties, have somehow found their own balance. Larger firms are more projected toward broader markets, including abroad, while smaller firms mainly target a more local market, which is closer to the consumer, placing value on the link with the territory.

However, they are all united by certain key themes, such as the greater valorisation of production, environmental sustainability, the search for comparison and aggregation among operators, the need for innovation, and the training and qualification of employees. To which is added the defence of businesses from risks derived from climate change and, although not directly revealed by the survey, from events that burden the general development of

economic activities, such as the Covid emergency and the conflict in Ukraine. Discussions with businesses also revealed some of the answers that may in some way enable them to face, with greater serenity and effectiveness, the challenges they will inevitably face. There is, in fact, a good propensity to collaborate and an awareness that forms of aggregation can foster a better approach toward the pitfalls of the market and, while respecting territorial peculiarities, in the enhancement of production. Just as there is a good propensity toward confrontation with research sector and the process of innovation that can arise from this relationship. There is also a well-established awareness that it is among the most environmentally sustainable activities and that this value must be reinforced through the introduction of practices that are increasingly attentive to the impact on the environment.

These processes cannot be addressed by farmers alone and require strong support from institutions, local, national and EU.

There are many expectations for the sector's new financial instrument, the FEAMPA, whose National Operational Plan envisages support for both structural interventions, with particular attention to the principle of sustainability, and aimed at encouraging product aggregation and marketing. An instrument that appears to be more ductile than its predecessor, allowing it to be declined in relation to the specific needs of the territory. Going to encourage greater attention to local issues, which can often be an obstacle to business development even though they may appear to be of lesser importance than the major structural issues, such as port services, including waste collection, or facilities and space for loading and unloading product. Other issues to consider are access to credit for the unfunded portion, procedures for participating in calls for proposals, and the timing of grants once projects are completed.

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Annex 1 - Environmental sustainability and quality certification marks

Introduction

The production of both fished and farmed shellfish lends itself to being enhanced through voluntary quality standards, especially the clam, baby clam, and mussels, also since they are among the flagship products of Italian fishing and aquaculture-mariculture.

There are several marks recognized at national and/or community level, aimed at certifying the fishing or shellfish farming supply chain.

However, while recognizing the strategic value of adopting production marks and specifications, fishermen and farmers are reluctant to adopt them because the certification process is complicated and the costs are considered, sometimes wrongly, high.

There is in fact usually a preliminary pre-certification phase, involving internal and external staff, which is followed by certification that is subject to periodic reviews by accredited certifying bodies.

On the other hand, the adoption of labels by these production chains would make the products more "attractive" to marketing by large-scale retailers, increasing market opportunities for both bivalve molluscs and caught and farmed gastropods, and improving visibility by consumers.

Some of the many brands in the agribusiness sector are reviewed below in order to identify those that represent a possible resource for the aquaculture supply chain under analysis.

Status

In recent decades, all sectors of the agri-food industry have focused heavily on quality brands to enhance the economic value of their products. This has led to a proliferation of brands with different purposes and varying degrees of credibility. It is important to note that for a brand to be economically appealing, it must associate quality with widespread recognition.

Regarding the objectives of certifications, we can broadly divide them into two categories: food-related and environmental. As early as the 1990s, the European Union established specific regulations concerning food quality brands linked to territory and tradition: PDO (Protected Designation of Origin), PGI (Protected Geographical Indication), and TSG (Traditional Specialties Guaranteed).

In order to promote and disseminate typical and high-quality Italian agri-food productions and enhance the competitive capabilities of the national agri-food system, within an integrated program for the valorisation of the national cultural, artisanal, and tourist heritage, there are products known as Traditional Agri-food Products (PAT). Traditional agri-food products are those whose processing, preservation, and maturation methods have been consolidated over time.

For the identification of traditional agri-food products, the regions and autonomous provinces of Trento and Bolzano verify that the methods are uniformly practiced within their territory, following traditional rules that have been maintained for a period of not less than twenty-five years.

These administrations are required to submit updated lists of PAT to the Ministry of Agriculture, Food Sovereignty and Forestry every year by April 12th, as stipulated in Ministerial Circular No. 10 of December 21, 1999.

The Ministry of Agriculture, Food Sovereignty and Forestry annually publishes the list of traditional products in accordance with the Ministerial Decree of September 8, 1999. The latest update of the list was published on March 28, 2022.

As for environmental quality certifications, the European Union has also regulated organic farming by establishing criteria for organic production and labelling of organic products, identifiable by the BIO logo.

In addition to that, there are other certifications provided by non-governmental organizations. The ones that seem to be gaining prominence today are the Marine Stewardship Council (MSC) for fisheries, the Aquaculture Stewardship Council (ASC) and GLOBALG.A.P. (Good Agricultural Practice) for aquaculture. These certifications emphasize environmental sustainability and social responsibility as key principles.

PDO, PGI and STG

Currently in Italy there are 321 (updated to 23 March 2023) overall the PDO, PGI and TSG brands, of which only 6 concern the product category "Fish, molluscs, fresh crustaceans" (table below). If we specifically focus on marine fish products, there are only 3: the IGP "Salted Anchovies from the Ligurian Sea," the DOP "Colatura di Alici di Cetara" (anchovy sauce from Cetara), and the PDO "Cozze di Scardovari" (mussels from Scardovari) (Table 37).

Table 37 – List of registered PDO, PGI and TSG products of fish, shellfish and crustaceans

N	Name	Cat	TYPE	Regulation number CEE/CE/UE	Date of publication in GUCE/GUUE	Region	Province
2	Acciughe sotto sale del Mar Ligure	I.G.P.	Fresh fish, shellfish, crustaceans	Reg. CE n. 776 del 04.08.08 Reg. UE n. 1577 del 05.09.17	GUCE L 207 del 06.08.08 GUUE L 239 del 19.09.17	Liguria	Genova, Imperia, Savona, La Spezia
71	Colatura di alici di Cetara	D.O.P.	Fresh fish, shellfish, crustaceans	Reg. UE n. 1529 del 14.10.20	GUCE L 349 del 21.10.20	Campania	Salerno
81	Cozza di Scardovari	D.O.P.	Fresh fish, shellfish, crustaceans	Reg. UE n. 1200 del 25.11.13	GUUE L 315 del 26.11.13	Veneto	Rovigo
269	Salmerino del Trentino	I.G.P.	Fresh fish, shellfish, crustaceans	Reg. UE n. 474 del 07.05.13 Modifica minore	GUUE L 138 del 24.05.13 GUUE C 255 del 04.08.15	Prov. Aut. di Trento, Lombardia	Trento, Brescia

N	Name	Cat	TYPE	Regulation number CEE/CE/UE	Date of publication in GUCE/GUUE	Region	Province
294	Tinca Gobba Dorata del Pianalto di Poirino	D.O.P.	Fresh fish, shellfish, crustaceans	Reg. CE n. 160 del 21.02.08	GUCE L 48 del 22.02.08	Piemonte	Torino, Asti, Cuneo
298	Trote del Trentino	I.G.P.	Fresh fish, shellfish, crustaceans	Reg. UE n. 910 del 16.09.13 Modifica minore	GUUEL 252 del 24.09.13 GUUE C 255 del 04.08.15 GUUEL L 55/40 28.2.2022	Prov. Aut. di Trento, Lombardia	Trento, Brescia

While it is true that this type of branding naturally has a broad territorial impact, potentially involving all producers within a specific area, the high-quality standards and costs involved often restrict the number of interested parties. Furthermore, the process of recognition by EU institutions and the use of these brands is quite complex.

The EU procedure for registering PGI and PDP is similar. Applicants for PDO brands must demonstrate that the quality or characteristics of a product are essentially or exclusively due to natural and human factors within the specific geographical area. On the other hand, applicants for GPI brands must demonstrate that the product is specific and enjoys a reputation or characteristic derived from its production within the relevant area.

To register a product name as a geographical indication, the following steps must be followed:

- The product must be defined according to a production specification, including a description of the product itself and its link to a specific geographical area.
- The application for the registration of a geographical indication must be submitted by the applicant group to the competent authorities of the Member State.
- The application is examined by the national authorities of the Member State and is subject to a national opposition procedure. Once this phase is completed, the authorities make a decision on approval and submit the application to the European Commission.

The applications for the registration of geographical indications must be submitted by producer group, which can be any association of farmers, producers, and/or processors producing the same product. Even individual producers can be treated as a group of producers when they meet specific legal requirements.

