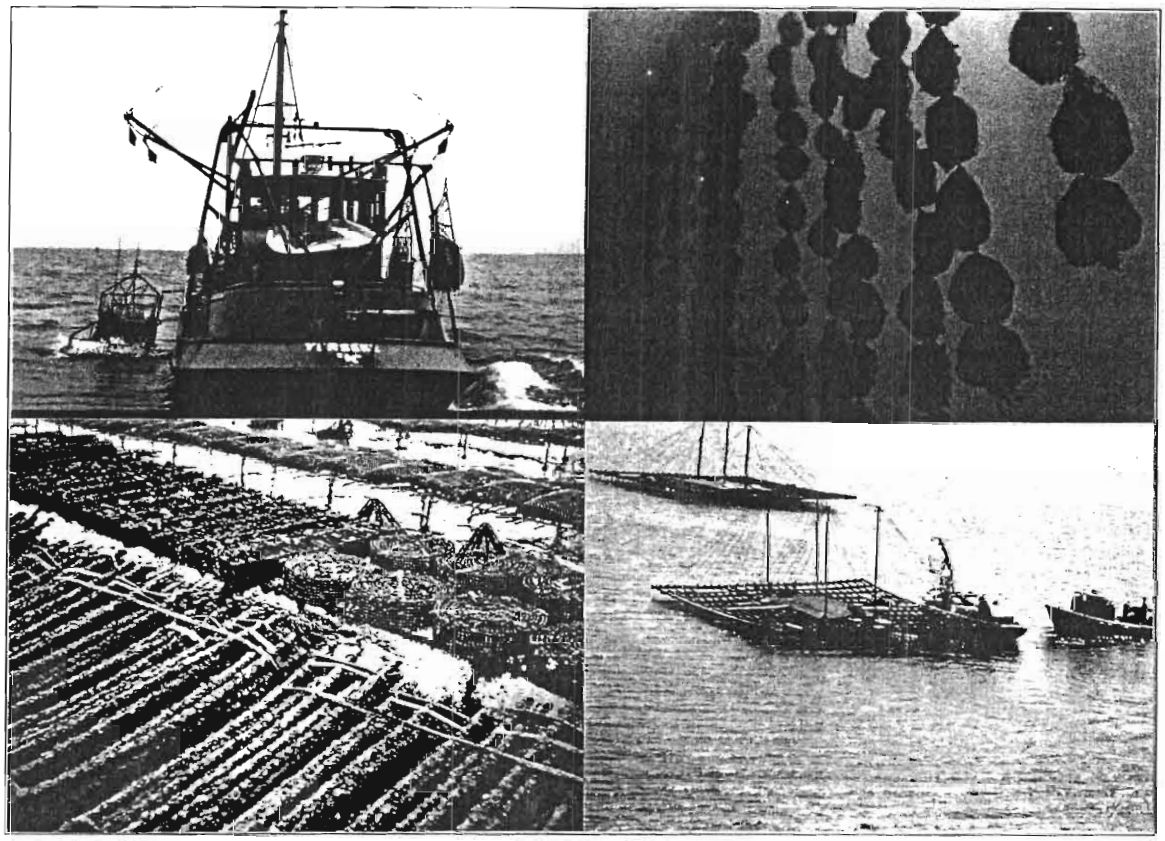
RAPPORTS INTERNES DE LA DIRECTION DES RESSOURCES VIVANTES DE L'IFREMER

Shellfish Culture in Europe



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Résumé :

Ce rapport comprend une approche descriptive et qualitative du secteur conchylicole traditionnel (moules et huîtres) dans la Communauté Européenne. Il aborde les aspects production, marché, organisation, réglementation, système d'aide dans les différents pays par une analyse comparative des secteurs, complétée par une synthèse chiffrée des données techniques et statistiques. Une vision d'ensemble des flux et de l'évolution des deux filières dans la Communauté est ainsi présentée. Un résumé des rapports nationaux évalue l'organisation, les contraintes et les perspectives du secteur dans chacun des pays.

Abstract :

This report includes a qualitative and descriptive approach of the oyster and mussel industries in the European Community. This report compares the structure of production, the marketsn the professional organisation, competition for the resource, legislation and support systemat the community level. Technical and statistical datas are summarized to représent the structure of the industry, the trade flows and the main evolutions of the two industries in the EC.

A summary of the county reports gives an overview of the present state of the industry in each country and suggest a first evaluation of constraints and prospects.

mots-clés	Conchyliculture, Europe, Production, marché, commerce extérieur, réglementation.
key words	Shellfish culture, Europe, Production, markets, External trade, regulation

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N°RI DRV	DEPARTEMENT	LABORATOIRE	AUTEURS	TITRE	DATE SORTIE	DIFFUS	NB PAGES	TIRAGE
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93-002	DRV/RA DRV/SEM	PMDC/BREST SEM/PARIS	P.G.FLEURY P.PAQUOTTE	EVALUATION ECONOMIQUE DE LA DIVERSIFICATION EN COQUILLE ST JACQUES D'UNE ENTREPRISE CONCHYLICOLE EN MER OUVERTE	Fév-93	Libre	21	150
93-003	DRV/RH	RH SETE	J.DUCLERC J.BERTRAND	VARIABILITE SPATIALE ET TEMPORELLE D'UNE PECHERIE AU FILET DANS LE GOLFE DU LION. ESSAI D'EVALUATION DE L'IMPACT D'UN RECIF ARTIFICIEL.	Fév-93	Libre	42	?
93-004	DRV/VP	VP/NANTES	M.ETIENNE; M.DARZACQ; J.NOEL; A.DANIEL	QUALITE DU THON APPERTISE. CRITERES PHYSICO-CHIMIQUES	Mar-93	Libre	72	?
93-005	DRV/VP	VP/NANTES	N.BREGEON	DOSAGE RAPIDE DE L'HISTAMINE DANS LE THON : MISE AU POINT, OPTIMISATION, APPLICATION	Mar-93	Restreint	61	?
93-006	DRV/SEM	SEM/PARIS	P.GUILLOTREAU (contrat univers ENSAR/CERETIM)	LE MESO-SYSTEME HALIO-ALIMENTAIRE EUROPEEN, ANALYSE ET MODE DE FONCTIONNEMENT	Mar-93	Libre	440	30
93-007	DRV/SEM	SEM/PARIS	M.GALLE (AIDA : Ass Intégrat Données envir dans syst déc Aménag))	LES MECANISMES DE DECISION DANS LA GESTION DES PECHES - LE CAS D'UN PORT MEDITERRANEEN	Mar-93	Confid	152	20
93-008	DRV/SEM	SEM/PARIS	M.ANTONA, D.BAILLY, P.PAQUOTTE, M.GABBOTT, J.GIBBS H.HARMSMA et S.SHAW	LA CONCHYLICULTURE EN EUROPE	Mar-93	Libre	55	150

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92-001	DRV/RA DRV/SEM	PMDC/BREST PARIS	J.C.DAO, P.G.FLEURY PH.PAQUOTTE	ELEMENTS DE REFLEXION POUR L'EVALUATION ECONOMIQUE DE LA FILIERE COQUILLE ST JACQUES	Nov-91	LIBRE	60	100
92-002	DRV/RA	PMDC/BREST	J.C.DAO, X.CASEY	RADE DE BREST 1989-1990 FIXATION DU NAISSAIN DE PECTINIDES SUR LES COLLECTEURS EXPERIMENTAUX	Déc-91	LIBRE	40	100
92-003	DRV/RA	PMDC/BREST	N.BAILLON	ANALYSE DES STRIES DE CROISSANCE DES POST-LARVES DE (PECTEN MAXIMUS)	Déc-91		47	100
92-004	DRV/RA DEL	CREMA DEL/BREST	HUSSENOT M.KEMPF	AQUACULTURE ET ENVIRONNEMENT SEMINAIRE 18/22 NOVEMBRE 1991,	Jan-92	LIBRE	31	20
92-005	DRV/RA	PMDC/BREST	R.ROBERT,G.TRUT M.BOREL, D.MAURER	GROWTH, FATNESS AND GROSS BIOCHEMICAL COMPOSITION OF THE JAPANESE OYSTER CRASSOSTREA GIGAS IN STANWAY CYLINDERS IN THE BAY OF ARCACHON, FRANCE	Fév-92	LIBRE	21	
92-006	DRV/VP	GENIE ALIMENTAIRE	M.CARDINAL J.CORNET ET AL.	QUALITE DE LA CHAIR DE LA TRUITE FARIO	Jan-92	RESTR	19	
92-007	DRV/RH	PORT EN BESSIN	G.PAULMIER	CATALOGUE ILLUSTRE DES MICROPHYTES PLANCTONIQUES ET BENTHIQUES DES CÔTES NORMANDES	Mar-92	LIBRE	71	
92-008	DRV/RH	NANTES	H.BEUCHER	LOGICIELS DE DYNAMIQUE DES POPULATIONS	Mai-92	LIBRE	95	40
92-009	DRV/RH	NANTES	G.ARZUL,F.ROGER .E.ERARD-LE-DENN ET AL.	SURVEILLANCE ECOLOGIQUE ET HALIEUTIQUE DE L'ENVIRONNEMENT MARIN DU SITE DE LA CENTRALE DE PENLY (MANCHE EST)	Mai-92	RESTR	105	30
92-010	DRV/RA	PORT EN BESSIN	H.JEANNERET J.KOPP,J.P.JOLY ET AL.	L'OSTREICULTURE SUR LA CÔTE EST DU COTENTIN	Sep-92	LIBRE	64	150

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N°RI DRV	DEPARTEMENT	LABORATOIRE	AUTEURS	TITRE	DATE SORTIE	DIFFUS	NB PAGES	TIRAGE
92-011	DRV/RA	LA TREMBLADE	A.GERARD J.M.PEIGNON ET AL	OBTENTION DE SOUCHES CONCHYLICOLES PERFORMANTES PAR POLYPLOIDISATION	Aoû-92	RESTR	36	20
92-012	DRV/RA	LA TREMBLADE	O.RAILLARD P.SOLETCHNIK ET AL	MODELISATION DE L'ECOSYSTEME DU BASSIN DE MARENNES-OLERON	Jun-92		261	
92-013	DRV/RA	L'HOUMEAU	M.J.DARDIGNAC	LA MYTILICULTURE DANS LE PERTUIS BRETON	Déc-92	LIBRE	31	
92-014	DRV/RA	LA TREMBLADE	A.BODOY J.GARNIER S.HEURTEBISE	LES POSSIBILITES D'ELEVAGE DU PETONCLE NOIR CHLAMYS VARIA, DANS LES MARAIS MARITIMES DE LA REGION POITOU-CHARENTES	Sep-92		26	
92-015	DRV/RA	CREMA L'HOUMEAU	J.HUSSENOT ET AL.	STIMULATION DE LA PRODUCTIVITE NATURELLE PAR ENRICHISSEMENTS MINERAUX ET ORGANIQUES	Nov-92	LIBRE	97	100
92-016	DRV/RA	CAYENNE	J.M.GRIESSINGER ET AL.	AMELIORATION DES TECHNIQUES D'ELEVAGE DE LA CHEVRETTE MACROBRACHIUM ROSENBERGII EN GUYANE	Oct-92	LIBRE	85	
92-017	DRV/RA	PMDC/BREST	J.BARRET	ESSAI DE TRAITEMENT DU SEDIMENT CONTRE LE VIBRIO P1 LORS D'UN DEMI-ELEVAGE DE PALOURDES	Avr-92	LIBRE	34	100
92-018	DRV/RH	LA ROCHELLE L'HOUMEAU	J.C.QUERO, P.ARZEL et AL	LES ALGUES ET INVERTEBRES MARINS DES PECHES FRANCAISES	Jun-92		392	75
92-019	DRV/RH	SETE	A.CAMPILLO J.L.BIGOT	LES PECHERIES FRANCAISES DE MEDITERRANEE : SYNTHESE DES CONNAISSANCES	Aoû-92		206	
92-020	DRV/RA	COP/TAHITI	T.RENAULT E.THOUARD M.WEPPE	MORTALITES MASSIVES EN ELEVAGE LARVAIRE DE LATES CALCARIFER	Déc-92		43	20
92-021	DRV/RA	PALAVAS	D.COATANEA J.OHEIX ET AL.	ESSAIS DE TELECAPTAGE DE L'HUÎTRE PLATE OSTREA EDULIS EN MEDITERRANEE	Déc-92	LIBRE	62	40

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N°RI DRV	DEPARTEMENT	LABORATOIRE	AUTEURS	TITRE	DATE SORTIE	DIFFUS	NB PAGES	TIRAGE
92-022	DRV/RA	LA TRINITE	C. LE BEC J.MAZURIE	L'HUÎTRE CREUSE CRASSOSTREA GIGAS EN BRETAGNE (SUIVI 1990)	Déc-92	LIBRE	34	
92-023	DRV/RA	LA TRINITE	C.LE BEC J.MAZURIE	L'HUÎTRE CREUSE CRASSOSTREA GIGAS EN BRETAGNE (SUIVI 1991)	Déc-92	LIBRE	37	
92-024	DRV/RH	SETE	C.BENE	LA GESTION DES RESSOURCES INSTABLES	Oct-92	LIBRE	49	

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SUMMARY

The approach of the oyster and mussel industries in the European Community conducted is principally qualitative and descriptive.

The first step has been a bibliographic and statistic survey of these industries. Then experts such as trade association members, administration officials have been interviewed and visits of sites organized in France, UK, Ireland, Holland and Italy.

Country reports have been established by each participants for the main producing or consuming countries. These reports examine the structures of production, the markets, the professional organisations, competition for the resource, legislation and support system.

Country reports have been used for a comparative analysis at the community level. Group analysis has been applied to each of the aspects presented in the country reports. Technical and statistical data are summarized in this report to represent the structure of the industry, the trade flows and the main evolutions of the two industries in the Community.

A summary of the country reports gives an overview of the present state of the industry in each country and suggest a first evaluation of constraints and prospects.

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INTRODUCTION

For a complete understanding of the results of this first analysis of the sectors of the mussel and oyster industries in Europe, the sectors have been examined with respect to certain factors, namely the structures of production, the markets, the professional organisations, competition for the resources and legislation.

For each of these factors, the sectors (country/species) have been regrouped as a function of simple economic characteristics, of size, or other functional forms. In each group common traits are described so that the major differences may justify a second level of analysis.

At this stage the approach is principally qualitative and descriptive. This approach aims to represent Europe in terms of sectorial characteristics, national or regional and to set a basis for the construction of research questions intended to be tackled by a more quantitative approach.

The presentation under the form of a typology is obviously a simplification of reality. In order to keep information to a minimum on the state and the evolution of the different sectors, the general summaries of the scientific reports appear in an appendix to this synthesis.

I THE MUSSEL AND OYSTER SECTORS IN EUROPE

Before tackling the different aspects of the organisation of the sectors, this first section presents an overview of the sectors and their evolution by means of a graphic representation of the sites, techniques, species and principal commercial flows.

1.1 Tables and graphs

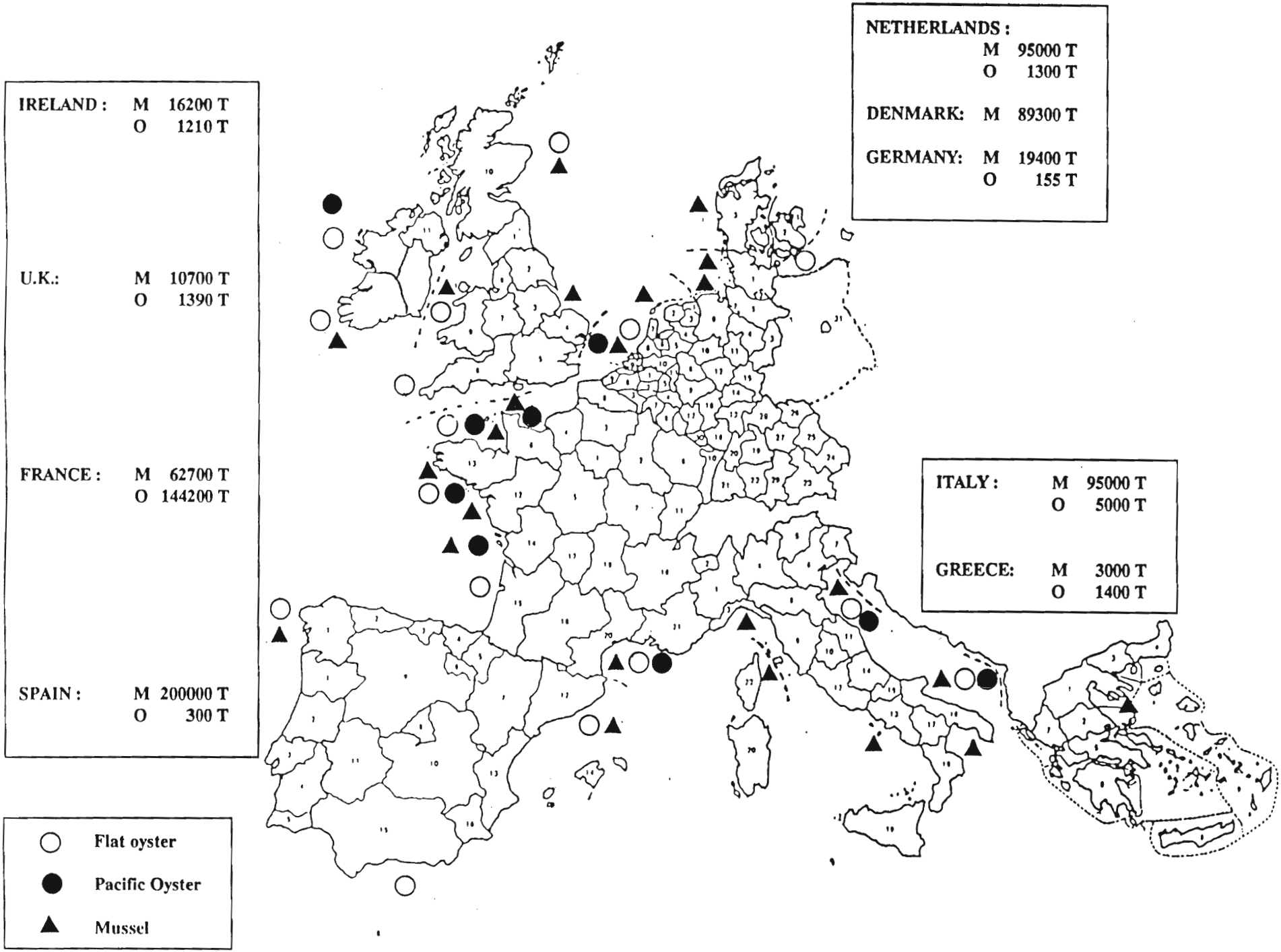


Figure 1.1 : Main Production Areas and Species in Europe (1990)

Figure 1.2 : Oyster Rearing Technics in Europe

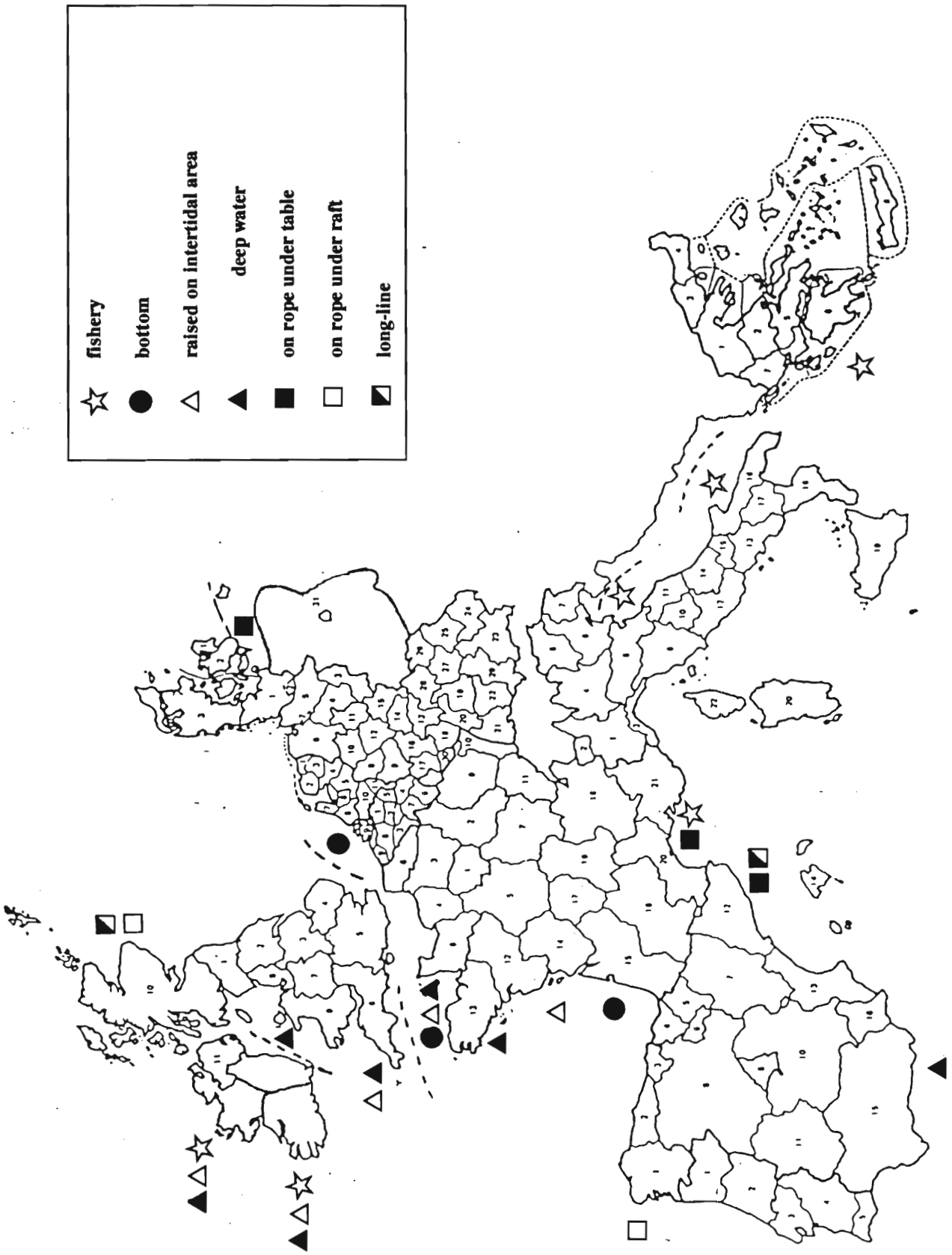


Figure 1.3 : Mussel Rearing Technics in Europe

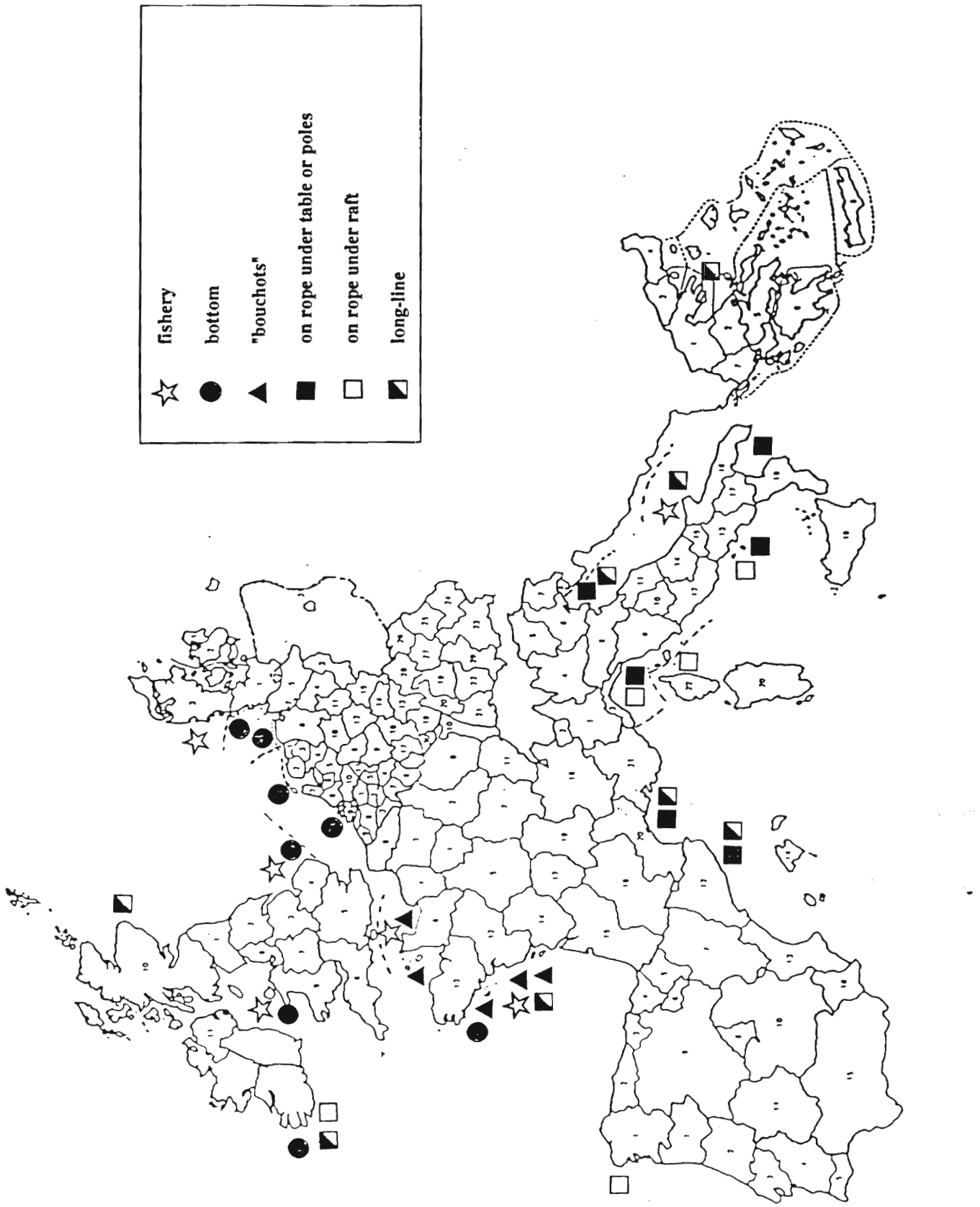


Figure 1.4 : Development of Production - Pacific Oyster

	83	84	85	86	87	88	89	90
IRELAND	35	110	101	113	104	200	380	430
U.K.	50	50	54	71	122	134	160	570
HOLLAND	0	0	0	522	772	795	1 250	1 000
GERMANY	0	0	0	24	40	80	125	155
DENMARK	0	0	0	0	0	0	0	0
ITALY	2 000	2 000	2 000	2 000	2 000	2 000	2 000	2 000
FRANCE	121 000	113 000	121 500	119 500	127 970	133 170	147 710	142 600
SPAIN	13	30	63	141	105	78	100	100
GREECE	0	0	0	0	0	0	0	0
TOTAL	123 098	115 190	123 718	122 371	131 113	136 457	151 725	146 855

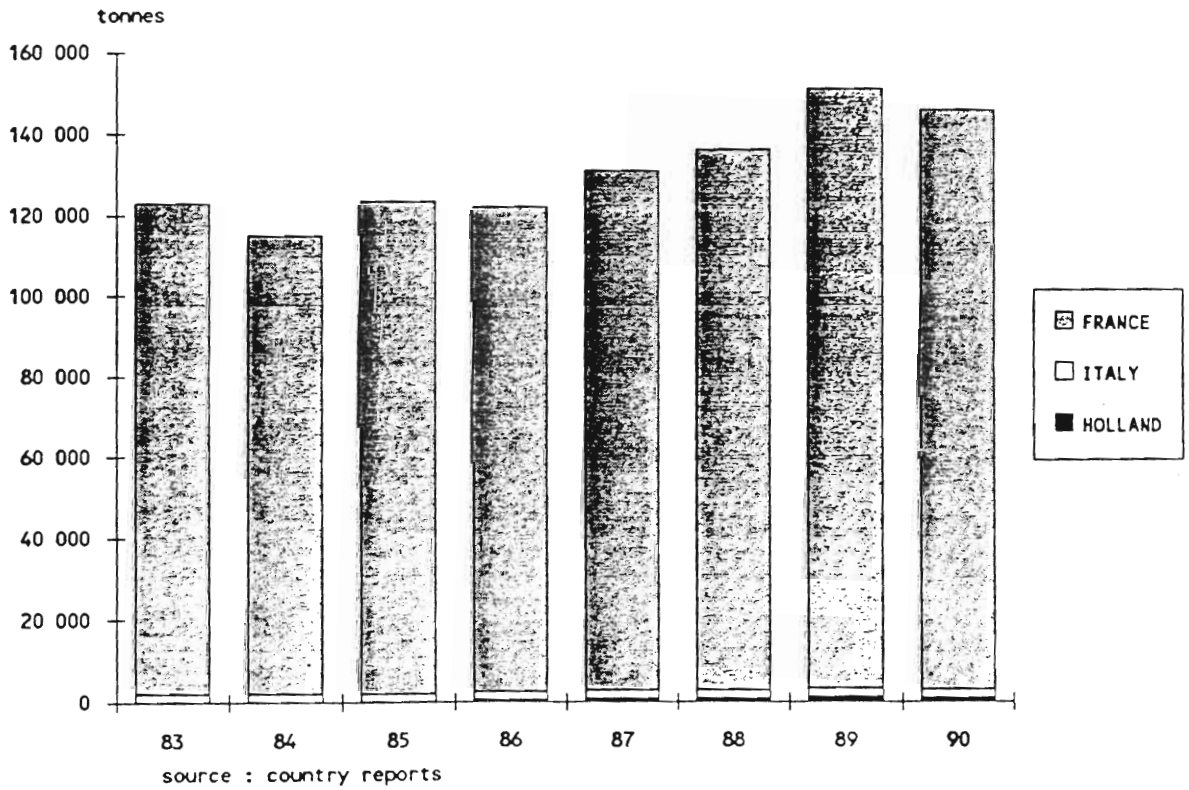


Figure 1.5 : Development of Production - Flat Oyster

	83	84	85	86	87	88	89	90
IRELAND	338	398	431	478	741	755	765	770
U.K.	290	380	477	631	137	110	51	820
HOLLAND	816	825	887	1 054	692	700	730	295
GERMANY	0	0	0	0	0	0	0	0
DENMARK	0	0	0	0	0	0	0	0
ITALY	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000
FRANCE	1 243	6 105	1 467	1 570	2 370	2 270	1 601	1 600
SPAIN	12	22	19	31	291	154	200	200
GREECE	n.d	n.d	n.d	1 854	894	1 413	1 410	1 400
TOTAL	5 699	10 730	6 281	8 618	8 125	8 402	7 757	8 085