Once registered, any producer based in the geographical area and that satisfies the conditions set out in the product specification, even if it did not initiate the registration, will be entitled to use the registered geographical indication.

Recognition and registration process are also not short. The European Commission has a maximum of six months to examine the application and decide whether the product should be protected under the relevant quality scheme. The EU registration process takes approximately 18 months, in addition to the national procedure.

Upon receiving the application for a geographical indication, the European Commission examines it. If the conditions specified in the applicable regulation are deemed to be met, the Commission publishes the application in the Official Journal of the European Union.

From the date of publication in the Official Journal of the European Union, authorities of a Member State or a third country, as well as individuals or legal entities with a legitimate interest, may submit an opposition to the Commission. The period for filing an opposition varies depending on the applicable regulation.

Widening the gaze to the European Union, for the category "Fish, molluscs, crustaceans fresh" the products concerned by protection with PDO and PGI brand, presented, published, or registered, are 51.

Those pertaining specifically to shellfish are shown in Table 38.

Table 38 – PDO-GPI-marked products registered for the category "Fresh fish, shellfish, crustaceans"

product name	marchio	species	country	process status
Bohusläns blåmusslor	D.O.P	<i>Mytilus edulis</i>	Sweden	published
Bulot de la Baie de Granville	I.G.P	<i>Buccinum undatum</i>	France	registered
La Coquille St Jacques des Côtes d'Armor	I.G.P	<i>Pecten Maximus</i>	France	registered
Grebbestadostron	D.O.P	<i>Ostrea edulis</i>	Sweden	published
Huîtres de Normandie	I.G.P	<i>Crassostrea gigas</i>	France	submitted
Huîtres Marennes Oléron	I.G.P	<i>Crassostrea gigas</i>	France	submitted
Malostonska Kamenica	D.O.P	<i>Ostrea edulis</i>	Croatia	registered
Mexillón de Galicia	D.O.P	<i>Mytilus galloprovincialis</i>	Spain	registered
Moules de Bouchot de la Baie du Mont-Saint-Michel	D.O.P	<i>Mytilus edulis</i>	France	registered
Novigradska dagnja	I.G.P	<i>Mytilus galloprovincialis</i>	Croatia	published

There is only one gastropod product for the rest are bivalve molluscs, oysters, mussels and a pectinid.

Traditional Food Products (PAT)

PATs are being continuously updated, in May 2016 there were a total of 4,965, of which only 148 were in the category of "preparation of fish, shellfish and crustaceans and special techniques for raising them," as summarized in Table 39.

Table 39 – List of Traditional Agri-Food Products as of 2016

The latest summary table available on the Ministry of Agriculture website is for the 20th revision in February 2020 (Table 40).

Table 40 - List of Traditional Agri-Food Products as of 2020

Prodotti agroalimentari trazionali 2020 XX Revisione												
Regione/Prov. Autonoma	Bevande analcoliche, distillati e liquori	Birre	Carni (e frattaglie) fresche e loro preparazione	Condimenti	Formaggi	Grassi (burro, Margarina, oli)	Prodotti Vegetali allo stato naturale o trasformati	Pasta fresche e prodotti della panetteria, della biscotteria, della pasticceria e della confetteria	Prodotti della gastronomia	Preparazioni di pesci, molluschi e crostacei e tecniche particolari di allevamento degli stessi	Prodotti di origine animale (miele, prodotti lattiero caseari di vario tipo escluso il burro)	Totale
Abruzzo	7	0	25	0	14	2	30	49	17	1	4	149
Basilicata	2	0	17	0	14	0	44	51	14	3	4	149
Calabria	11	0	28	1	23	3	73	86	12	21	11	269
Campania	21	0	59	0	57	5	235	116	28	10	21	552
Emilia-Romagna	12	0	47	3	12	0	58	173	79	8	6	398
Friuli Venezia-Giulia	7	0	44	3	15	3	47	20	8	13	18	178
Lazio	9	0	63	4	41	9	106	175	10	10	9	436
Liguria	7	1	27	10	17	3	105	77	42	7	4	300
Lombardia	7	1	70	0	62	2	30	76	5	5	4	262
Marche	7	0	30	4	12	7	42	46	1	1	4	154
Molise	5	0	32	0	12	0	30	69	0	10	1	159
Piemonte	8	0	68	5	50	1	94	102	0	3	11	342
Prov. Autonoma di Bolzano	5	0	16	0	14	1	18	35	0	0	1	90
Prov. Autonoma di Trento	8	1	35	0	15	1	16	24	0	1	4	105
Puglia	13	0	24	1	17	1	114	78	38	9	4	299
Sardegna	7	0	17	1	21	1	54	77	1	15	20	214
Sicilia	4	0	6	2	26	1	78	91	32	11	13	264
Toscana	8	0	80	2	34	3	192	121	0	10	11	461
Umbria	0	0	13	2	4	0	12	31	0	6	1	69
Valle d'Aosta	2	0	7	0	9	5	2	6	1	0	4	36
Veneto	11	0	101	0	34	1	118	75	3	22	15	380
Totale	161	3	809	38	503	49	1498	1578	291	166	170	5266

There have been two recent revisions, numbered 21 and 22, with updated lists published in the Official Gazette in March 2021 and March 2022, respectively. While the Ministry's website lacks a summary table for these revisions, regional lists are available. From examining these lists, we can see that the number of food products affected increased from a total of 5,266 in February 2020 (Tab..) to 5,333 in 2021, and further to 5,450 in March 2022.

Regarding the specific category mentioned earlier (preparation of fresh fish, molluscs, and crustaceans, and specific breeding techniques), there was an increase in the number of products from 148 in 2016 to 166 in 2020. There were no additional increases from 2020 to 2021, and the number reached 167 in 2022 with the inclusion of a single preparation related to the Puglia region.

Organic aquaculture

According to EUMOFA data, the total production of organic aquaculture in Europe was estimated at 74,032 tons in 2020, accounting for 6.4% of the total aquaculture production in the EU. This represents a 60% increase compared to the data reported for 2015, mainly driven by the growth in organic mussel production.

Mussels, with 41,936 tons, make up more than half of the total organic aquaculture production in the European Union. They are followed by salmon (12,870 tons), trout (4,590 tons), carp (3,562 tons), oyster (3,228 tons), and seabream/seabass (2,750 tons).

The main European producers of organic aquaculture are in Ireland (salmon and mussels), Italy (mussels and other fish species), France (oysters, mussels, and trout), the Netherlands (mussels), Spain (mussels and sturgeon), Germany, Denmark, and Bulgaria (mussels).

In Italy, the organic aquaculture sector is continuously developing in 2021, although absolute values are still modest. There are currently 69 companies distributed throughout the country, representing a 12.8% increase compared to 2020. Regarding their distribution, it is worth noting that two regions predominantly engage in this activity: 43% of organic aquaculture companies are located in Veneto, and 32% in Emilia-Romagna.

According to the Ismea report "Anticipazione Bio in cifre 2022," which includes an overview map of the distribution of facilities in the Italian peninsula, detailed information regarding the nature and type of species farmed is not provided. The report only offers a general indication.

However, it should be noted that in the Marche region, there are three mussel (*Mytilus galloprovincialis*) aquaculture farms with recent certification that are not yet listed on the website (Table 41).

Table 41 – List of shellfish farms with organic certification in Marche region

ACTIVE	NAME	SIGLA ODC	ODC NAME	HEADQUARTER
NO	Maricoltura biologica Marchigiana s.r.l. Società Agricola	IT-BIO-007	Bioagricert S.r.l.	Marche
SI	Andreatini Alberto	IT-BIO-009	CCPB S.r.l.	Emilia-Romagna, Marche
SI	Vi.l.mar s.s. Società Agricola	IT-BIO-009	CCPB S.r.l.	
SI	Mitili San Bartolo s.r.l. Società Agricola	IT-BIO-009	CCPB S.r.l.	

MSC, ASC, GLOBAL G.A.P.

Currently, it is difficult to trace seafood and aquaculture productions with the MSC, ASC, or GLOBAL G.A.P. certifications in Italy, unlike other parts of Europe. It should be noted that in terms of certified MSC productions, examples include 2,000 tons/year for Argentine anchovy (*Engraulis anchoita*) and 20,000 tons/year for Dutch mussels (*Mytilus edulis*). The Jersey oyster (*Crassostrea gigas*) is ASC-certified with a production of 700 tons/year.