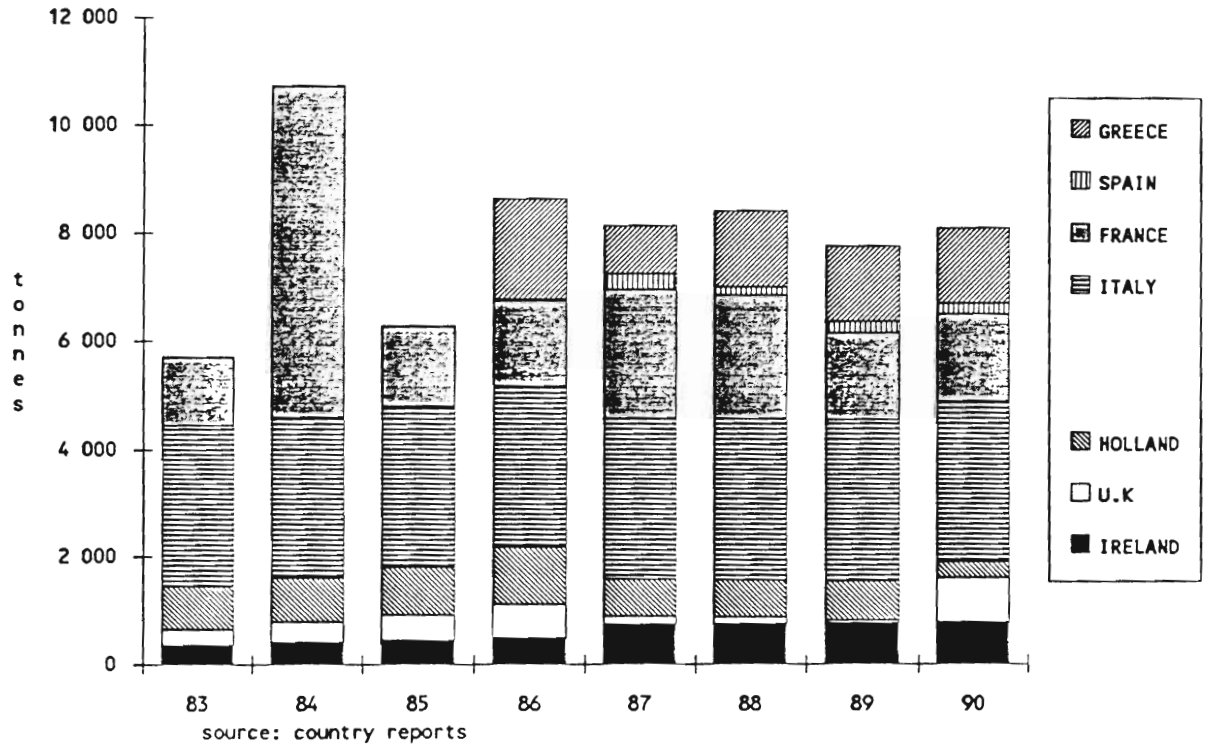


Figure 1.6 : Development of Production - Mussel

	83	84	85	86	87	88	89	90
IRELAND	6 320	13 720	11 990	12 115	16 390	14 470	11 700	16 200
U.K.	5 855	4 290	5 825	9 630	4 910	6 940	9 035	10 680
HOLLAND	110 000	68 000	105 000	67 000	87 000	64 000	107 000	92 000
GERMANY	31 000	65 000	21 000	29 000	25 000	29 000	18 000	19 400
DENMARK	67 000	80 900	83 300	86 900	77 400	66 700	72 600	89 300
ITALY	69 000	66 300	76 000	79 000	85 400	102 800	90 000	95 000
FRANCE	47 900	47 500	51 400	51 400	54 700	71 700	73 150	62 750
SPAIN	212 590	235 000	251 000	235 000	173 800	170 680	203 440	220 000
GREECE	155	190	210	230	480	1 100	1 500	1 500
TOTAL	549 820	580 900	605 725	570 275	525 080	527 390	586 485	606 830

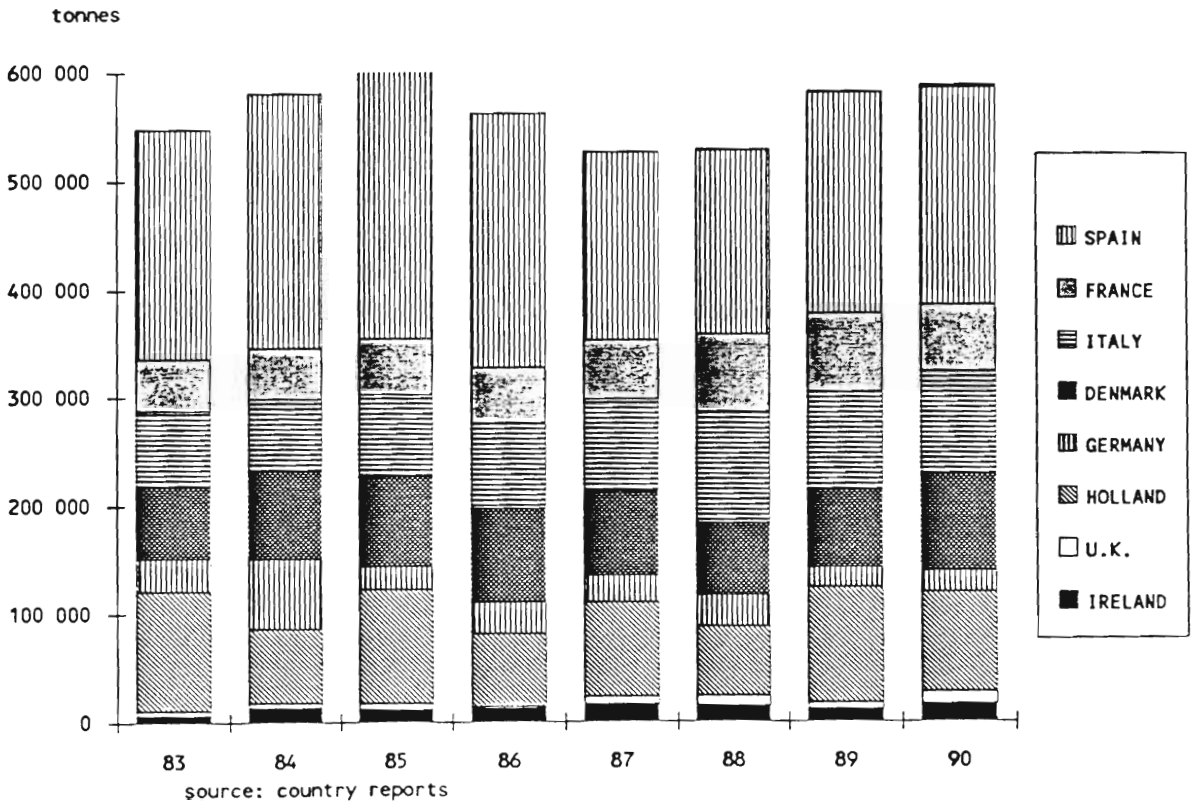


Figure 1.7 : Structure of apparent consumption in the countries of the EEC

mussels (in tonnes)

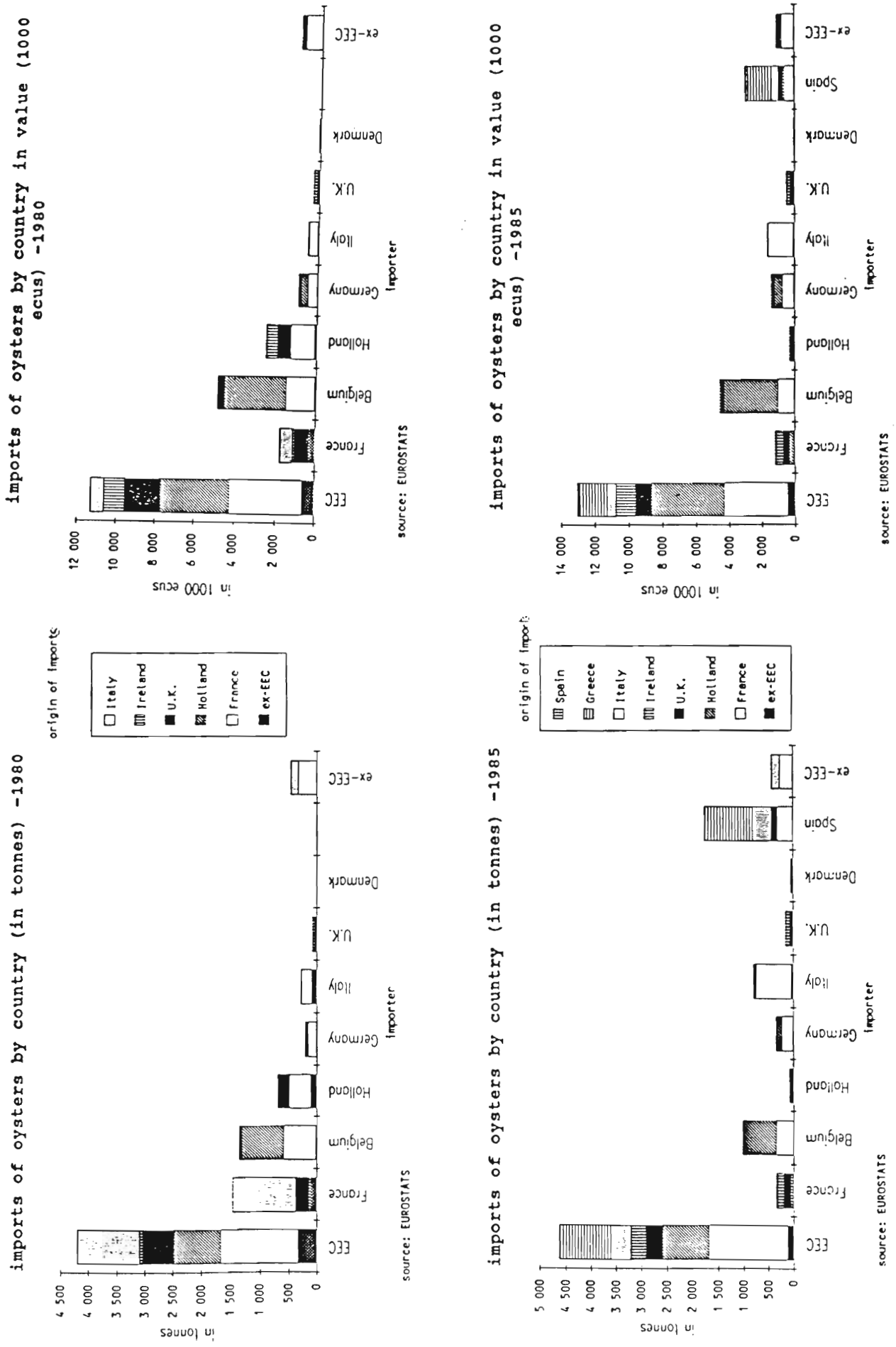
		production (T)	imports. (T)	exports (T)	apparent consumption (T)	in % europe
Ireland	85	11 990	0	-5 944	6 046	1,05%
	90	16 200	759	-8 609	8 350	1,44%
U.K	85	5 825	1 691	-3 297	4 219	0,73%
	90	10 680	597	-4 628	6 649	1,15%
Holland	85	105 000	35 495	-52 551	87 944	15,23%
	90	92 000	15 950	-45 982	61 968	10,70%
Germany	85	21 000	12 691	-9 355	24 336	4,22%
	90	19 400	12 895	-15 234	17 061	2,94%
Denmark	85	83 300	27	-36 410	46 917	8,13%
	90	89 300	1 239	-12 974	77 565	13,39%
France	85	51 400	37 515	-1 132	87 783	15,20%
	90	62 750	34 724	-1 444	96 030	16,57%
Italy	85	76 000	17 296	-274	93 022	16,11%
	90	95 000	11 007	-426	105 581	18,22%
Spain	85	251 000	1 200	-25 131	227 069	39,33%
	90	220 000	1 813	-17 016	204 797	35,35%
Greece	85	210	0	-198	12	0,00%
	90	1 500	0	-128	1 372	0,24%
EUROPE	85	605 725	105 915	-134 292	577 348	100,00%
	90	606 830	78 984	-106 441	579 373	100,00%

oysters (in tonnes)

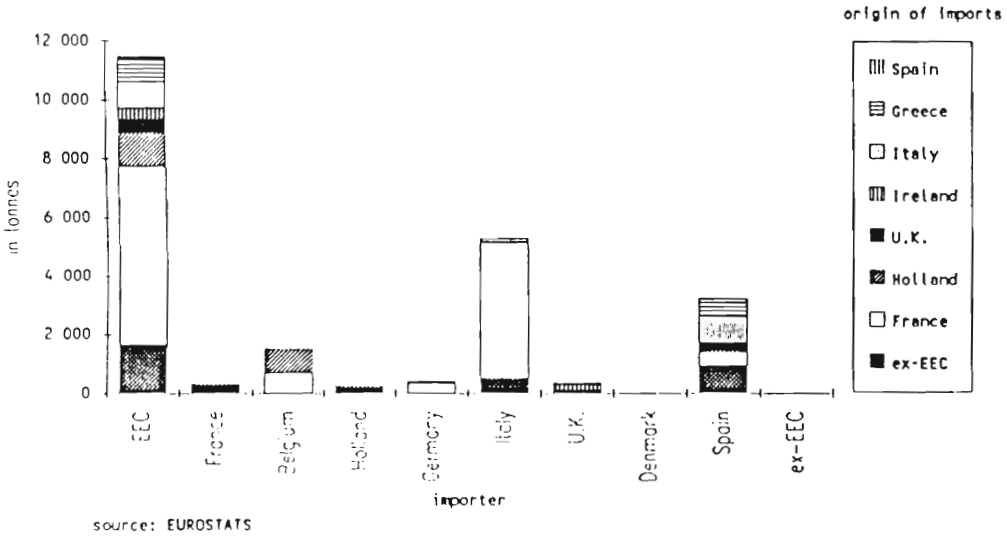
		production (T)	imports. (T)	exports (T)	apparent consumption (T)	in % europe
Ireland	85	532	0	-298	234	0,18%
	90	1 200	0	-394	806	0,52%
U.K	85	531	173	-326	378	0,29%
	90	1 390	386	-476	1 300	0,84%
Holland	85	887	89	-908	68	0,05%
	90	1 295	274	-1 134	435	0,28%
Germany	85	0	358	0	358	0,28%
	90	155	430	0	585	0,38%
Denmark	85	0	46	0	46	0,04%
	90	0	0	0	0	0,00%
France	85	122 967	351	-1 810	121 508	93,71%
	90	144 200	382	-6 110	138 472	89,36%
Italy	85	5 000	778	-576	5 202	4,01%
	90	5 000	5 282	-880	9 402	6,07%
Spain	85	82	1 798	-19	1 861	1,44%
	90	300	3 120	-60	3 360	2,17%
Greece	85	1 000	0	-989	11	0,01%
	90	1 400	0	-803	597	0,39%
EUROPE	85	130 999	3 593	-4 926	129 666	100,00%
	90	154 940	9 874	-9 857	154 957	100,00%

source: data in country reports and for external trade in EUROSTATS

Figure 1.8 : Large commercial flows in Europe -Oysters (1980-1985-1990)