There are no specific sections on the websites of national representatives of these certifications that provide lists and regional distribution of Italian companies adopting them. In the Marche region, ASC/GLOBAL G.A.P. is adopted by a long-standing trout farming company in the province of Macerata, while MSC and ASC certifications are held by a distributor of fresh and pre-mixed fish products in the province of Fermo. In 2018, a bivalve mollusk producers' organization in Veneto obtained the MSC certification.

Sustainable Aquaculture

DM n.7630 of February 4, 2020, recognizes the specification of the "Acquacoltura Sostenibile" (Sustainable Aquaculture) trademark by the Association for the Valorisation of Sustainable Italian Aquaculture Quality.

This brand is part of the National Livestock Quality System (SQN) established by the Ministry of Agricultural, Food and Forestry Policies (MIPAAF) with decree n. 4337 of March 4, 2011, in accordance with Commission Regulation (EC) No. 1974/2006 of December 15, 2006, on support for rural development by the European Agricultural Fund for Rural Development (EAFRD).

The goal of the trademark is to qualify aquaculture by improving product quality and the production process in terms of sustainability and the well-being of farmed organisms. It aims to "add value" to the products of the companies involved in the supply chain, while expanding their market opportunities.

The "Sustainable Aquaculture" certification can be used for various seafood products, including fresh refrigerated fish, fresh/live molluscs, packaged in modified atmosphere (ATM), vacuum-sealed, and pasteurized products. It can also be applied to processed fish products such as those packaged in ATM, vacuum-sealed, pasteurized, and smoked.

In order to use the certification, the producer must comply with minimum legal requirements as a prerequisite and adopt value-enhancing requirements that involve the origin and traceability of the products from eggs-larvae-fingerlings to commercialization. They must not use genetically modified organisms and must control the physicochemical parameters of the breeding water, which must meet specific threshold values.

The same rules must be applied for the use of feed in fish farming. Bivalve molluscs must be exclusively raised in production areas classified as A or B, as established by Regulation (EC) No. 2017/625. Unlike fish, there are no environmental parameters to comply with for molluscs, as there is no possibility of intervention in their case.

The certification also includes limiting the density of farmed organisms according to values defined in the regulations to promote animal welfare. Routine checks are performed to verify the health, welfare, and mortality rate of the individuals.

Adopting sustainable practices involves reducing waste of raw materials, implementing practices that promote material recycling, and responsible management and disposal of waste. Annual training updates for staff on workplace safety are required. The certification also encourages the integration of young people, graduates, and undergraduates into the workforce.

The activation or participation in agreements with universities and national/international research centres to provide internships for students or enrolment in the work-school registry is also part of the requirements.

Formalizing a supply chain agreement is necessary, involving not only breeders but also one or more of the following stakeholders: processors, packagers, and distributors. The supply chain

agreement, in addition to complying with the regulations, should also include a guaranteed minimum price for primary production, define the selling price, and ensure fair value distribution throughout the entire supply chain.

Currently, the only certified company is the Pescatori Goro Consortium, for the clam (*Ruditapes philippinarum*).

Slow Food Presidia

In recent years, a "cultural" brand has been added to the previously mentioned brands that focus on quality and sustainability of productions. This brand is known as Slow Food Presidia, along with the products included in the Ark of Taste, also by Slow Food. It should be noted that Slow Food Presidia support small traditional productions that are at risk of disappearing. They enhance specific territories, revive ancient crafts and processing techniques, and save indigenous breeds, vegetable varieties, and fruits from extinction. In Italy, there are currently 369 Slow Food Presidia, with only 14 related to "fish, seafood, and derivatives." On the other hand, the Ark of Taste gathers products that belong to the culture, history, and traditions from all over the world. It encompasses an extraordinary heritage of fruits, vegetables, animal breeds, cheeses, breads, desserts, cured meats, and more. In Italy, there are 1,178 products listed in the Ark of Taste, with only 27 related to "fish, seafood, and derivatives." Among these, 6 also have the Slow Food Presidium designation, resulting in a total of 35 products in this merchandise category protected by both Slow Food Presidia and the Ark of Taste.

Within the Marche region, there are 2 products included: the "Mosciolo Selvatico di Portonovo" (mussel - *Mytilus galloprovincialis*), protected by Slow Food Presidium, and the "Crocetta di Ancona" (pelican's foot - *Aporrhais pespelecani*), included in the Ark of Taste.

Other certifications and disciplines

Increasingly, large retailers adopt internal brands that select suppliers based on internal standards and audits to guarantee higher quality standards for specific productions and product lines.

To give examples from three well-known retailers, Coop adheres to the "Friend of the Sea" and "Dolphin safe" labels, ensuring that products under the "Coop-Pesca sostenibile" brand are fully traceable and do not come from illegal fishing activities or fishing vessels blacklisted for non-compliance with regulations protecting mammals or from fish stocks in crisis.

Another Coop standard, "Coop-Origine," guarantees that aquaculture products do not use antibiotics and adhere to low-density farming standards to ensure a healthy product in harmony with the production environment. The same standard applies to "Conad percorso qualità."

Esselunga has developed the internal brand "Pesca Sostenibile" (Sustainable Fishing): initially launched for freshwater fish, such as rainbow trout, raised in fresh, well-oxygenated mountain stream waters in Trentino, it has expanded to include marine fish such as sea bass and gilt-head

bream, raised following animal welfare principles, environmental respect, and rational use medications.

In general, large retailers aim to pursue the objectives and recommendations set by FAO, IUCN, and other supranational institutions for the conservation of fish stocks. This includes reducing non-selective and environmentally damaging fishing techniques and combating illegal activities that do not comply with regulations.

Certification costs

The costs of certification can vary significantly and depend on various factors, including the number and/or size of production units involved, the number of employees, production volumes, and revenues, as well as the technical expertise required for the preliminary evaluation prior to certification.

Indicatively, the costs range from a few thousand euros for certifications such as Organic and Sustainable Aquaculture to tens of thousands of euros for certifications like PDO, PGI, TSG, MSC, ASC, and GLOBAL G.A.P.

However, it should be noted that to assess the actual magnitude of the costs, including the particularly burdensome ones, estimates should be made on a per-production-unit basis. For example, if we consider significant productions of 1,000 tons per year, a total investment of 50,000 euros would translate to a certification cost of 5 cents per kilogram.

These costs do not include the necessary activities conducted prior to certification, which effectively "prepare" the company for the evaluation by the certification body. Internal and/or external resources can be utilized for these activities. It is advisable for the company to designate a point person internally to handle the preparation of all documentation required by the standard, to liaise with the certification body and other relevant organizations, and to manage the administrative procedures. Additionally, during the certification process, a qualified external consultant can provide support to the internal point person. The consultant can also offer training to improve the internal understanding and knowledge of the standard. In this case, the costs of external consultancy will need to be added to the certification costs.

Expectations and needs of stakeholders

The ongoing policy of stakeholders aims to reassure consumers and reduce the gap between producers and end consumers by investing heavily in communication. Certified products have proven to be an effective means of achieving these goals and gaining greater visibility. However, it is important to understand market trends and sensitivities and to determine the most appropriate responses to them.

The organized retail sector, particularly in relation to fresh and very fresh products, is showing increasing interest in certification, especially in terms of environmental and national product certifications. Some of the major retail groups are targeting visibility, which cannot be effectively

communicated through simple production regulations, as well as food safety and sustainability, especially for their own brand products.

Regarding the species considered most interesting in terms of different types of certifications, mussels are highlighted for organic certification, baby clams for MSC certification, and native clams for both organic and ASC certification.

Groups that cater to the final consumer are quickly moving towards introducing environmental labels for fresh products, while the evolution seems to be slower for retail and commercial catering groups.

Certifiable productions and producer orientation

The bivalve mollusc species that are currently potentially more interested in certification are the "lupin or wedge shell clam" (*Chamelea gallina*), the "mussel" (*Mytilus galloprovincialis*), and the "carpet shell clam" (*Ruditapes philippinarum* and *Ruditapes decussatus*). The first species is primarily wild-caught, and despite recent difficulties, national production is around 20,000 tons per year, mainly from the Adriatic Sea.

The other species are predominantly farmed, with average national production of approximately 60,000 tons per year for mussels and 30,000 tons per year for carpet shell clams. Despite their significant quantities and unquestionable and documented quality, some of these products suffer from low economic valorisation. For this reason, certifications can prove to be an important economic opportunity.