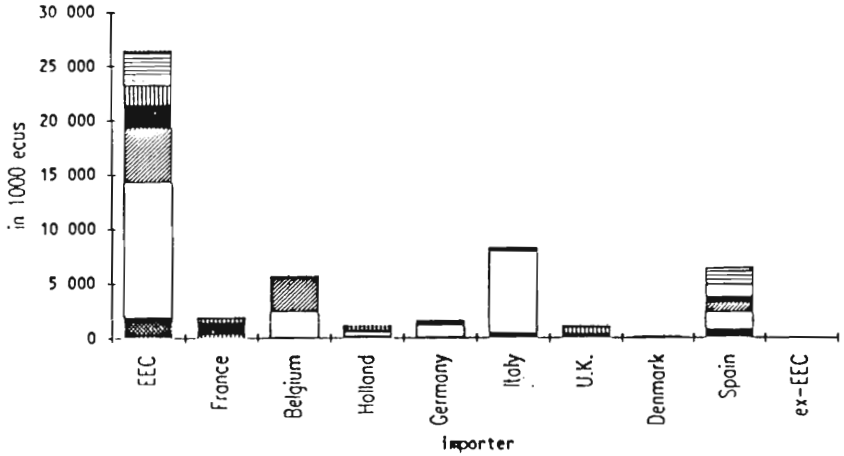


imports of oysters by country (in tonnes) -1990



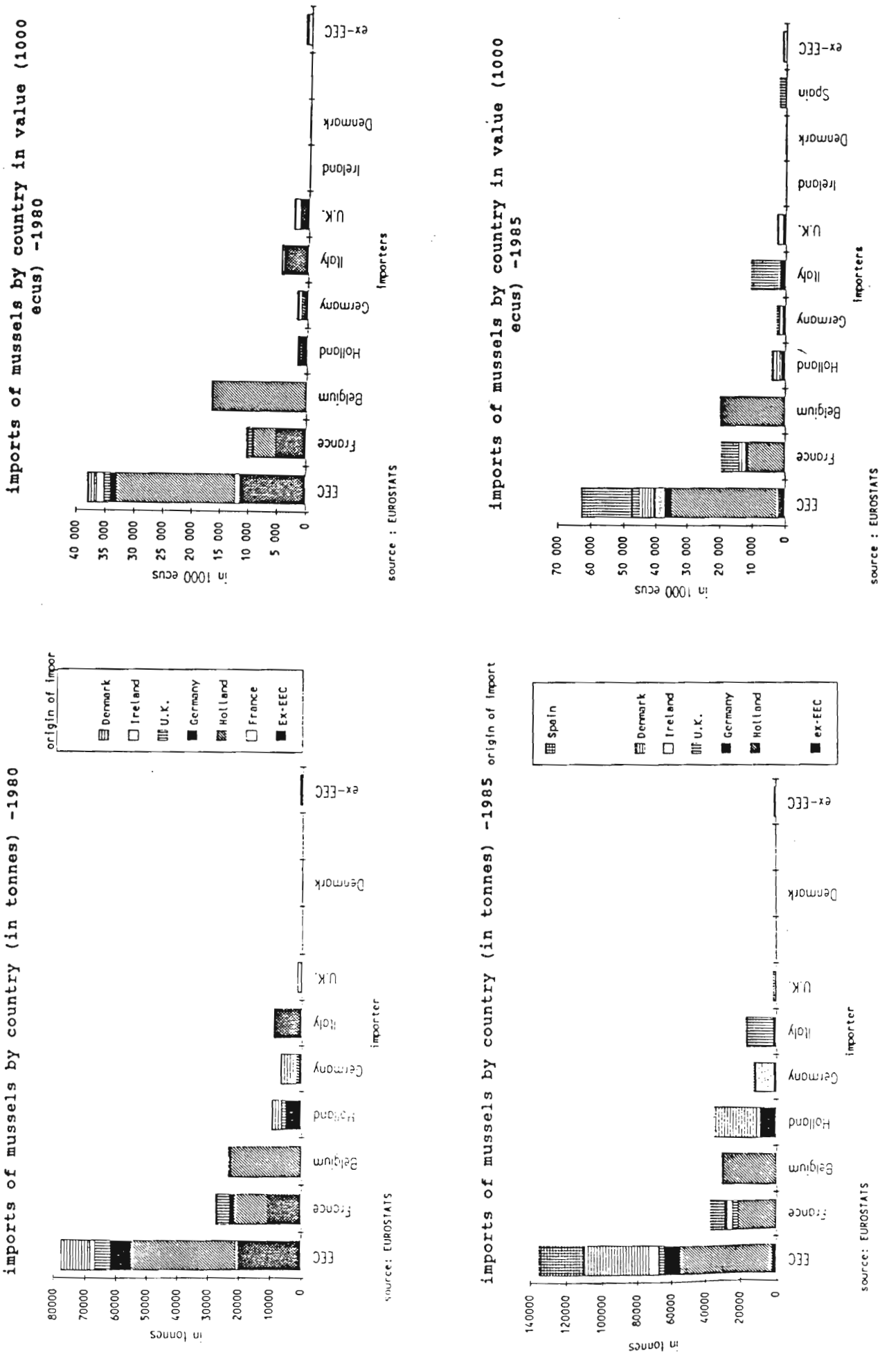
source: EUROSTATS

imports of oysters by country in value (1000 ecus) -1990

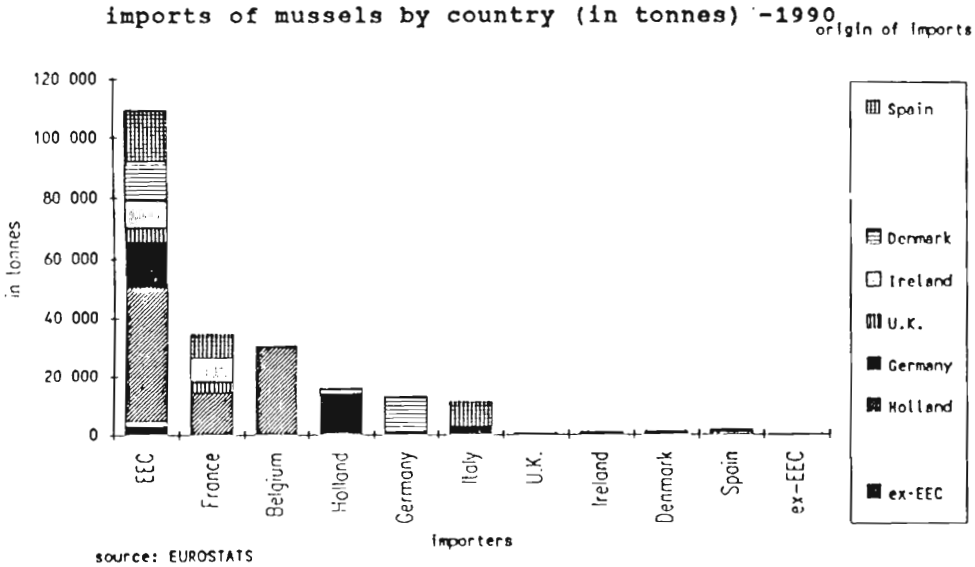


source: EUROSTATS

Figure 1.8 : Large commercial flows in Europe - Mussels (1980-1985-1990)

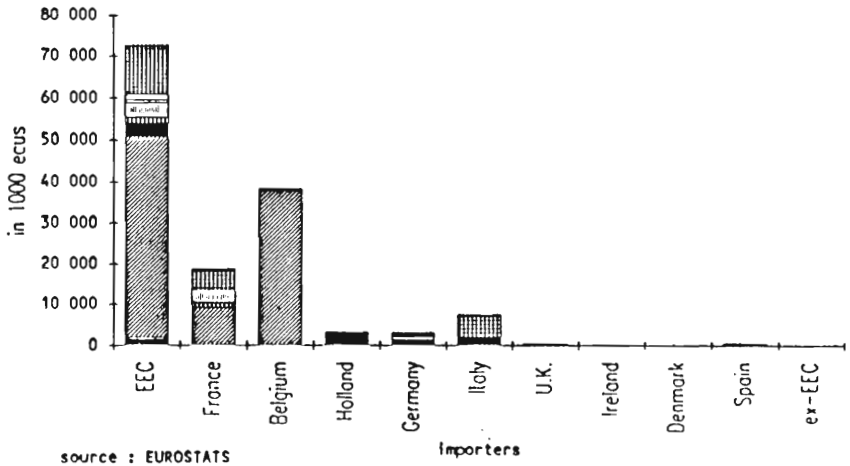


imports of mussels by country (in tonnes) -1990



source: EUROSTATS

imports of mussels by country in value (1000 ecus) -1990



source : EUROSTATS

Figure 1.9 : Producing Units and Employment in the mussel and oyster sectors (1990-1991)

	PRODUCING UNITS	EMPLOYMENT TOTAL	(FULL-TIME)
Ireland	125	1 088	(300)
U. K. *	466	594	(198)
Holland	75	251	(251)
Germany	8	60	(60)
Denmark **	81	n.a.	(50)
Italy ***	n.a.	1 700	(600)
France****	4945	14 100	(8 100)
Spain	2 700	4 688	(3 750)
Greece	50	98	(68)

Source: country reports

* 1986

** 1 farm and 80 vessels fishing mussels (26 full-time, 54 part-time)

*** taking account of the multi-activity fishing-shellfish culture in Italy, the data concerning part-time employment are not very significant. These data must be read: 1700 families for which the main source of income is shellfish culture.

****: 1989

n.a. : not available

1.2 Commentary on the tables and graphs

1.2.1 General Commentary on the statistics

The data sources used in the different country reports are various :
- FAO (for production)
- national statistics (for production, consumption, distribution or foreign trade)
- P.O. (for prices)
- CEE - EUROSTATS (for foreign trade)

There is often a lack of consistency among these different sources for the same kind of information. We therefore have chosen not to mix the time-series data and to give preference to only one data source for inter country comparisons when this was available and accurate enough.

Production statistics usually tend to minimize it. Crossing different data sources shows this deviation is apparently more important when the collection of information is based on sanitary control system. When the information is collected through centralised wholesale market structures, which only exist in a few countries, the deviation is smaller. In particular, the evaluation of the production level in France is likely going to be more difficult due to the suppression of the sanitary tags which are the only source of information on the production.

As for international trade, observations collected in the field lead us to think there is an under-evaluation of the flows as well in the Mediterranean as in northern Europe (Netherlands, Germany, Denmark). Besides, the foreign trade price data which are given by EUROSTATS are not consistent when comparing export and import of the different countries.

1.2.2 Production

The total production of mussels is 605 000 tonnes and that of oysters 155 000 tonnes in 1990, with respective values of Mln ecus 321 and Mln ecus 135 at the production level.

Mussel production is dominated by Spain (220,000 tonnes), Italy, Holland, Germany, of equal importance (90 to 100,000 tonnes) and France (60,000 tonnes). Almost all of the countries in Europe produce or are developing the production of mussels, for each it is often difficult to determine which is fished and which is farmed. The commercial flows are very important. The species produced in the waters of the Atlantic or the North Sea (*Mytilus edulis*) are different from those cultivated in the Mediterranean (*Mytilus galloprovincialis*). Wild fisheries and cultivation not based on fixed structures are dominant in the north of Europe. The countries of the south cultivate using permanent technical structures in the sea, either fixed or floating. Ireland and Great Britain combine the two types of system, under the headings extensive and intensive farming. The general tendency in Europe is towards an overall stagnation of production volume in spite of the strong dynamism of those regions who have developed mussel culture recently.

The production of oysters is dominated by France (95%). Two types of oyster are produced, the pacific oyster (Crassostrea gigas) and the flat oyster (Ostrea edulis), almost totally by cultivated systems. Fished production is very badly tabulated in the statistics. The marketing channels are very weak. The pacific oyster is produced everywhere by elevated systems (pockets and tables) and to a limited extent on trays in the Atlantic. Cultivation in the Mediterranean is carried out by suspended systems. After the development of parasitosis, the production of flat oysters has become very limited and confined to the coasts of the west of Ireland and Great Britain on the one hand and the Mediterranean on the other. Oyster culture production has not developed

very significantly and attempts to encourage its development have remained isolated and limited.

1.2.3 Consumption

The analysis of apparent consumption appears to show one group of producing countries with weak domestic demand and another group of producers with too much. Generally speaking it can be seen that the large export flows travel from the north towards the south. The largest area of shellfish consumption is bounded by Belgium, France, Spain and Italy. The countries with weak production are also those with low consumption who are net exporters.

1.2.4 Units of production

The number of units of production, an approximate measure as the relevant statistics are generally not available, appears to show major differences in average size. The large producing countries of the north have the largest units, with one size identified which could perhaps be qualified as industrial. Production from the large countries of the south on the other hand, is on a very small scale (artisan or family). The production units in the weaker producing countries are a fairly recent development, their average size resembling that of small enterprises.

1.3 Complimentary to the scientific reports

For two groups of countries, national reports have not been written. There are two remaining member countries of the EEC (Greece and Portugal) and three non-member countries (Yugoslavia, Albania, Turkey) whose production output can be found on the European market. This is principally for mussels. Their activity is described briefly below.

1.3.1 Greece

For Greece, the youngest of the sector, with relatively simple and homogeneous characteristics it was considered that the information contained in the report prepared by EAFE for the Commission of the European Communities in 1989 was sufficient at this stage. The principal findings are shown below.