Currently, only one Producer Organization has requested and obtained MSC certification, as mentioned earlier. In July 2018, the Bivalvia Veneto Cooperative Society, in synergy with CO.GE.VO. (Consorzio Gestione Vongole) in Venice and CO.GE.VO. in Chioggia, obtained MSC certification for clam fishing in the Venetian area of the Adriatic Sea. This fishing activity was deemed sustainable and well-managed following an assessment conducted by an independent certification body. This was the first fishing activity to receive the most important sustainability certification not only in Italy but throughout the Mediterranean basin.

Since clam fishing is conducted in a similar manner in all marine compartments, this example can serve as a precedent for potential requests and acquisition of the certification by other Producer Organizations and Mollusc Management Consortia.

Regarding organic certification, as previously emphasized, it represents an important opportunity for the sector, both for mollusc production and fish farming, considering the recent commitment by the EU to support organic production until 2030 through the "Farm to Fork" strategy. This strategy also includes support from each Member State for conversion and consumer communication/awareness campaigns, backed by public entities (EU and national).

However, Regulation (EU) No. 2018/848 on organic production and labelling of organic products imposes a series of constraints that can nullify the benefits.

In fish farming, the required guarantee of animal welfare necessitates specific investments and additional labour. The obligation to separate organic production from conventional production requires the development of specific productions and facilities. The mandatory use of organic feed, which must come from organic aquaculture or certified fishing, as well as the organic certification of juveniles and fry, has a significant impact on production costs.

Organic fish farming may have lower yields due to the challenges in managing parasites, as the use of medications is limited for certification purposes. This inevitably leads to the need to reduce stocking density, which is another constraint to meet.

Furthermore, the non-admissibility of closed-loop aquaculture systems requires privileged locations for the facilities.

Regarding molluscs, the exclusion of productions located in areas classified as "B" that do not achieve the "good" ecological status according to Directives 2000/60/EC and 2008/56/EC could exclude shellfish farming companies that obtained certification before the entry into force of Regulation (EU) No. 2018/848. This poses a risk of excluding one of the largest sectors of national aquaculture production, consisting of over 30,000 tons of carpet shell clams annually, from the organic market.

Insights into some of the most popular certifications

PDO- Protected Designation of Origin

What it is

The European system of "protected designation of origin" (PDO) and "protected geographical indication" (PGI) for agricultural and food products was established in 1992 to harmonize and integrate existing protection rules in some European Union countries.

The term "designation of origin" refers to the name of a region, a specific place, or, in exceptional cases, a country that is used to designate an agricultural or food product with the following characteristics.

Principles/characteristics

The agricultural or food product must have the following characteristics:

- It originates from that region, specific place, or country.
- Its quality or characteristics are essentially or exclusively due to a particular geographical environment, including natural and human factors.
- Its production, processing, and preparation occur within the delimited geographical area.

Pathway for the recognition procedure

Who can apply:

European Regional Development Fund



www.italy-croatia.eu/argos



- An association of producers or processors dealing with the same agricultural product or food product, regardless of its legal form or composition.

How the procedure for recognition is initiated and developed:

- The association applies for recognition, including the specifications, to the Ministry of Agriculture, Food Sovereignty and Forestry, which initiates a three-phase procedure: investigative, community, and inspection. While the association is involved in the first two phases, in the third phase, which takes place after the product is registered in the Community Register, individual producers are involved.

What is the disciplinary

It is a fundamental and mandatory document that the association of producers or processors must have prepared, which includes at least:

- The name of the agricultural or food product, including the designation of origin or geographical indication.
- The description of the agricultural or food product, indicating the raw materials, if applicable, and the main physical, chemical, microbiological, or sensory characteristics of the agricultural or food product.
- The delimitation of the geographical area and, if applicable, the elements indicating compliance with other specific conditions.
- The elements proving that the agricultural or food product originates from the delimited geographical area.
- The description of the method of obtaining the agricultural or food product.
- The elements justifying the link between the quality or characteristics of the agricultural or food product and the geographical environment, as well as the link between a specific quality, reputation, or other characteristic of the agricultural or food product and its geographical origin.
- The name and address of the authorities or organizations responsible for verifying compliance with the provisions of the specifications, along with their specific tasks.
- Any specific rules for labelling the agricultural or food product in question.
- Any requirements to be complied with under community or national provisions.

Main normative reference

- REGULATION (EC) No. 510/2006 OF THE COUNCIL of 20 March 2006 on the protection of geographical indications and designations of origin for agricultural products and foodstuffs.

PGI - Protected Geographical Indication

Unlike PDO, PGI requires that only one or more stages take place in the delimited geographical area. For all other aspects, such as application, procedure, and specifications, the same rules as PDO apply.

What is it

"Indication of geographical origin" means the name of a region, a specific place, or in exceptional cases, a country, that is used to designate an agricultural or food product with the characteristics described below.

Principles/characteristics

Originating from that specific region, place, or country, and for which a particular quality, reputation, or other characteristics can be attributed to that geographical origin, and whose production and/or processing and/or preparation take place within the delimited geographical area.

Pathway for the recognition procedure

Who can apply:

- An association of producers or processors dealing with the same agricultural product or food product, regardless of its legal form or composition.

How the recognition procedure is initiated and developed:

- The association applies for recognition, including the specification, to the Ministry of Agricultural and Forestry Policies, which initiates a three-phase procedure: examination, community evaluation, and inspection. In the first two phases, the association is involved, while in the third phase, which takes place after the product is registered in the Community Register, individual producers are involved.

What is the disciplinary

It is a fundamental and mandatory document that the association of producers or processors must have prepared, which includes at least:

- The name of the agricultural or food product, including the designation of origin or geographical indication.
- Description of the agricultural or food product, including the raw materials used, if applicable, and the main physical, chemical, microbiological, or organoleptic characteristics of the agricultural or food product.
- Delimitation of the geographical area and, if applicable, the elements indicating compliance with other specific and precisely defined conditions.

- Elements that prove that the agricultural or food product originates from the delimited geographical area.
 - Description of the method of obtaining the agricultural or food product.
 - Elements justifying the link between the quality or characteristics of the agricultural or food product and the geographical environment, the link between a specific quality, reputation, or other characteristic of the agricultural or food product and its geographical origin.
 - Name and address of the authorities or organizations responsible for verifying compliance with the provisions of the specification, and their specific tasks.
 - Any specific rules for labelling the agricultural or food product in question.
 - Any requirements to be met according to community or national provisions.

Main normative reference

- REGULATION (EC) No 510/2006 OF THE COUNCIL of 20 March 2006 on the protection of geographical indications and designations of origin for agricultural products and foodstuffs.

ASC – Aquaculture Stewardship Council

What is it

ASC stands for Aquaculture Stewardship Council, an independent non-profit organization. ASC was founded in 2009 by WWF (World Wildlife Fund) and IDH (The Sustainable Trade Initiative) to manage global standards for responsible aquaculture. The ASC standards were initially developed through the Aquaculture Dialogues, a series of roundtables initiated and coordinated by WWF.

The ASC program and certification mark recognize and reward responsible aquaculture. ASC is a global organization that works internationally with aquaculture producers, seafood processors, retail and foodservice companies, scientists, conservation groups, social NGOs, and the public to promote best practices for environmental and social choices in aquaculture.

In collaboration with its partners, ASC operates a program to transform global aquaculture markets by promoting the best environmental and social performance in aquaculture. ASC aims to increase the availability of certified sustainable and responsibly produced aquaculture products. The credible ASC consumer label provides third-party assurance of compliance with production and chain of custody standards, making it easy for everyone to choose ASC-certified products.

Principles/characteristics

ASC certification for Sustainable Aquaculture is based on 7 fundamental Principles:

Principle 1: Observe the law and comply with all applicable legal requirements and regulations in the location of the farming activity.

Rationale: This principle aims to ensure that all farms seeking ASC Bivalve certification meet their basic legal obligations. Compliance with the law will ensure that producers fulfil the most fundamental environmental and social requirements and serve as the foundation for the effectiveness of the standards.

Principle 2: Avoid, remedy, or mitigate significant negative effects on habitats, biodiversity, and ecological processes.

Rationale: One of the main environmental concerns associated with bivalve aquaculture is the intensity of production and its impact on ecological communities in the immediate vicinity of farming activities. As bivalves are cultivated in dynamic coastal environments, the effects on the farming ecosystem are challenging to measure consistently across different farms. To overcome this challenge, the Dialogue has developed a tiered approach based on initial risk assessments followed by increasing levels of monitoring tailored to the specific local conditions of the site. Additionally, it has been agreed that, to verify environmental sustainability, the requirements must also address the cumulative impact of multiple farms in a given area.

Principle 3: Avoid negative effects on the health and genetic diversity of wild populations.

Rationale: Bivalve aquaculture can pose risks to wild populations due to the introduction of cultured species, as well as exotic parasites and pathogens. When species are introduced to an area without adequate risk assessment, they can cause increased predation and competition, diseases, habitat destruction, genetic alterations in the stock, and, in some cases, extinction. Farming operations that use hatchery-reared seed to cultivate native species have the potential to influence the genetic diversity of nearby wild populations.

Principle 4: Manage diseases and parasites in an environmentally responsible manner. **Rationale:**

Disease management is a key issue in any form of intensive aquaculture. The ASC Bivalve standard is committed to disease and parasite management practices that have the least possible impact on the surrounding ecosystem.

Principle 5: Use resources efficiently.

Rationale: Although shellfish farming has one of the lowest carbon footprints among intensive/semi-intensive food production systems, it is reasonable to expect that shellfish farms operate efficiently and demonstrate sustainable energy use. Additionally, proper waste management and pollution control are important to minimize the impact that farming operations have on the environment.

Principle 6: Be a good neighbour and conscientious citizen.

Rationale: Shellfish aquaculture often takes place in proximity to communities that may be affected by aquaculture activities. Conflict arising from the lack of agreement on how to use coastal resources can have a significant impact on the social sustainability of a bivalve farming operation.

Principle 7: Develop and manage businesses in a socially and culturally responsible manner.

Rationale: Shellfish aquaculture should be undertaken in a socially responsible way that ensures operations benefit workers and local communities. The labour rights of individuals working in shellfish farms are important, and working conditions in farms should ensure that employees are treated and paid fairly. Adequate farm conditions include the absence of child labour, forced labour, and discrimination. Grievance procedures and whistle-blower protection are crucial in achieving and maintaining fair and equitable working conditions. Socially responsible shellfish farming should also ensure the health and well-being of workers through safe and hygienic working conditions, with relevant training available to workers and managers.

Pathway for the recognition procedure

Certification applications can be submitted by producers or producer associations engaged in aquaculture activities for eligible species, which include: abalone, bivalves (clams, oysters, mussels, and scallops), cobia, freshwater trout, pangasius, salmon, yellowtail, shrimp, and tilapia.

Organizations interested in distributing or trading ASC-certified seafood products must also be certified under the Chain of Custody standard. The ASC logo can only be used on products sold or distributed along a certified supply chain, ensuring the integrity and traceability of each step, from farm to table.

How the procedure for recognition is initiated and developed:

Aquaculture companies seeking ASC certification turn to a Conformity Assessment Body (CAB) that has been accredited by Accreditation Services International GmbH (ASI). Only companies certified by an ASI-accredited CAB are eligible to sell certified products in a recognized Chain of Custody and have the right to use the ASC eco-label.

Accreditation is the process by which CABs are evaluated to determine their competence in providing certification to ASC standards. The accreditation process includes annual assessments of each accredited CAB and ASC-conducted audits of the CABs.

ASC has exclusively designated ASI to provide accreditation services for ASC. ASI is completely independent of ASC. ASI is based in Bonn, Germany, and also provides accreditation services to the Forest Stewardship Council (FSC) and the Marine Stewardship Council (MSC). Despite similar names, all these organizations are independent of ASC.

ASI is responsible for assessing CABs against the requirements outlined in this document. All accreditation decisions are made independently by ASI. The independence of ASC, ASI, and CABs ensures that high-quality and objective audits and certification decisions are carried out without bias for all clients worldwide.

What the standard requires

The principles of the standard are supported by 22 Criteria, each associated with 40 performance indicators.

Criteria for Principle 1:

1. All applicable legal requirements and regulations in which livestock operations take place.

Criteria for Principle 2:

1. Effects on seabed due to off-bottom methods and suspended cultures.
2. Effects on phytoplankton component.
3. Critical habitats and species interactions.
4. Environmental awareness among staff.

Criteria for Principle 3:

1. Introduction of parasites and pathogens.
2. Sustainable sourcing of wild seed.
3. Introduction of non-indigenous farmed species.
4. Farming of native species.
5. Transgenic animals.

Criteria for Principle 4:

1. Disease and parasite management.

Criteria for Principle 5:

1. Waste management/pollution control.
2. Energy efficiency.

Criteria for Principle 6:

1. Community relations and interactions.

Criteria for Principle 7:

1. Child labour.
2. Forced, coerced, or compulsory labour.
3. Discrimination.
4. Health and safety.
5. Fair and decent wages.
6. Freedom of association and collective bargaining.
7. Non-abusive disciplinary practices.
8. Working hours

MSC - Marine Stewardship Council

What is it

The Marine Stewardship Council (MSC) is an international non-profit organization established to address the issue of unsustainable fishing and ensure the future supply of seafood with the vision "of having our planet's oceans teeming with life today, tomorrow, and for generations to come."

MSC manages an ambitious program and works with numerous partners to transform the global seafood market and promote sustainable fishing. Certification is open to all types of wild populations, both marine and freshwater fisheries, regardless of size, scale, ecology, geography, and technologies used. Even bottom-cultivated mussel farming can be included in this certification scheme, as it falls under "Enhanced Fisheries."

MSC has established credible and recognized standards for sustainable fishing and the traceability of seafood products. The MSC standard for fishing companies has been developed in collaboration with scientists, the fishing industry, and marine conservation organizations. It reflects the most up-to-date and globally shared scientific knowledge and best management practices.

The MSC standard encompasses principles, criteria, indicators, and requirements to address potential social and environmental issues associated with fishing activities. The criteria are the areas of focus to address the issues, the indicators determine what to measure to assess the extent of the problem, and the requirements are the scores and/or performance levels that need to be achieved to demonstrate that problems or impacts are minimized.

Principles/characteristics

The MSC certification for Sustainable Fishing is based on three fundamental principles:

Principle 1 - "Safeguarding the health of target species populations": Ensuring the maintenance and restoration of the health of targeted species populations. Fishing should be conducted in a manner that does not lead to overfishing or depletion of exploited populations. For populations that are depleted, fishing should be carried out in a way that clearly contributes to their recovery.

Principle 2 - "Minimizing environmental impact of fishing": Maintaining the integrity of ecosystems. Fishing operations should enable the maintenance of the structure, productivity, function, and diversity of the ecosystem (including habitat and ecologically associated species) on which fishing depends.

Principle 3 - "Effective management system implementation": Developing and maintaining effective fisheries management systems that consider all relevant aspects, including biological, technological, economic, social, environmental, and commercial factors. Compliance with local and national laws, regulations, and standards, as well as international agreements. Fishing is subject to an efficient management system that respects local, national, and international laws and

regulations and incorporates institutional and operational arrangements that require responsible and sustainable resource use.

Pathway for the recognition procedure

Who can apply:

The application for certification can be made by fishing producers or producer associations engaged in fishing activities. Organizations interested in distributing or trading MSC-certified seafood products must also be certified under the Chain of Custody standard. The MSC logo can only be used on products sold or distributed along a certified supply chain, ensuring the integrity and traceability of each step from farm to plate.

Aquaculture is not covered by the MSC certification. Separate standards for aquaculture have been developed by the Aquaculture Stewardship Council (ASC).

How the procedure for recognition is initiated and developed:

To obtain MSC certification, it is necessary to approach an independent certification body that is accredited for the MSC standard. The certification body will conduct an optional preliminary assessment (pre-assessment) followed by a comprehensive evaluation (full assessment) to ensure that the fishing activity meets the required standards.

1. Pre-assessment (optional)

Identifies potential difficulties in obtaining certification. If the pre-assessment is positive, the fishing company may decide to proceed directly to full assessment. Alternatively, the company can resolve aspects that need improvement through an action plan before entering full assessment.

2. Comprehensive evaluation

It lasts 6 to 18 months and includes possible stakeholder input and peer review.

3. Duration of Certification

The certification has a duration of 5 years. During this period, the fishing company implements the required improvements as a condition of the obtained certification.