Introduced in the beginning of the 1980's, Greek mussel culture production was seen to rapidly develop following the dynamic investment resulting from community aid. Production is by surface long-lines inspired by the development of the same technique in Italy. Principally located in the Gulf of Salonique at the beginning, it has spread throughout most of the northern regions. In 7 years production has increased 20 times over reaching 3,000 tonnes in 1990, with 60 farms employing around 100 persons. If the installed capacity was utilised to its full potential it is possible that production could be doubled. It should then stagnate because of the slowing down of investments. Reasons for this are multiple. One needs a European guard against the country's economic difficulties, the reluctance of investors faced with a technique presenting large risks (loss of stock) and of the growing cost of access and of provision of sites which may be valued in a certain way. The market demand is largely local and is at the catering level, the distribution network has been scarcely developed. The cost of opening the national market exceeds the average of a sector that is placed with very little available capital and is disposed primarily towards the very lucrative nearby market in Italy, before its own domestic market.

1.3.2 Portugal

Production in Portugal is very small, the flat oyster banks were destroyed by parasitosis at the beginning of the 1970's. In 1989, production levels were 100 tonnes of oysters and 325 tonnes of mussels with the absence of any new investment (EAFE, 1989).

The other countries intervene on the European market through their exports of mussels principally to Italy. They share all the characteristics of being weak consumers, inclined towards a significant production potential.

1.3.3 Albania, Yugoslavia, Turkey

Albania and Yugoslavia have started to set a value on their coastal lakes by the development of suspended production techniques on ropes and poles imported from Italy. The development potential in the medium term is judged to be important.

In Turkey, mussel fishing is known as an important development. Export volumes and values are not on the whole registered. However, discussions conducted in Italy have placed them to be of the magnitude of several thousand tonnes. It was also noted that one species in particular is very highly valued in Italy, *Modiolus barbatus* 1. However, no information can be obtained on the existence of an evaluation of exploitable wild stocks in Turkey.

1/ But F.A.O. statistics do no mention the production of this species in Turkey and generally in the Mediterranean area.

The relative low costs of production in the Adriatic sea and the eastern Mediterranean and their potential for growth weighs heavily on the dynamics of investment in Italy, a country where the deficit in mussels seems strong.

II SYSTEMS OF PRODUCTION

The systems of production for mussels and oysters are highly variable between one country and another taking all the different aspects into account (techniques, legal systems, economics,...). Here we examine the production systems from an economic perspective other aspects of production being examined elsewhere. It becomes apparent from the reports that it is very difficult to consider fished and farmed production separately. The distribution flows are highly complex and generally are not segmented for statistical purposes with no differentiation being made of the level of the markets. Elsewhere the segmentation that appears in terms of outlets (fresh and processed consumption) for mussels rests on quality criteria for a large part independent of type of production.

Three criteria have been used to produce a classification system of production : the types of production techniques, the relative importance of the sector in relation to total European production and their rates of growth, an indication of the dynamics of the sector.

Amongst the techniques of production we first consider farming systems, sometimes referred to as intensive production. They are characterised by spat collecting operations and/or the placing of fixed structures in the sea. In some of the systems fisheries provide a part of the spat and a part of the stock are farmed on the bottom.

Systems based on the collection of juveniles in natural surroundings and the absence of fixed structures, are considered here as a type of managed fisheries. This is the basis of the economic typology used here and is independent of definitions of fisheries or aquaculture established by usage or right in the different countries.

The smallest sectors in 1990 with little perspectives for growth or those based on fisheries are not taken into account (oysters in Portugal, Italy, Greece and Germany).

Figure 2.1 : Characteristics of the national sectors of production for mussels and oysters

Mussels

	Principal type 1981-83	1990	Production (tonnes) 1981 (*83)	1990	Average annual rate of growth
Spain	E	E	212 590*	220 000	+ 0,5%
France	E (P2)	E (P2)	57 970	62 750	+ 0,9%
Italy	E (P2)	E (P2)	69 000*	95 000	+ 4,7%
Netherlands	P1	P1	125 000	92 000	- 3,3%
Germany	P1	P1	11 000	19 400	+ 6,5%
Denmark	P2	P2	67 000	89 300	+ 3,2%
United Kingdom	P2(E)	E/P2	11 515**	10 680	- 0,8%
Ireland	P1 (E)	P1 (E)	6 323*	16 200	+ 14,4%
Greece	E	E	155*	1 500	+ 38,3%
Total			(560 550)	606 830	(+ 0,9%)

** Fisheries 1980 and farming 1981

Oysters

	Principal type 1981-83	1990	Production (tonnes) 1981 (*1983)	1990	Average annual rate of growth
France	E	E	85 170	144 200	+ 6,0%
Netherlands	E	E	600	1 300	+ 9,0%
Ireland	E	E	370*	1 200	+ 18,3%
United Kingdom	P2	E (P2)	n.a.	1 390	-
Total			(86 140)	148 090	(+ 6,2%)

Types:
E : Farming
P1 : Managed fisheries with individually allocated concessions
P2 : Managed fisheries without allocated concessions
( ) : the system of production represents 10 to 20% of the total according to the country and the year
/ : there is an important contribution from two production systems, the former being in the majority

Four large categories of production organisation are thus identified for the principal production sectors:

i) Important sector dominated by farming

mussels in Spain
mussels in Italy
mussels and oysters in France

ii) Important sector dominated by managed fisheries

mussels in Holland
mussels in Denmark
mussels in Germany

iii) Sector of average importance with joint development of managed fisheries and farming

mussels in Ireland
mussels in Great Britain

iv) Sector of limited importance or with recent development based on farming

mussels in Greece
oysters in Holland
oysters in Ireland
oysters in Great Britain

2.1 Important sector dominated by farming

This category includes Spain and Italy for mussels and France for mussels and oysters. All the principal farming techniques are represented with their development depending upon the country in question.

An important distinction can be made between the oldest producers (Italy, France) and the more recent development of mussel culture in Spain. Production in Italy and France is characterised by wide geographic dispersion and almost all of the protected zones accommodate structures of production. Historically the key regions played an important role in the dynamics of development (Marennes Oleron, Charron, Taranto). At the same time the diffusion of technology and expansion was often by a site leader (Trieste for the long-lines in Italy). For Spain however there is very powerful geographical concentration (90% of the production is in Galicia). The dynamics of development are far less endogenous in this sector. The public willingness for backing this dynamic model is concentrated a priori on the most favourable sites.

2.1.1 Artisan and family units of production

The principal characteristic, independent of the species and the countries, is that of a production that is family-based or artisan-based. The production units are small with apparently weak investment, the fundamental cost of access has often been hidden by illegal transactions. The employment of a majority of family manpower guarantees great flexibility. The production tools are privately owned and only the real estate remains in the public domain. The real estate is managed in most cases like a family inheritance out with the collective management situation.

2.1.2 Factors determining size

The size of exploitation is determined by two factors. The first comes indirectly from the nature of the technique and the effects of know-how and the need for investment. The second comes from in the regulations for sanitary control which effect the externalisation or internalisation of the function of the wholesale market at the level of the units of production.

Know-how plays an important role in farming management and can be difficult to transfer. Know how will act as a limitation on the size of exploitation to that the manager can supervise, the level of production depending afterwards on the production potential of the sites used for exploitation. It can be seen that the techniques used in the open sea (long-lines), make possible the exploitation of a larger average size than the older raised techniques, poles or rafts. The higher volume of investment and the conditions of subsidies explain probably this larger size of the units..

Where the regulations impose necessary important investments for the first market sale (wholesale market), the capital is generally of the form of large specialised units (depuration centres in Italy and Spain). Certain ones can be set up by the grouping together of producers but they are more generally the result of an integration of depuration by the sector of commerce. They are mostly used for depuration and the trade of all types of shellfish. Here where the need to invest is less, the integration or the segmentation of the production and wholesale markets depends on the margins that can be achieved. When the beneficial margins to production are weak one can see a strong movement of integration towards sales by the producers (oysters in France since the end of the 1970's). Conversely, when the control of the commercial margins hardly alters the profitability of the production units, the two operations remain relatively separate (mussels in France).

Generally the integration of production with the wholesale market signifies larger economic unity, made all the more large by the fact that the commercial practice does not only concern actual production but also carries purchases for resale. Some of the larger enterprises see their proper production as nothing more than a fullback measure to smooth out variations in supply and as a means of obtaining access to concessions.

2.1.3 Multiactivity or complementarity between fishing and aquaculture ?

In those three countries (France, Italy, Spain) fishing provides only a minor contribution to the national production of mussels with all the characteristics of variability depending on natural conditions (the productivity of the sites) or on the economic conditions (substitution between targeted species for techniques which are multi-gear, multi-species).

In terms of sources of revenue, multiple activity in fisheries and aquaculture is rare in France and Spain. When it does occur, it is more often undertaken by one or more members of the family rather than by the manager of production. The timetable of tasks for shellfish farming spreads over a major part of the year and the manager of the site would find it difficult to undertake any another activity. The involvement in shellfish culture and fishing plays a particularly important role in Italy. Again, however we must be precise about the meaning. Rather than a means for increasing revenue from exploitation, it seems to be that the practice of shellfish culture and fishing production serves as a revenue stabiliser and a better utilisation of the means of production (boats). The substitution carried out is often a function of the hazards of whichever production is considered to be the "normal" or principal activity, the fishery or the shellfish culture. This complementarity plays an important role in spreading the effects of crises and it is always marked by a strong specialisation in shellfish.

Farming, fishing and the marketing of shellfish appear to be very specialised activities, concentrating on one species which in most cases is cultivated by farmed production only, or specialising uniquely on shellfish. This specialisation occurs with the performance of a set task using the same equipment (a boat) which is not highly specialised, and a know-how in matters of handling and marketing shellfish. Conversely, there is rarely an identical species specialisation in farming between fisheries and shellfish culture. This will depend upon the existence or not of wild stocks of shellfish of high commercial value.

The development, when it is not effected by market problems (oysters), often depends on the improvement of existing production techniques and of access to new sites (open sea) by innovative technology.

2.2 Important sector dominated by managed fisheries

The production of mussels in Holland, Denmark and Germany could perhaps be considered as a fishing activity managed to varying degrees. Dutch and German production could be classed as farmed production, in the sense that the sites are allocated to individuals, they utilise the practices of spreading wild mussels at an intermediate stages in the biological cycle and preconditions to marketing are largely developed. From an economic point of view however the production activity has all the characteristics of a managed fishery, the transfer of stocks being seen to assure a better productivity from the banks by reducing the biomass or to reach zones more protected from storms. The natural banks spread out from the Frise Isles in the Wadden sea and then northwards the length of the Danish coast.

The principal problems of the regulation of the productive sector are those of the appropriateness of the effort of lifting seeds for recruiting the stocks, of sharing between floats and of a great dependence on the natural variability of the stocks. These are typically the problems of management of fisheries with the sedentary characteristics of the species allowing systems of concession. The regulation measures include the division of zones, quota systems, licences and periods for fishing.

The production units, in a reduced number, are average enterprises with industrial characteristics and the cases of internationalisation of investments are numerous. The dynamics of the sector in the three countries mainly comes from the activity of dutch enterprises. The capital invested in the production is often provided for by the processing industry or the trade.

The wholesale market is carried out in two ways. The first is the auction market at Yerseke, through which all dutch production passes and also a large part of the Danish and German production. The other part, is exclusively intended for processing and selling directly to industries, when they are not those industries who have integrated production. The production sector is very structured.

A movement of expansion has been carried out for 10 years principally in Germany. But the production level reached is threatened by the diverse competition (see section VI) more than by overexploitation, which can exist on certain banks. The downwards tendency in this production level is already being felt strongly in Holland.

2.3 Sector of average importance with joint development of developed fisheries and farming

This is the case for the production of mussels in Ireland and the United Kingdom. These sectors, dominated a decade ago by managed fisheries on natural banks, can be seen to be progressively developing farming systems on permanent structures. In Ireland, far more than in the case of Holland, what we is referred to here as managed fisheries is

very near to a farming system. It is locally differentiated by the term extensive farming and rests on the spreading of young fished mussels.

The units of production are very scattered and play a very limited role in the local economies where they are developed with the exception of some zones in Ireland. The total production is however far from negligible, especially when a very weak national demand is taken into account.

The units of production are on the whole artisanal, employing several people. Farming of and fishing for shellfish are often associated. The marketing systems are very diverse, but their integration with the production is not hindered by too strict regulation with respect to sanitary control.

The production capacity installed is often under-utilised due to a general lack of organisation of these sectors, particularly in marketing matters. At this moment in time new investments are relatively small in number.

2.4 Sector of limited importance or recent development based on farming

The sectors grouped here (mussels in Greece and oysters in Holland, Ireland and the United Kingdom) are all similar in terms of their limited importance in the volume produced : 1,200 to 1,500 tonnes. They are characterised by a number of restricted sites where one finds a small number of farming sites without a major role in the local economy.

The development of these farms is relatively recent. The catalyst was the disappearance of the natural stocks of flat oyster (Ireland, United Kingdom and Holland) and by voluntary political public aid.

The accelerated growth indicates a strong dynamic development, but this must be seen in relation to the yield compared to the size of these sectors. There are multiple difficulties preventing a significant expansion (lack of sites, diseases, lack of know-how of techniques, of management or marketing, development of distribution networks, absence of national demand,...).

The average size of the sites is relatively important. At this level we can again see the effects of subsidies, the use of recent technology or of a highly structured shellfish sector.

With the exception of what is practised in Holland where the flat oyster had to be replaced by the pacific oyster, which is less highly valued, the investments realised in the middle of the 1980's did not again attain their levels of full exploitation. The projections here for 1995 are therefore optimistic. The slowing down of investments allows us to foresee a relative period of stagnation in the medium term.

III- THE MARKET

3.1 Types of market structures

The structure of the wholesale stage of market transactions varies according to two principal criteria:

- The existence of an organised body operating at the wholesale stage of market transactions (price and volume fixing...) notably via producer organisations, P.O's, or agreements between industries.
- A concentration of registered transaction agreements at the wholesale level between agents and dealers.

Four categories of market structure can be identified:

i) wholesale markets which are organised and centralised
Holland, Spain, Denmark, Germany

ii) wholesale markets which are organised and not centralised
Italy

iii) wholesale markets which are not organised and not centralised
Greece, France, U.K, Ireland

iv) no wholesale market, but an integration of production by the processing or trade industries
Denmark and Germany and the Dutch traders

3.1.1 wholesale markets which are organised and centralised

The wholesale market is characterised by minimum fixed prices and reference prices (Spain, Holland), the existence of a withdrawal fund (Holland), negotiations within industry on the intended offers for processed price and volume (Spain), the centralisation and redistribution of bids by the depuration stations (Spain). In these two countries, these operations are conducted by the setting up of P.O's.

The transactions can be said to be centralised in that they are carried out by an agreed allocation of a small number of buyers(merchants and depuration stations, processing industries), for the next sale :
- by one unique auction market (Holland)
- by cooperatives (Spain).
Direct dealings do not exist between the producers and the merchants.

For Denmark and Germany an important amount of production is marketed via the market structure in Holland.

3.1.2 wholesale markets which are organised and not centralised

In Italy the obligation of depuration for all production in local stations results in an organised market at the wholesale level. Although no reference price exists, the level of prices are homogenised by the equal flows passing through the same depuration stations.