4. Annual Audit

Periodic verification audits are conducted by the certifier to ensure ongoing compliance with the standard. The obtained certification requires regular surveillance activities, including an annual assessment, to evaluate the maintenance of compliance with the Standard.

What the standard requires

The standard is supported by 23 Criteria, to which 28 performance indicators are associated.

Criteria for Principle 1:

1. Fishing activities must adhere to catch levels that maintain the high productivity of the target population.

2. If the exploited populations are overfished, fishing should be conducted in a manner that facilitates their recovery and rebuilding.
3. Fishing should not alter age-class structure, genetic structure, or sex ratio to a level that impairs the reproductive capacity of the stocks.

Criteria for Principle 2:

1. Fishing is conducted in a manner that preserves the natural functional relationships between species and does not result in changes to trophic levels or the state of ecosystems.
2. Fishing is carried out in a way that does not jeopardize biological diversity and avoids or reduces mortality or injury to endangered, threatened, or protected species.
3. Where the involved populations are overexploited, fishing will be conducted in a way that allows for the specified recovery and rebuilding of the species within specified timeframes.

Criteria for Principle 3:

A. System Management Criteria:

1. Fishing activities must not be conducted without regard to international agreements.
 - The management system must:
 2. Clearly demonstrate objectives consistent with MSC Principles and Criteria through a transparent consultation process involving all stakeholders.
 3. Be culturally appropriate.
 4. Respect legal and customary rights and the long-term interests of those dependent on fishing.
 5. Have an appropriate mechanism for dispute resolution within the system.
 6. Provide economic and social incentives that contribute to sustainable fishing and avoid subsidies that contribute to unsustainable fishing.
 7. Act in a timely and flexible manner based on the best available information, using a precautionary approach, particularly in the face of scientific uncertainty.
 8. Include an appropriate research plan tailored to the scale and intensity of the fishery, addressing management information needs and ensuring timely dissemination of research results to all stakeholders.
 9. Ensure periodic assessments of the biological status of the resource and the impacts of fishing.
 10. Specify measures and strategies that control the level of resource exploitation (setting catch levels to maintain high productivity, considering non-target species (size, age, sex) caught and landed in association with or as a result of targeting the species, identifying appropriate fishing methods that minimize negative impacts on the

- habitat, providing for recovery and rebuilding of exploited fish populations, mechanisms in place to limit or close the fishery where catch limits are reached, etc.).
11. Have appropriate compliance, monitoring, control, surveillance, and enforcement procedures in place to ensure compliance with established exploitation limits and specify corrective actions to be taken if those limits are exceeded.

B. Operational Criteria:

Fishing activity must:

12. Use fishing gear and practices aimed at avoiding the capture of non-target species (and undersized, age, and sex individuals of the target species), reduce mortality of catches where they cannot be avoided, minimize discarding of what cannot be released alive.
13. Implement appropriate fishing methods aimed at minimizing negative impacts on habitats, especially in critical or sensitive areas such as spawning grounds and nurseries.
14. Not use destructive fishing practices such as poisoning and explosives.
15. Minimize operational residues such as lost fishing gear, oil spills, residues from onboard fish processing, etc.
16. Be conducted in compliance with the fishery management system, laws, and administrative requirements.

Assist and cooperate with management authorities in collecting data on catches, discards, and other important information for effective resource and fishery management.

Main normative reference

Standards for fishery products: Fisheries Standard and Guidance Version 2.0 1 October 2014

<https://www.msc.org/documents/scheme-documents/fisheries-certification-scheme-documents/fisheries-standard-version-2.0>

Fisheries Certification Requirements Version 2.0 1 October 2014

GLOBALG.A.P. – Good Aquaculture Practice at Every Stage of Production

What is it

The initiative was established in 1997 by some of the leading European retail chains, united under the name of Eurep (Euro-Retailer Produce Working Group). Its main objective was to meet the growing consumer demand for food safety and environmental responsibility. Sustainability is now the watchword for the primary sector. In fact, to meet consumer needs, most European retailers require "sustainable" products, and often this is a mandatory requirement for entering the supply chain.

Originally, the GLOBALG.A.P. standard was developed in collaboration with agricultural producers and later expanded to cover the primary sector involved in the production of animal-origin products. A part of this standard, the Aquaculture module, was specifically developed to regulate the seafood sector for human consumption.

Today, GLOBALG.A.P. is a globally recognized standard that guarantees the quality, safety, and sustainability of products throughout the entire primary sector. It is now widespread in over 100 countries and approved by GFSI (Global Food Safety Initiative).

Principles/characteristics

The principles of GLOBALG.A.P. Aquaculture certification address the following topics:

- Food safety
- Traceability
- Worker safety, health, and well-being
- Animal welfare
- Environmental stewardship

Pathway for the recognition procedure

Who can apply:

GlobalG.A.P. certification applies to both individual companies and Producer Groups, such as cooperatives, consortia, producer organizations, etc. These groups are also required to establish a documented Quality Management System that manages the relationships among member producers and ensures that all operations follow the requirements of the standard.

How the procedure for recognition is initiated and developed:

Companies intending to obtain certification for their products are required to implement the requirements and fulfil the obligations outlined in the standard. They need to submit a certification application to an accredited certification body along with the necessary attachments, sign the provided cost proposal from the chosen certification body, and enter into a certification and sublicense agreement, which includes accepting the clauses outlined in the certification regulations.

Upon receiving the documentation mentioned above, the certification body conducts a document evaluation, performs on-site certification inspections at the production sites, makes a decision regarding certification, and issues the certificate. The certified products are then registered in the registry of certified products. Subsequently, surveillance activities are carried out to assess the ongoing compliance with the standard.

The GLOBALG.A.P. "Chain of Custody" certification can be requested by all companies involved in post-production stages, including handling, packaging, distribution, and sale. These operators are interested in marketing GLOBALG.A.P. certified products under their own name, management, and

responsibility. They must ensure proper identification and full traceability of the products throughout each stage of production and commercial distribution. This is achieved through systematic collection of evidence to document the product's history during various phases of production and commercial distribution.

What the standard requires

GlobalG.A.P. Aquaculture is exclusively applicable to aquaculture farms and covers the entire farming process of the certified product, starting from the phase when the mollusc, fish, or egg enters production until the pre-processing stage.

The GLOBALG.A.P. standard encompasses various key areas, each of which includes control points (a total of 265, including post-harvest handling) with their respective compliance criteria.

The check list covering the aquaculture module is given below.

AB.1 Site Management

1.1 Legislative framework

1.2 Documentation

AB.2 Reproduction

2.1 Stock of juveniles and seeds

2.2 Incubator management

2.3 Youth removal

AB.3 Chemicals

3.1 Storage of chemicals

3.2 Empty containers and unused chemicals

3.3 Transportation of chemicals

AB.4 Worker health and safety

4.1 Training

4.2 Health and safety

AB.5 Fish welfare, management, and husbandry (at all levels of the production chain)

5.1 Traceability and origin of stock

5.2 Fish health and welfare

5.3 Treatments

5.4 Records of treatments

5.4 Mortality

5.6 Cages in water

5.7 Ponds

5.8 Biosecurity (in addition to feed defence requirements)

5.9 Machinery and equipment

AB.6 Sampling and monitoring

AB.7 Feed management

7.1 General

7.2 Feed Records

- 7.3 Aquaculture feed storage
- AB.8 Disinfestation
- AB.9 Environmental and biodiversity management
- 9.1 Environmental Management
- 9.2 Predator exclusion plan
- 9.3 Escapes
- 9.4 Areas of high conservation value
- AB.10 Water availability and use
- 10.1 General
- 10.1 Discharges
- AB.11 Fishing and post-fishing operations
- 11.1 Fishing - method of fishing/shipping
- 11.2 Labelling/tracking of caught fish
- AB.12 Harvesting and crowding facilities.
- 12.1 Welfare of fish in harvest and crowding facilities, including transfer to wells, and/or before fishing
- 12.2 Mortality in harvest facilities, including wells, and/or before fishing
- 12.3 Escapes and native species
- AB.13 Slaughter activities
- 13.1 Stunning and bleeding
- 13.2 Bloody waters
- AB.14 Purification
- AB.15 Post fishing - mass balance and traceability
- 15.1 Validation of entries
- 15.2 Segregation
- 15.3 Documents and data on procedures
- 15.4 Certified outputs and labelling
- 15.5 Mass balance
- 15.6 Feed safety system
- AB.16 Social criteria

Main normative reference

All Farm Base, Aquaculture -Edition V5.0-2 30 June 2016

General Regulations - Aquaculture Rules -Edition V5.0-2 30 June 2016

Quality Management System Checklist - All Scopes -Edition V5.0-2 25 July 2016

http://www.globalgap.org/uk_en/documents/#fq=gg.standard.gg:

Integrated Farm Assurance: All Farm Base – Aquaculture Module (Edition 5.0-2_July2016)

<http://www.ccpb.it/blog/2012/05/08/global-gap/>

BIO – ORGANIC PRODUCTION

What is it

«Organic production» refers to a production management system that promotes and enhances the health of ecosystems, including biodiversity and biological cycles. It is based on precise and specific production standards aimed at achieving social, ecological, and economic sustainability.

Principles/characteristics

Organic production is based on the following general principles (Reg. UE n. 848/2018):

- a) Appropriate design and management of biological processes based on ecological systems that utilize internal natural resources, employing methods that:
 - Use living organisms and mechanical production methods.
 - Practice production systems that adhere to the principle of sustainable exploitation.
 - Exclude the use of genetically modified organisms (GMOs).
 - Rely on risk assessment.
- b) Limitation of the use of external production factors.
- c) Strict limitation of the use of production factors obtained through chemical synthesis.
- d) Adaptation of regulations governing organic production to take into account health conditions, regional climatic diversities, local conditions, various stages of development, and specific animal husbandry practices.

Furthermore, among the specific objectives, it includes:

- Using animals raised in organic farms from birth for organic animal production.
- Maintaining biodiversity of natural aquatic ecosystems, the long-term health of the aquatic environment, and the quality of surrounding aquatic and terrestrial ecosystems for aquaculture production.

The products from hunting and fishing of wild animals are not considered part of organic production.

Specifically, producers of algae and aquaculture animals must comply with the provisions outlined in Annex II Part III of the aforementioned regulation.

As for general requirements, conversion to organic production can occur according to the following methods and timelines:

- a) 24 months, for facilities that cannot be drained, cleaned and disinfected;
- b) 12 months, for facilities that have been drained or shut down;
- c) 6 months, for facilities that have been drained, cleaned and disinfected;
- d) 3 months, for open water facilities, including those producing bivalve molluscs

In the specific case of **bivalve molluscs**, which are the main subject of this investigation and are not fed by humans but rely on natural plankton as their food source, the regulation stipulates the following requirements:

- a) These filter-feeding animals obtain all their nutritional needs from nature, except in the case of juvenile specimens raised in hatcheries and nurseries;
- b) The development areas are deemed suitable in terms of health and have a high ecological status, as defined by Directive 2000/60/EC, or a good ecological status, as defined by Directive 2008/56/EC, or they are of equivalent quality to: — those of production areas classified as A under Regulation (EC) No. 854/2004, until December 13, 2019, or as of June 14, 2018, Official Journal of the European Union L 150/75 IT. — that of the corresponding classification zones defined in the implementing acts adopted by the Commission in accordance with Article 18, paragraph 8, of Regulation (EU) 2017/625, as of December 14, 2019.

There are also specific guidelines regarding the origin and collection of seeds, stabling, cultivation, facility management, and specific regulations for oyster farming.

Seed:

- a) In the case of bivalve molluscs, wild seed collected outside the production unit can be used, provided that no significant harm is caused to the environment, it is allowed by local legislation, and the wild seed comes from: i) colonies at risk of survival during winter conditions or in excess of the demand; or ii) natural settlements of spat on collectors;
- b) For the Pacific oyster (*Crassostrea gigas*), preference is given to selectively bred stock to limit natural spawning and egg deposition;
- c) Recordings certifying the date, location, and methods of wild seed collection are required for traceability purposes;
- d) Wild seed can only be collected after obtaining authorization from the competent authority.

Relay:

- a) The production can be practiced in the same body of water where fish and algae production take place in a documented polyculture system as part of a sustainable management plan. Bivalve molluscs can also be cultivated in association with gastropod molluscs, such as periwinkles, in polyculture;
- b) The organic production of bivalve molluscs is practiced in areas demarcated by stakes, floats, or other visible markers and may be enclosed in net bags, cages, or other structures;
- c) Organic farms of molluscs and crustaceans take measures to minimize risks to protected species. If predator nets are used, they are designed to be harmless to diving birds.

Culture:

- a) Cultivation on ropes for mussels and other methods listed in the implementing acts can be practiced in organic production in accordance with Article 15, paragraph 3 (Specific

regulations regarding stocking density, production systems, and containment are followed to ensure that the specific needs of each species are met);

- b) Bottom cultivation of molluscs is authorized as long as no significant environmental damage occurs in the cultivation and harvesting sites. A separate chapter is added to the sustainable management plan, which includes a study and a report demonstrating minimal environmental impact. The operator provides this information to the competent authority or, if applicable, the control authority or certification body before commencing operations.

Facilities management:

- a) In the production, a stocking density is applied that does not exceed the usual density in local non-organic mollusc production. Operations such as sorting, thinning, and adjustment of stocking density are carried out based on biomass to ensure animal welfare and high product quality;
- b) Marine fouling organisms are manually removed or using physical means and, if necessary, discarded at a suitable distance from the cultivation site. To control competitive fouling organisms, molluscs can be treated with a lime solution once during the production cycle.

Oyster farming:

Cultivation in bags on racks is allowed. These or other structures for oyster farming are positioned in a way that does not create a continuous barrier along the coast. Oysters are carefully placed in parks according to the tidal patterns to optimize production. The production meets the requirements specified in the implementing acts referred to in Article 15, paragraph 3 (while adhering to specific regulations concerning stocking density, production systems, and containment to ensure the specific needs of each species are met).

Pathway for the recognition procedure

Who can apply:

- A producer, processor, or association of producers or processors who have notified their activity to the competent authorities of the Member State in which it is carried out, and whose enterprise is subject to the control system, shall be issued a certificate in accordance with Article 34, 35, and Annex VI of the regulation (EU) No. 848/2018.

How the procedure for recognition is initiated and developed in the Marche Region

From the consultation of the official and institutional websites of the region, no reference to aquaculture in any of its forms emerges. Only agricultural operators are mentioned.

(<https://www.regione.marche.it/Regione-Utile/Agricoltura-Sviluppo-Rurale-e-Pesca/Agricoltura-biologica>)

The region defines organic agriculture as a method of production that favours natural mechanisms to increase agricultural yields and control diseases and harmful insects. It uses

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phytosanitary products and fertilizers of natural origin, prohibits the use of growth hormones, antibiotics, or genetic manipulation.

Organic farmers employ a range of techniques that contribute to the preservation of ecosystems, reducing pollution and harnessing the natural ability of plants to create a balance with the environment and the land.

Every phase of the production process is monitored and certified, ensuring traceability to the final consumer.

Consumers can participate in the "Organic District" project, which aims to support entrepreneurs who want to enter the organic sector by helping them choose the most suitable qualification method for their socio-economic reality. The project promotes collaborations in agri-environmental agreements and the supply chain to compensate for the losses and additional costs that farmers may face. The region supports entrepreneurs throughout the process, providing specific funding and guidance at each step.

Membership in the project is possible for the following individuals:

- Individual or associated agricultural entrepreneurs with legal or operational headquarters in the Marche Region.
- Enterprises operating in the agricultural and agri-food sector, including those organized in business networks, cooperative societies, and consortia.
- Agricultural producer organizations and associations of agricultural producer organizations recognized under current legislation.

Companies formed between individuals engaged in agricultural activity and transformation, distribution, and/or commercialization enterprises, in which at least 51% of the share capital is held by the subjects referred to in points 1 to 3.

In addition to the information on joining the "Organic District" project, the region's website provides the procedures for becoming an "organic operator." This can be done through the following methods:

- To submit an online notification and choose the preferred control body among those authorized at the national level, please visit the website of SIAR (Regional Agricultural Information System). Please note that the use of the paper-based model is no longer allowed in compliance with Regional Decree (DGR) No. 617 dated 22-03-2010.
- The notification will be valid only if digitally signed by the company owner.
- All organic businesses (farms, processors, importers) must also have an updated Business File, which is managed through a convention with Agricultural Assistance Centres (CAA). The SIAR allows creating the notification of organic activity with information aligned with the electronic business file.