There is no direct contact between individual producers and buyers.

3.1.3 wholesale markets which are not organised and not centralised

In all cases, (France, Greece, Ireland, the U.K.), the wholesale market is open and the buyers are not registered dealers or identified in any formal way. Prices are formed by mutual agreement and there is no physical market structure.

In France, producers must have official authorisation to sell in the wholesale network or directly to the consumer, but this system does not effect the market mechanisms. (Transactions are always conducted by mutual agreement).

3.1.4 No wholesale market but an integration of production with the processing or trade industries

The Danish and German processing industry produces its own supply (cf 2.2). In this sense a wholesale market does not exist but instead backwards vertical integration.

The same situation could perhaps be said to exist for the dutch merchants who carry out 15% of the production and do not generally trade via the auction market.

3.2 Types of Markets according to the Structure of Supply

The markets for European shellfish are characterised by the level of domestic consumption and the degree to which they are either importers or exporters. In the majority of cases such a classification is meaningful when considering the markets for both mussels and oysters although in the analysis distinctions are made where appropriate. Using this framework four distinct groups of countries can be identified which describe their market activity. First those countries which have a relatively high level of domestic consumption and who either import or export. Secondly those countries where domestic consumption is small and who either import or export. This classification is shown below:

i) High domestic consumption/ net importers
- eg France for Mussels
- Italy for Mussels
- Belgium for Mussels and Oysters

ii) Large domestic consumption/ net exporters
- eg Spain for Mussels
- France for Oysters

iii) Small domestic consumption/ net importers
- eg UK for Oysters
- Germany for Mussels and Oysters
- Spain for Oysters
- Italy for Oysters

iv) Small domestic consumption/ net exporters
- eg Holland for Mussels
- Ireland for Mussels
- Greece for Mussels
- Denmark for Mussels
- UK for Mussels

3.2.1 High domestic consumption/ net importers

This category of market is characterised by a long tradition of shellfish consumption across all species. As a consequence there is a high degree of market discrimination based upon quality, size and product origin. In addition there are well developed marketing channels based upon traditional forms such as specialist shops and catering outlets although there is a detectable move toward the supermarket in these countries. Import activity is a function of:

i) Constraints upon domestic supply in particular the lack of suitable production sites, and the cost/availability of appropriate production technology.

ii) Seasonal domestic supply coupled with relatively stable domestic demand as is the case in France with the french Bouchot and in Italy which results in counter-cyclical import/production behaviour.

iii) Relative prices make it cost effective to import as domestic production unsuitable for processing due to high value.

iv) Market discrimination based upon size, quality and origin.

In the case of Belgium there is no domestic production and demand is met wholly through imports. The Belgian market is a traditional market with both consumption at home supplied via specialist retail outlets and supermarkets. Both the retail and catering sectors are supplied direct from dutch and french producers.

3.2.2 Large Domestic Consumption/ net exporters

Markets in this category participate in international trade only to take advantage of market opportunities presented elsewhere. France as the major producer of oysters in Europe satisfies domestic demand and supplies countries such as Italy which has a strong traditional demand for the product but insufficient domestic production.

In the case of mussels, Spain has a large domestic consumption yet it provides a supporting role for the French and Italian markets on a counter-cyclical basis. France in particular suffers from seasonal fluctuations in the supply of Bouchot mussels and Spain provides supplies of fresh product out of season. In addition it is uneconomic to process Bouchot mussels and Spain provides small amounts to satisfy the demand for processed mussels.

3.2.3 Small Domestic Consumption/ net importers

Markets which have small domestic consumption and import are mainly specialised and able to discriminate quality such as the case of the market for oysters in Spain and Italy. In the case of oysters in Italy and Spain the connoisseur market demands a high quality product defined in terms of species, size and origin for instance demand for large flat oyster (*Ostrea edulis*) from France. Within these markets the distribution is via specialised retail and catering outlets.

In the case of mussels Germany is an importer. The basis of the trade is the relative power of Holland who is able to divert German production from subsidiary companies to meet its own demand by overbidding German traders. The German market is then reliant upon the open market to supply domestic demand.

3.2.4 Small Domestic Consumption/ net exporters

These markets are characterised by two distinct forms. First those countries where domestic markets are highly fragmented, of relatively small size and lack market organisation. This description is particularly appropriate to the newer producing countries such as UK, Ireland and Greece. The lack of domestic demand possibly associated with low population density provides a natural motivation to export in order to gain access to larger markets. The pattern of market development is from a very localised market to an international market and eventually the national domestic

market. The problem is in servicing the export markets which require highly organised marketing activities which will need to be developed. The UK market for mussels is not able to discriminate quality. In response to these market conditions quality domestic production is directed toward export markets where quality products can attract premium prices while domestic demand is serviced by lower priced products imported in either fresh or processed form from Ireland.

The second form is that of the traditional producer such as Holland and Denmark which are characterised by small domestic demand but highly organised marketing channels which provide good access to export markets for domestic producers. The form of export activity is not common to all these countries with Holland and Ireland involved in the export of both fresh and processed products but Denmark mainly exporting processed mussels and Greece only fresh mussels.

Market Conclusions

The European markets for Mussels and Oysters can be broadly grouped into north and south. In the southern markets, for instance Spain, Italy and France, the consumption of shellfish forms a significant part of the diet and has done so for some period of time. Consumption is large in terms of volume and is across many different species. Demand is regionally segregated both with product type and also product origin. The distribution and marketing of shellfish is a specialised part of a large and well organised activity via well established retail outlets. Shellfish in particular are consumed mainly at home in fresh form. The traditional outlets for shellfish are now being replaced by the development of supermarkets. Northern markets are relatively new and domestic demand is small with catering outlets dominant. By far the largest part of production from these northern countries is directed at satisfying specialised demand in the larger southern markets. The present situation is one of dependency among countries and of specialised competition in some species and in some countries. Prospects for developing domestic demand in the north are dependant upon consumer awareness and appropriate marketing organisation.

The other most important factor is seasonality of consumption which occurs to varying degrees across the whole of Europe. The most extreme example is that of France with oysters where approximately 80% of domestic consumption occurs in the two months of December and January. There is an important role for marketing to attempt to reduce its effect and smooth out demand over the year.

IV PROFESSIONAL ORGANISATIONS AND SUPPORT SYSTEMS

4.1 Professional organisations for these sectors

This covers two aspects:
- The organisation of the sector by producer organisations (P.O.), according to community legislation (regulation 2062/80)

- Structures set in place in each country for representing the interests of the profession and for organising collective action.

According to the country, the forms of organisation are very variable (cf figure)

Figure 4.1 : Professional organisations in Europe

countries	Producers Organisations(P.O.)		Trade and professional associations	
	local and/or régional	national	local and/or régional	national
Ireland			X	X
U.K.			X	X
France	X		X	X
Italy			X	X
Spain	X		X	X
Germany			X	X
Denmark				X
Holland		X		X
Greece				

4.1.1 Producers organisations (P.O.)

Producer organisations are still not very widely spread in the shellfish sector. In France, The setting up of P.O.'s has been a very recent occurrence and geographically localised (Marennes Oleron for oysters, the Mediterranean area for mussels). For Holland and Spain, they rely on the transformation of the federal structures already existing in P.O.'s. The P.O.'s are regional in the case of Spain (with one P.O. in Galicia and one in Catalonia) and one in Holland.

For the other countries no P.O.'s are recorded.

The functions of the P.O.'s are principally economic and commercial:
- The fixing of a reference price and a withdrawal price (in all the cases)
- management of the collective marketing structures
- product promotion
- management of a withdrawal fund (Holland)

4.1.2 Trade associations

In the majority of the countries, the shellfish sector is represented *regionally or locally.* The representative structures are :
- of a cooperative nature (Italy, Ireland, Spain)
- of public status and established by legislation (France, Great Britain).

In all the countries with the exception of Greece where the sector is very new, the representation of the sector is at a *national level*, either by a cooperative (Spain, Italy, Ireland) or by public representation (France, Great Britain). Contrary to the local level, national representation is nearly always by interprofessional structures representing the sectors of commerce and distribution (France), the processing sectors (Denmark, Holland and to a lesser extent Italy) or research (Italy).

The principal functions of the organs of representation are institutional.

- supplying consultative advice
- negotiating with the Central Administration
- elaboration and circulation of information for usage by the profession
- setting in place collective actions which are of general interest for all the local representative bodies (politicising the structures, recycling shellfish wastage...).
- coordinating the regional organs for representation at a national level.

4.2 Direct financial aid

Direct financial aid, i.e. subsidies, is principally designated for structures of production. In all the European countries, these systems of aid are structured by the regulations of the Community, which impose a national counterpart to finance aid projects by the EEC.

4.2.1 Aid from the Community

During these past few years, community aid to the shellfish culture sector has been of two types : subsidies for investment or beneficial rates of interest on loans.
Subsidies for investment have been :
- regulations 4028/86 and 2908/83
- aid programmes for disadvantaged regions
- Integrated Mediterranean Programmes (I.M.P.)

The beneficial rates of interest were given to small sized projects under the framework of agricultural programmes (regulations 797/85 and 1760/87)

The reform in the type of system of Community aid rests on :
- the development of integrated programmes
- the increasing of aid given to disadvantaged regions
- the growth of aid to the marketing of goods
- the remission of regions as representatives of the Community.

4.2.2 National aid

The national counterpart of community aid grants for shellfish culture projects passes through different channels according to the country of designation : State aid, regional aid or State and regional aid combined.

The remaining aid is granted by the State in Ireland, Holland, Greece and Denmark. It varies from 10% of the investment, which is the minimum contribution required, to 25% (Ireland) and even 40% (Greece) for a financial contribution from the Community of 30 to 40%.

The rates of national aid are higher in the countries where the sector is recent (Greece, Ireland). In Ireland, "pilot" projects where the small size makes them ineligible for community aid are subsidised by the State to 50% or more.

In France and Spain the regions are assured of a counterpart of community aid because of the decentralisation that has existed since the beginning of the 1980's. National aid consists of subsidies (France and Spain) or of repayable loans (Spain).

Mixed aid between State and regions is granted in Great Britain, Germany and Italy. In Italy, national aid is specifically for the cooperative sector and for research, only regional aid concerns investment for production.

4.3 Indirect aid

Indirect aid is concerned on the one hand with technical aid for projects and on the other, with actions promoting products or of canvassing the markets, training and research.

Many countries (France, Ireland, Spain, Italy) arrange bodies who grant technical aid for the setting up or following of projects application forms in shellfish culture. This is done at a state level (Ireland), regional level (France, Spain) or by professional organisations (Italy, Holland).

Support for marketing and promotion of products is insured via public or semi-public organisations in France and Spain (FIOM, FROM). These organisations have an equivalent role of control by and financial support from the P.O.'S. In the other countries, promotion and support for marketing rests in professional organisations or from private initiatives.

V REGULATION

5.1 Legal framework

Only two countries have national specific regulations governing shellfish culture namely France and Spain. For both, there are basic regulations which cover all aspects of shellfish culture, for Spain there are also are regional legislations which develop the general essence of the national law.

In the other European countries, regulation applying to shellfish is linked to general regulations covering fisheries and navigation. Except for Holland and Denmark, these regulations are fragmented and often regional.

5.2 Access to resource

The designation of usage of Public Maritime Space varies from highly controlled (France) to limited control as is the case in Denmark and Greece. In most countries, areas and species farmed are regulated by central and regional authorities. In all countries, there is no constraint on growing of seed collected in the wild for production. In some areas, local regulations limit farming to one species, excluding others.

The recent development of off-shore devices has shown the limits of regulations in some countries to provide an adequate frame to design new areas for aquaculture.

Figure 5.1 : Conditions of designation of rights of access in Europe

Conditions of designation	free	area	species	stage of culture	method of culture	water quality
Ireland		X	X			
U.K.		X	X			
Denmark	X					
Germany		X	X			
Holland		X	X			
France		X	X	X	X	
Spain		X	X			
Italy		X	X		X	X
Greece		X				

5.2.1 Nature of access rights

Three types of rights of usage can be identified, linked to both aquaculture and fisheries: private property rights, demarcated rights and licensing and quota systems.

Private property rights exist in Holland for oyster culture (private lakes) and in the U.K. which has some private fishery beds. In Italy, private property is permitted by law but has not so far been implemented in practice for shellfish farming.

Demarcated rights are the general case in European shellfish culture. These cover various legal forms (concessions for culture or authorisations to exploit the resource), and different conditions of usage.

Licensing and quota systems specific to shellfish fisheries are used in Denmark and France. For Holland, Germany and Italy only vessel licences are required.

5.2.2 Conditions of rights

Conditions of demarcated rights vary across Europe. There are four main distinctions that can be made.

- The requirement of professional capacity is only the case in France (400 hours diploma or professional practice).
- Priorities to lease are given to cooperatives in Spain and Italy and to small farmers (less than 4 rafts) in Spain and the U.K..
- Length of lease can vary across countries and also within countries. In Italy leases vary from under four years to a maximum of 99 years. In Spain the maximum is 50 years operated by 10 year renewable leases and in the U.K. it is 60 years.
- Transfer of lease is not permitted without the permission of the regulating authorities in any European country and cannot be on a financial basis. However in Spain, France and Italy, the owner can sell any infrastructure or land improvement related to the lease and so is recompensed for the added value he has created on the lease. In Ireland, owners of the lease can allow access to other fishermen. In addition, Italian French and Spanish regulations permit transference of leases through generations with control by the administration. Despite the legal provisions deemed to preserve the public control over the Public Maritime Space, in some countries, leases tend to be transferred in conditions similar to private land properties.

- There is a large differential between the cost of leases throughout Europe but in all cases, their cost is never calculated on expected profitability but merely to cover administrative costs.

5.2.3 Management of rights

According to the country, management of rights can take different forms.

Management of culture zones covers different aspects of shellfish culture and fisheries namely:

- management for disease prevention (bonamia for oysters and mytilicola for mussels) : movement of production and restocking is generally permitted within a country with restrictions for products from unsafe zones. But for stock movement between countries, either imported stocks cannot be redeposited in the water as a rule with the possibility of derogation (France), or it is permitted with conditions on the species or origins. If stocks need to be destroyed because of disease, grants and subsidies systems exist. In some specific cases, culture of a species is forbidden (pacific oysters in Galicia).
- management of stock density : regulation exists regarding stocks and trophic capacities of zones in the U.K. and Ireland. In France and Spain, rules exist for decreasing stock density but definition and enforcement of all the criteria are problematic. For Italy and Greece, there are no stock density controls.
- planning is a main issue in all the main producing areas but is easier to implement in the new producing areas. Rules concerning fragmentation of units (size of units) and reallocation of land within units are gathered in structural policy. In the U.K., France, Italy and Spain these are implemented at a regional level.

5.3 Sanitary regulations

This covers two main aspects: pre-harvest (shellfish is in water and considered like a farmed animal) and post-harvest regulations (shellfish is considered as food).