- The organic operator uses the SIAR application by accessing the regional computer system directly (through a smart card/CNS) or by relying on entities authorized by the Marche Region through a mandate.

The regional reference legislation is contained in Regional Law No. 76 of December 29, 1997, which regulates organic farming, and Regional Law No. 3 of April 3, 2002, which regulates agritourism and rural tourism.

MAIN NORMATIVE REFERENCE

- REGULATION (EU) No 848/2018 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007.
- COMMISSION REGULATION (EC) No 889/2008 of 5 September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling, and control.
- COMMISSION REGULATION (EC) No 710/2009 of 5 August 2009 amending Regulation (EC) No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to the introduction of detailed rules on organic production of animals and seaweed in aquaculture.
- The DM No. 11954 of 30 July 2010 contains provisions for the implementation of Regulation (EC) No. 710/2009 regarding organic aquaculture. It was published in the Official Gazette No. 211 on 9 September 2010.
- The DM No. 11955 of 30 July 2010 relates to the notification for aquaculture and was published in the Official Gazette No. 212 on 10 September 2010.

Annex 2 - Questionnaire submitted to shellfish enterprises

QUESTIONNAIRE QUESTIONS TAB A	
<i>A1. Enterprise information</i>	<i>A2. Production information:</i>
Respondent (first and last name)	Species n°1:
Respondent's role:	Production sector:
Business name:	Only hatchery:
Legal form:	Organic certification:
Business type:	Other brands:
Municipality:	Process certification:
Province:	Breeding method:
Region:	Marketing:
Tax Code:	Own marketing:
Ceased activity:	Outsourced marketing:

Years in business:	Species No. 1:
Shellfish purification centre:	Annual production (tons):
Shellfish shipping centre:	Mussels % stocking:
Number of active associated facilities:	Mussels % bulk:
Number of active slaved vessels:	Average price (€/Kg):
	Buyer Wholesaler:
	Buyer Retailer:
	Buyer Other farms:
	% destined for domestic market:
	For Provincial markets:
	For Regional markets:
	For National markets:
	% destined for international market:
	Annual amount of product discarded (kg):
	Product was discarded because:
	Annual amount of product lost (kg):
	Product was lost because:
	Other species raised in the past:
	If yes which:
	Interest in raising a second species in the future:
	If yes which one:
	Any notes:

QUESTIONNAIRE QUESTIONS TAB A	
A3. Plant information:	A4. Boat information:
Plant Regional Code:	Boat 1:
Plant Status:	Boat Name:
AUSL plant code:	Serial number:
Plant Location:	License:
Region:	Stationary Port:
Province:	Notes:
Municipality:	Year of hull construction:
Number of species reared:	Hull material:
Distance from the coast (miles):	LFT (m):
Distance to port:	GT (gross tonnage):
Average depth:	Auxiliary engine:
Breeding area classification:	Number of traction motors:
Linear meters:	KW total:
Area (square meters):	Year of engine construction:
Water area:	Power supply:

Plant management:	No. annual embarked persons:
Water type:	No. seasonal embarked persons:
Staging area at sea:	Processing equipment:
	<i>Harvesting belt:</i>
	<i>Ginning machine:</i>
	<i>Sorter:</i>
	<i>Conveyor belts:</i>
	<i>Washing tunnel:</i>
	<i>re-tubing belt machine:</i>
	<i>Other:</i>

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QUESTIONNAIRE QUESTIONS TAB B

Number of female operators:
Number of male operators:
Age groups:
Men:
< 21
21-30
31-40
41-50
51-60
> 60
Women
< 21
21-30
31-40
41-50
51-60
> 60
N° total individuals
< 21
21-30
31-40
41-50
51-60
> 60
Nationality of operators (no. of operators):
Italian:

European Union:
non-EU:
Education level of operators (no. of operators):
elementary school:
middle school license:
high school diploma:
college degree:
Is the enterprise family-owned?
If yes, how many household members work in the enterprise?

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QUESTIONNAIRE QUESTIONS TAB C

C1. How is your aquaculture enterprise perceived in the local area?

Are there or have there been reasons for friction with the local community?

C2. How does the local community perceive the product derived from aquaculture?

C3. How have you resolved issues (if any) with the local community?

C4. What benefits do you think your enterprise has brought to the local area?

C5. And what negative consequences might it have in the area?

QUESTIONNAIRE QUESTIONS TAB D

D1. Is the enterprise part of one or more cooperatives?

(If yes) Is the management of the enterprise integrated within the cooperative?

D2. Have you ever tried to cooperate with others without succeeding?

(If yes): for what reasons?

D3. Does the enterprise belong to/participate in international industry committees?

(If yes): which ones?

D4. What could be the benefits of integrated management?

D5. Do you believe that collaboration among breeders could help the dissemination of innovations?

D6. Have you ever collaborated with universities, NGOs and/or research institutions?

D7. Does the company belong to producer associations:

D8. Does the enterprise adhere to a Producer Organization:

D9. If no, does it consider it interesting to join a Producer Organization:

QUESTIONNAIRE QUESTIONS TAB E

E1. What are your main sources of information regarding aquaculture?

E2. In general, do you consider these sources reliable?

E3. Have you ever participated in training courses?

E4. Have your employees ever participated in training courses?

E5. Are you satisfied with the level of preparation your employees have or have obtained post-training?

E6. In your opinion, what are the key topics that should be included in training courses?

E7. Have you ever compared yourself with other colleagues in the industry for sharing information and/or knowledge in the industry?

QUESTIONNAIRE QUESTIONS TAB F

F1. Is there a business plan in place?
F2. How often do you invest in your enterprise? Why? And what kind of investments?
F3. What % of annual revenue is invested in the business?
F4. Have you ever faced/do you still face problems in the distribution of your product?
F5. Who are your main customers?
Retailers:
Wholesalers
Supermarkets
Restaurants
Other:
F6. Does your business have a regular customer base? What % does it represent of total customers?
F7. Do you have information on consumer preferences? If yes, which ones?
F8. Have you ever been involved in any collective promotion activities? If yes, which one?
F9. What are the major issues faced in selling the product?

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 RAZVOJNA AGENCIJA
 ŠIBENSKO-KNIŠINE ŽUPANIJE

 DUBROVAČKO-
 NERETVANSKA
 ŽUPANIJA

 MINISTARSTVO
 POLJOPRIVREDE

 REGIONE AUTONOMA
 FRIULI VENEZIA GIUUA

QUESTIONNAIRE QUESTIONS TAB G

G1. Have you adopted any innovations in your enterprise recently? Of what kind?
Technological:
Environmental:
Social:
Other:
G2. What are your future innovation needs?
Vessel
On-board equipment
Plant
Breeding techniques
Brands
Professional training
Financial instruments
Environmental sustainability
G3. How do you assess the effectiveness of existing policy measures in adopting innovations?
G4. Would you be willing to participate in a pilot test application before the adoption of the innovation?
G5. Do you need to acquire substantial skills and knowledge before adopting a technological innovation?
G6. Are you aware of eco-innovation (environmental innovation) in the aquaculture sector?
G7. What does blue-growth mean to you?
G8. Are you in any way included with your enterprise in the concept of "blue-growth"?
G9. Have you ever attended any conferences/meetings or other events that provided information on innovations and the future of aquaculture? If yes, which ones?
G10. What are the main reasons for adopting innovations in your enterprise?
Greater profitability:
Sustainability/resilience:
Environmental preservation:
Ease/convenience:
Other
G11. What could be some best practices that could be adopted to improve the sustainability of aquaculture enterprises?
G12. Do you think there are any 'quality certificates' that could benefit your enterprise?
G13. In your opinion, what are the main reasons that hinder the adoption of innovations by aquaculture enterprises?
G14. Could you describe one of your experiences in abandoning or acquiring any kind of innovation for your company?

QUESTIONNAIRE QUESTIONS TAB H

H1. Are you aware of the European Union's integrated maritime policy and its goals?
H2. Do you think the current management rules of the European Union's maritime policy are effective in supporting aquaculture activity?
H3. Have you ever participated in calls/projects/applications for European grants/funding?
If yes, did you encounter any difficulties during the application preparation process? Which ones?
H4. Have you ever received European funding/grants to support your aquaculture enterprise? If yes, which ones?
H5. Was the funding received adequate to cover the costs of the actions for which it was intended?
H6. What are the main challenges of aquaculture enterprises that maritime policy should help overcome?

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