- *Pre-harvest regulation* includes water quality control (organic and industrial pollution) and parasitic control 2/.
In Spain, the U.K., Ireland, Denmark, Germany and Holland the control of water quality does not result in zone definition according to the safety of the water. If problems of safety occur, the exploitation of the stocks is stopped. In near future, European regulations will generalize water classification.

Zones are defined in France and Italy and depuration is then required for production from unsafe zones. In Italy, zones where aquaculture is permitted are those defined as safe or conditional. In any case, mussels and oysters are classified as depurable and then must be depurated.

Positive response on parasitic control results in halting temporarily the exploitation of stocks for all members countries.

- *Post harvest regulation* includes three levels, i.e enterprise control, domestic product control and external trade control.

In all the countries except France, producers do not need authorization to sell the harvested shellfish. In France, they have to be registered as "expéditeurs" (i.e registered

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2/ the control of stocks movement is described in point 5.2.

on a safety list named "casier sanitaire") to resell shellfish. If they are not registered, they can only sell to "expéditeurs".

Domestic product control exists in various forms throughout the Community covering depuration for all production for direct consumption (Spain, Italy), food handling, storage and transportation regulations (mainly Ireland, U.K., Italy).

Trade regulation : imports into countries generally have to meet the same regulation standards as national products. For example in Spain and Italy, imports must be from a preagreed zone and must be always depurated in the country importer 3/.

Conclusion

With the standardization of European regulations, all legislation should be harmonized throughout Europe towards a rather strict control to protect public health. For the countries where regulation on handling facilities do not exist, the whole economy of production and marketing might be strongly affected. In countries where national sanitary regulations are already very strict, especially in Italy and Spain, the production sector will have to decide whether or not to keep the present system of depuration. It might work as a protection for the national production or a weakness against imports in the context of free trade across countries.

VI COMPETITION FOR ACCESS

The development of the sector is facing various cases of competition for access to resources. The following table gives a general view of the main cases.

Figure 6.1 : Nature of competition for access in Europe

nature of competition	across species	with tourism	water quality	nature protection	boat navigation
Ireland	X				
U.K.			X	X	
Denmark				X	
Germany				X	
Holland				X	
France	X	X	X		X
Spain			X		
Italy			X		X
Greece		X			X

VII CONSTRAINTS ON DEVELOPMENT

The major development issues for oyster and mussels are summarized in figure n

3/ Except for the trade between Spain and Italy: in this case, shellfish can be depurated either in the exporter or the importer country.

Figure 7.1 : Major issues for development in Europe

	OYSTERS	MUSSELS
Denmark	_____	access / conservation
Germany	market price too low	access / conservation access to market
Holland	market organisation disease	access / conservation variability of supply
UK	competition of access / sites market-lack of demand & organisation	same as for oysters
Ireland	market organisation access to market development issue of cost	market organisation access to market low demand
France	site limitation market price problem water quality planning	site limitation water quality planning/ undercapacity
Spain	disease(bonamia)-restricts Pacific production	site access planning
Italy	_____	site limitation planning/water quality depuration-high costs
Greece	_____	costs-needs grants for production access to market low demand
Yugoslavia/ Albania	organisation	organisation and development

APPENDICES

GENERAL SUMMARIES BY COUNTRIES

ANNEX N°1 : GENERAL SUMMARY - IRELAND

1. The Irish shellfish industry forecasts large increases in production for both mussels and oysters towards 1995. With the development of submerged production techniques for mussels and the continued improvement in husbandry of flat oysters coupled with high levels of pacific oyster seed suggest that the forecast production increases are likely to be attained.

2 Environmental and biological conditions in Ireland are conducive to such an increase. However the presence of bonamia and the dependence of the mussel industry upon water quality to ensure adequate seed do provide possible threats.

3 The regulatory environment in Ireland is providing problems for producers. Regulation has proved inadequate in preventing Bonamia and the failure to implement the EC directive on water quality could effect all producers in the long term. The failure of aquaculture licensing system which establishes title to production areas has caused for some producers problems in securing financial aid and insurance. The resolution of the court case surrounding the designation of production sites could prove to be destabilising if dispute resolution mechanisms are inadequate.

4 The majority of producing units are small relying upon domestic markets. While prospects for the domestic market are encouraging it will not provide an adequate level of demand to support the proposed increases.

5 As a consequence producers looking to continue growth will need to look toward foreign markets to provide the necessary demand. During 1989 the industry suffered from the collapse of two major processing outlets. The decline into receivership of the Bantry bay Mussel Co and sharp reduction in the buying of Pacific oysters from Cuan Fisheries in Northern Ireland has made it necessary to re-align traditional trading relationships. Producers are looking toward the UK market to provide a significant proportion of the necessary demand for Irish products although France, Germany and Belgium will continue to be important. This re-alignment has also resulted in producers being forced to confront marketing and organisational arrangements in an effort to secure new outlets for the products.

6 In general terms the prospects for growth in the Irish shellfish industry are good. With backing of government agencies the industry has the potential to become a major shellfish exporting country towards 1995.

ANNEX N° 2 : GENERAL SUMMARY - U.K.

1 The species of mussel cultivated in the UK is the native mussel, *Mytilus Edulis*. In addition to dredged wild mussels are farmed using seabed cultivation and suspended cultivation techniques.

2 Dredged wild and cultivated beds are found in North Wales, the Wash and sheltered harbours and estuaries such as Poole Harbour, the river Axe and the River Teign. Scottish beds can be found at Tain and Montrose. Farmed rope production can be found in the sea lochs on the West Coast of Scotland and the Islands of Hebrides and Orkneys.

3 Two types of oysters are farmed in the UK: the Native or flat oyster, *Ostrea edulis* and the Pacific oyster, *Crassotrea Gigas*. The Native oyster is both fished from wild stocks and farmed, whereas the Pacific Oyster does not appear naturally in UK waters. The Pacific Oyster was introduced from America partly to combat the decline in stocks of the native oyster which have decreased dramatically in the last few years. Farming methods used are intertidal cultivation subtidal cultivation and hanging cultivation. Choice of method is dictated by site conditions.

4 Most UK production of the native oyster comes from the naturals beds in the Solent in Hampshire. Production of the Pacific Oyster is found along the east, west and south coasts of England and Wales, in Lochs in Northern Ireland and in Scotland in Orkney and the sea lochs in the Western Seaboard.

5 Mussel production in 1990 was between 6,000-7,000 tonnes compared to production of oysters totalling about 1,400 tonnes. Although mussels are the most valuable farmed shellfish, they only represent 8% of total aquaculture production in the UK and production of both mussels and oysters is very small compared to European counterparts and is of limited domestic economic importance.

6 The industries are very fragmented, characterised by small units of production which employ a large proportion of casual and part-time labour. In 1986, it was estimated that only 594 people were employed in shellfish culture and of these 264 were part-time and 132 were casual workers. Presently, there are 466 shellfish farms in operation in the UK, 229 in Scotland, 13 in Wales and 5 in Northern Ireland.

7 Currently, the industry is very underdeveloped with large areas suitable for cultivation that have not been exploited. Reasons for this are mainly economic with costs and risks involved in expansion exacerbated by the fragmented nature of the industry. Small scale operators lack the knowledge, skill and guarantied profits for reinvestment and development and costs are something high.

8 The way forward would seem to be by improved marketing and quantity through the formation of co-operatives and trade promotion through trade associations. This may be helped by the new EC hygiene regulations which will encourage members of the industry to combine on a co-operative basis to provide cleaning facilities, something whose costs make it uneconomic for small farmers.

ANNEX N° 3 : GENERAL SUMMARY - THE NETHERLANDS

1. The Netherlands has two types of shellfish culture: mussel culture and oyster culture. In 1990 the landing value amounted to respectively 100 mln Dfl and 15 mln Dfl.

2. Mussels are farmed on plots using bottom culture. The two production areas are the Wadden Sea in the North with a share of two thirds of total landings, and Zealand (Oosterschelde) in the South-west. Yerseke in Zealand is, however, still the centre of trade and processing. The major advantage of the Oosterschelde is the possibility to clean and temporary store mussels at the rewatering plots.

3. In 1990 there were 75 companies farming mussels of which 71 are established in Zealand. The number was rather stable recent years, most companies are established for two or more generations. Most companies are only farming mussels and have no trade activities. Their mussels are sold at the auction at Yerseke.

4. The possibilities to increase the landings are limited due to lack of new plots. The landing value has grown also because of better market conditions.

5. The farming of flat oysters is strongly effected by the Bonamia disease. The production dropped in 1990 to a low level. Currently, the farming of giga oysters is becoming increasingly important.

6. Oysters are farmed in Zealand, in lake Grevelingen (flat oysters) and Oosterschelde (giga's). There are 20 companies of which ten started in the eighties. The other ten stayed in business despite the icy winter in 1963 and the threat of closure of the Oosterschelde. Nearly all companies have trade activities.

7. Access to the production areas is limited by the scarcity of plots for shellfish culture. The plots are rented from the government. Pressure from the environmental lobby makes it nearly impossible to increase the total farmed area. This scarcity is the most limiting factor to mussel culture.

8. The mussel PO plays an important role in organizing mussel farmers, exploiting the auction, promotion activities and lobbying. The mussel PO is fully financed by a levy paid by the mussel farmers, who are member of this PO. Currently there is no marketing organization for oyster farmers.

9. Currently there are no national grants for shellfish culture. However shellfish culture could develop prosperous without any substantial grant. The rent for the plots in mussel culture was raised by the government by 300 percent.

10. Nearly all companies in shellfish culture are based on family labour input. Only the ten traditional oyster farms are mainly based on hired in labour. The total number of employees is about 250 in mussel culture and 100 in oyster culture (including people working on land cleaning oysters).

11. Most companies in shellfish culture have a very strong financial base, the share of loans is low. The capital is raised by reserved profit in the past. In mussel culture almost all capital is invested in the vessel, in oyster culture the share of the landbased installations is higher. In mussel culture the ship are fairly new. In oyster culture most installations are far depreciated.

12. The average area of plot is 75 ha in mussel culture and 56 ha oyster culture. The plots of the oyster farmers are less intensively used due to the Bonamia disease.

13. The first selling of mussels is concentrated in the auction in Yerseke. 70 percent is sold to fresh processing, the rest is processed to canned and frozen mussels. Imports play also an important role in the supply of the Dutch mussel trade and processing. About 85 percent of the fresh mussels is exported. Oyster are mostly directly sold at export markets.

14. Mussel prices fluctuate strongly due to variations in supply and quality. The average export price of oysters shows a decreasing trend due to an increasing share of giga oysters.

15. In general the profits of the mussel farms are high. Due to natural causes (icy winters, storms) gross returns can strongly fluctuate. Small companies are more vulnerable because their plots are more concentrated in one area. As the major part of costs is fixed, the profits fluctuate with gross earnings.

16. The profits of the oyster farms are moderate to high. In general the costs are low. Due to the Bonamia disease profitability may drop dramatically.

17. The most important reasons for uncertainty in shellfish culture are the natural causes. In mussel culture these are icy winters, storms and lack of seed, in oyster culture icy winters and the Bonamia disease are the risk factors.

18. Critical success factors for mussel culture are availability of plots managerial and technical skills. For oyster culture also negotiating and trading capabilities are important.

19. Because of the limited access possibilities to shellfish culture the number of entrances and leavings is low. Only in oyster culture a considerable number of new companies started in the eighties.

20. Strengths of mussel industry in The Netherlands are:
- transparent market, because of central selling in auction in Yerseke
- concentration in Yerseke of wholesale and processing which causes is synergetic effect
- outward and international orientation of mussel industry
- storage system of mussels in water allows deliveries on call
- good professional organization
- limited access restricts competition between mussel farmers.

Weaknesses are:
- limited availability of plots
- growing pressure from environmental lobby
- variations of landings.

21. Strengths of the oyster industry are; limited access, knowledge of (traditional) markets and well organized transportation and distribution.

Weaknesses are: focused on traditional markets only, not very outward oriented, low level of professional organization, less innovativeness and high overhead costs of traditional oyster farmers and the spread of Bonamia disease.

22. Shellfish culture in The Netherlands is very strongly effected from other activities and interests. The major influence are the claims from the nature conservation lobby. Also the shrimps fisheries in the Wadden Sea (mussel culture) have conflicting interests.

ANNEX N° 4 : GENERAL SUMMARY - GERMANY

1. The farming of mussels is by far the most important activity in shellfish culture in Germany. The landing value of mussel culture in 1990 amounted 11 mln DM against only 1 mln DM for oyster culture.

2. Mussel culture in Germany is in many aspects influenced and stimulated by Dutch companies. In the eighties most companies were taken over by the Dutch and same kind of bottom culture like in The Netherlands was introduced. Until then there was only fishing of mussels.

3. Mussels are farmed in the Western Wadden Sea (Niedersachsen) and in the Northern Wadden Sea (Schleswig Holstein). Most of the mussels are farmed in the Northern Wadden Sea.

4. There are eight companies farming mussels of which two small ones are the only pure German companies. Some companies are fishing on cockles. Some companies are also processing mussels, mostly only primary (fresh) processing. One company has a large cooking factory.

5. Two companies are farming oysters (giga's) at the island Sylt and in the Baltic Sea, both companies are in its developing stage.

6. Access to the production sites is regulated by the regional authorities (Lander). To farm mussels a licence for the fishing vessel is required and farming plots (rented from the authorities). The number of licences and the total area of plots are both limited for conservation reasons. Since the mid eighties free fishing of mussels is almost completely forbidden.

7. The total number of people employed in mussel culture is 60 (excluded 70 men in the cooking factory) and 30 in oyster culture. In mussel culture almost all are full time employed, in oyster culture two thirds is part time employed. Only the smaller mussel companies are based on family labour inputs.

8. Dutch capital, grants and cheap loans (from national and regional authorities) played an important role in the renewal of the fleet fishing for mussels. Most of the capital is invested in the vessel, the share of the shore installations is relatively low.

   One oyster farm has a firm financial backing from a private German investor. Grants were also a important source of capital for oyster culture. Most of the capital is invested in the land based installation.

9. The plot area in mussel culture averages about 500 ha per company, which is quite large. The utilization of plots is rather extensive especially in Schleswig Holstein.

10. Most mussels are (unprocessed) exported to The Netherlands. A smaller volume is sold (fresh) inland in the Rhein-Ruhr region by the traditional German mussel wholesalers. There is no auctioning of mussels in Germany. The oysters are sold to general fish wholesale and also directly to a department store chain.

11. In Germany the price of mussels is determined by the Yerseke (Netherlands) auction price and quality (size, meat content). A part of the mussels is sold on contract at a fixed season price. Another part is delivered to the Dutch parent companies at an internal company price. The average landing price tends to rise thanks to better farmed quality.

The ex farm price of the German giga oyster is about three times higher than the price of the oysters imported from France due to special marketing and taste (Sylt Royal).

12. The gross returns of the mussel companies range between 350 thousands DM for the small mussel farms until more than 3 mln DM for the bigger farms. The profitability is in general fair to good.
The oyster farms operate with serious losses, the prospects look bad.

13. The annual fluctuations in the profits of the mussel farms are mostly determined by variations in landing value. Most cost are fixed. Critical success factors are: the total fish hold capacity of the vessels, links with Dutch processing companies, technical skills, knowledge of the market and negotiating capabilities. Until now plots are not the limiting factor, which may change if more restrictions are set for conservation reasons. In oyster culture negotiating and marketing capabilities are essential.

14. Strengths of the German mussel industry are: sufficient production areas, financial support from regional and national authorities and links with Dutch mussel industry.
Weaknesses are: limits on fish hold capacity, long distance to main markets, imbalance in market power and growing pressure from the nature conservation lobby. Especially the growing demand for nature conservation can have far reaching implications for German mussel culture.

15. Strengths of the oyster farms are: sufficient production areas, financial support from regional and national authorities, firm financial backing of one of the companies.
Weaknesses are: high costs for labour, breeding material and depreciations, limited market potential for higher priced product, icy winters.

ANNEX N° 5 : GENERAL SUMMARY - DENMARK

1. In Denmark there is no shellfish culture of any importance. Fishing mussels is by far the most important activity in the shellfish sector. In 1990 the total landings amounted to about 90 thousand tons; the value of the landings was about 25 mln DKK.

2. The possibilities for mussel culture are limited mainly due to conservation reasons. Beside from technical point of view mussel culture is only possible in the Wadden Sea.

3. The main production area is the Limfjord with a share of 90 percent of the total landings. In the middle of the eighties also a considerable quantities were fished in the Wadden Sea. Due to tightened quota restrictions the landings fell dramatically.

4. There are 80 vessels with an allowance to fish mussels. For only about 50 vessels fishing mussels is an important activity, and 26 fish of them full time on mussels. The five vessels in the Wadden Sea are exploited by Dutch subsidiary companies. 45 companies are fishing (mostly full time) in the Limfjord, the rest is fishing in the Baltic Sea (mostly part time).

5. The access to mussel fisheries is restricted. In order to fish on mussels a fisherman needs a licence for the vessel. The maximum engine power and fish hold capacity is restricted.
   Beside, there is a quota system. The total quota in the Wadden Sea was reduced from 34 thousand tons in 1986 to 1500 tons in 1990. The landings in the Limfjord are limited to a maximum per vessel per day.

6. The main reason for the restrictions on mussel fisheries is the pressure from the nature conservation lobby. The Ministry of Fisheries has to develop its policy inside the framework of the policy of the Ministry of Conservation.

7. The total number of people employed in mussel fisheries is about 50. Beside these people also a number of people is part time fishing on mussels. Most companies work with family labour input. Only the Dutch owned vessels work with a crew on wage contract.

8. The major of capital is invested in the vessel. Most vessels are small, old and financially nearly completely depreciated. Only the vessels in the Wadden Sea are bigger. In 1990 the average insurance value was 2 mln DKK for vessels in the Wadden Sea and 1 mln DKK in the Limfjord.

9. Until recent years nearly all mussels were sold to the canning factories at the Limfjord. Due to the shortage on the Dutch market fishermen started also selling mussels to Dutch traders.

10. The increasing export to The Netherlands has also effected the price level. The average price went up and is now also depending on the quality. The Danish mussel price gets more and more influenced by the Yerseke (Netherlands) auction price.

11. The price of mussels is much lower than in the neighbouring countries, which is due to the quality (tough, low meat content). Mussels for the fresh market (Wadden Sea, Isefjord) are much higher priced. The mussels from the Wadden Sea resemble more the German and Dutch type of mussels.

12. The average turnover of the companies fishing full time on mussels is between 1 mln and 1.5 mln DKK, which is much lower than in the neighbouring countries. Profits seem to be fair due to the low cost. In general the number of companies leaving seems to be low. Only in the Wadden Sea the number of vessels has to be reduced due to conservation reasons.

13. Quota and the fish hold capacity are the limiting factors in mussel fisheries. Risk factors are storms in the Wadden Sea, and the DSP and PSP contamination in the Limfjord.

14. The strengths of the mussel industry are: abundant mussel stocks, large canning factories also engaged in canning fish, good marketing and product development of canned mussels, stable supply of mussels and low prices (until recent years). Weaknesses are: restrictions from nature conservation, bad quality of mussels from Limfjord, growing competition from Dutch traders and processors on the market for raw material and processed (canned) products.

ANNEX N° 6 : GENERAL SUMMARY - BELGIUM

1. Belgium has no shellfish culture of any importance

2. Belgium is an important market for mussels and oysters, which are mostly imported from The Netherlands

3. There are no specific sanitary regulations for shellfish in force. The imported product has to meet the requirements of the country of origin.

4. Most customers (shops and restaurants) buy delivered from shellfish traders in Yerseke (The Netherlands) because of the short distance. Long established trade relations between the Dutch traders and their customers play an important role.

5. The share of fish shops in the selling of fresh shellfish is declining. Only in Flanders the fish shops is more important in the distribution of shellfish.

6. The average annual price of mussels fluctuates strongly due to variations in supply and quality. The price of oysters is declining because of the growing share of giga oysters.

ANNEX N° 7 : GENERAL SUMMARY - FRANCE

1. Oyster farming is the main aquacultural activity in France, in terms of production, value and number of producing units, ahead from mussel farming. Non specialized mussel fisheries exist in some places too, but with variable results. Fished mussels represent from 1% to 15% of the total amount depending on the year.

2. France is main producer and consumer of oyster in Europe. Production of cup oyster (*Crasssotrea gigas*) is solely by farming. It has raised from about 120 000 m.t. at the beginning of the eighties to 140 000 m.t. in 1990, that is to say plus 20% during that time. Flat oyster (*Ostrea edulis*) is around 1 600 m.t. , from farming or fisheries. The last decade has seen diseases which have destroyed the entire Portuguese oyster stock (*Crassostrea angulata*) and a large proportion of the flat oyster one.

3. French mussel production is assessed at about 60000 m.t. but is characterized by important annual variations. The evolution of this production has seen the start of a new production site (Normandy) in the eighties, the infestation by the parasite *Mytilicola* in 1983, the development off-shore in the Mediterranean since 1987 and the regular lack of wild spat (a new phenomenon for French mussel culture) for 3 years. As for the fisheries, very irregular, the trend is towards a reduction of the production with the definite close of some beds in the Channel.

4. Shellfish culture in France is characterized by highly heterogeneous conditions of production (species, techniques), production areas scattered along the French seashore and various types of farms. Cup and flat Oyster farmings are performed on the Atlantic coast and the Channel coast on the seabed in intertidal areas, on the seabed in deep sea or on tables in intertidal areas. In Mediterranean lagoons only molluscs are produced in suspension under tables.

5. For mussel production, it is the species *Mytilus edulis* on the Atlantic coast and the species *Mytilus galloprovincialis* mainly on the Mediterranean coast. There is an heterogeneity among the rearing techniques: farming on poles so called "bouchots" on the Atlantic coast provides about 70% of the national production; suspension farming under long-lines or tables on the Mediterranean coast counts for more than 20% while production on the seabed is limited to South Brittany and provides less than 10%.

6. Mussel culture has been engaged for a few years in the restructuring of the current production areas (more space between the poles, move towards the open sea). At the present time, it seems unlikely the activity could settle new sites or former oyster farming sites but off-shore. The long-lines were first developed in the Mediterranean but are now used on the Atlantic coast too.

7. Oyster culture knew a huge spatial expansion during the sixties and the seventies thanks to the development on farming on tables. Now, expansion possibilities seem rather poor unless a major technological innovation happens. Moreover, conflicts for the use of the water in terms of access, quality and management appear versus tourism, agriculture and urbanization.

8. The firms are most often family owned. Some production units include the commercialisation (farming and shipping units). They are either devoted to oyster only (80%) or to mussel (10%), either mixed.

9. In oyster culture, production units are still small, notably smaller than in mussel culture, with a fast decrease of their number due to the lack of succession. Mussel farms are also most often familial but bigger and bigger and therefore have now higher investment needs. In particular, off-shore farming requires very important investments which are done solely by big firms. In oyster culture as well in mussel culture, the more recent are the production areas the bigger are the size of the farms, the level of mechanization and the management control

10. Commercialisation is neither centralized nor organized. In each production area, ex-farm sales are decided by mutual agreement between farming-shipping units and various buyers (wholesalers, retailers, caterers, supermarkets). There is central structure for marketing shellfish in France. The few P.O. are local and have not an important role yet in supply organization. The role of Marennes-Oléron area is worth being focused on for it commercializes part of the oyster production from other areas. This area like many others is now encountering difficulties related to increasing production costs due to insufficient common management.

11. Such a scattered supply does not help to implement policies for quality control or for promotion. Moreover , for mussel culture, the regular DSP proliferation in summer on the French seashore modifies the market conditions. The concentration of the sales at fall enhances the competition between areas, which was not important till now, and induces a price drop.

12. The mussel market is a market for fresh product and the consumption of processed product is still very low. This market shows a high deficit: the national fresh mussel consumption is twice as big the domestic production. The competition between national product and imports is still characterized by a complementarity season/product. But the emergence of a substitution phenomenon among the consumers contributes to reinforce this contest.

13. France is the main market for oyster in Europe. The domestic market absorbs 95% of the French production, only fresh, with a strong seasonality in winter. Thus there is a big pressure on the prices which have been, in constant terms, drastically decreasing since 1980 .This trend is not balanced by a big enough increase of the demand, neither foreign nor domestic. None of the product is processed and exports are still low.

14. The management of the sector is characterized by the progressive implementation of common area management rules the aim of which is to improve the state of the firms. This pattern is not completed in the same way according to the different areas. Mussel culture takes advantage of a more dynamic profession, better disposed to management and collective organization. In oyster culture,the management of the producing areas and the stock regulation are approached now in terms of density while a more global approach in terms of structural policy and common installations seems necessary.

15. The sector of marine cultures has been specifically ruled for a short time in a way which takes into account the marine cultures as a whole, associates the producers to the decision making and gives a definite status to the firms. The State exerts a strong control for the access and the use of the Public Seashore (D.P.M.) which is totally under its management. Some difficulties remain as for the reservation and the conservation of the farming areas, and as for the availability and the cost of land.

ANNEX N° 8 : GENERAL SUMMARY - ITALY

1. Sea food consumption is fairly high in Italy, particularly for bivalve molluscs, but only the production of the mussel *mytilus galloprovincialis* is significant. In 1990, the evaluation of this production (including part of the fisheries) is between 70 000 m.t. and 90 000 m.t.

2. The system of production is the same throughout the sites all along the Italian coasts. It is a suspended culture on ropes covered with nets. The rearing cycle is two years long, one year for the spat which is collected in the wild and one year for ongrowing. Only the structures where the ropes are suspended change : "pergolari" (on poles or floating) in lagoons and sheltered bays or "long-lines" in open sea where the new developments take place

3. To increase the production, either present cultures have to be intensified, one can hardly wish for in most cases, or heavy investments in long-lines systems. The steadiness of the price in current value and the fast increase of cheap productions by countries in near eastern Mediterranean induce a general waiting position. Production should stabilize around 100 000 m.t., at least till the management projects enable Venezia lagoon to come back to its former production level.

4. After a major crisis in 1973, it took ten years for mussel culture to recover its full activity. Production has been increasing a lot in most of the sites, more because of enhancing the biomass than the surfaces. In most of cases, there has been a doubling of production but the whole production has not increased so much. That is due to environmental problems in Venezia lagoon the production of which has been reduced of more than 50% and has lost the position of first producer to the benefit of Taranto.

5. Production is mostly due to small family units. The cooperative movement plays a important role in the functioning of the activity. Because the depuration is compulsory, the depuration plants are reinforced and are the only legal way for marketing both domestic and foreign production. These intermediaries, who act as wholesalers, play an important role in price formation and competition regulation.

6. Market is drawn by demand which is particularly high twice a year : in summer, when the ratio of the meat to the shell is good and at Christmas. These peaks are for both price and quantity. Domestic production supplies the market from March to September and imports (especially from Spain) the rest of the year. People eat a lot of small cheap mussels in the South while in the North they ask for bigger ones and they pay more in the big cities. Competition from northern European products, fresh or frozen, usually is not considered as a threat.

7. The sectorial management suffers from scattered responsibilities among local, regional and national levels. Access to the resource and control of the environmental quality (especially in lagoons close the big cities like Venezia and Tarento). The consequences of overstocking are worrying in some areas. The present hard sanitary regulation may give a disadvantage to domestic products compare to imports in the framework of the new European rules.

ANNEX N° 9 : GENERAL SUMMARY - SPAIN

1 Mussel farming in Spain dates back to 1945. It is the main aquacultural activity in this country with a production over 200 000 m.t. a year. Its position is of major importance within Europe. On the other hand, oyster farming is little developed (about 300 m.t.) for it suffers high biological and pathological diseases.

2 The technology used to rear mussels (Mytilus galloprovincialis) is very homogeneous all over the production sites. Ropes covered with mussels are hanged under rafts ("bateas"), long-lines or tables. The main rearing areas are concentrated in Galicia, on the Atlantic coast: almost 95% of the production is done in only 5 "rias" and only one of them counts for 60%. In a smaller extent, Catalunia on the Mediterranean coast provides about 5% of the national production and is now developing thanks to recently implanted long-lines.

3. The same hanging technique is used for oyster in Galicia and Catalunia. But flat oyster farming in Galicia has been initiated by the depuration plants which import young oysters to grow or even ready to sell oysters they only dip in the rias for a short time.

4. After a fast growth during the seventies and eighties, mussel production is now at a standstill with steady number of implantations and productivity. The growth of the production is now limited due to intensive use of areas in activity, cost and difficulty of access to potential areas either at the mouth of the rias in unsheltered zones or to the open sea.

5. Mussel farming sector is mainly made with small scale family owned firms quite small financial capacity. Entrance in the activity requires to buy a rearing structure. The high level of this expenditure and the small number of available "bateas" explain some inflexibility in the sector.

6. The collective organisation of the sector is strong. Producers belong to local associations grouped in two P.O.. Theses P.O. have a major role in the commercialisation and the price formation. So are put together the conditions for an *oligopoly* to work: the P.O. manage most of the production; the ex farm price level which is determined through an agreement between associations and farmers is attractive; supply is regulated within the associations; the P.O. provide financial and commercial services to the producers; buyers are distinct from producers and have to dispose of processing units (depuration plant or cannery).

7. Two issues may be the cause of a split in this supply organization: the recent purchase of depuration plants by producers associations and the implementation of the new Common Instruction which would give the producers the opportunity they wish to sell directly while direct sales have been till now strictly forbidden.

8. The mussel market is divided in :
- a fresh market for about 55% of the Spanish supply. It is an outlet for big size mussels, especially in winter.
- a market for processing (frozen or canned) which is the outlet for about 45% of the production, especially small mussels from Galicia.

9. In terms of quantity, mussel is the second eaten seafood in Spain after *hake*. The Spanish production provides the domestic market, the most important, and also big outlets abroad. Exports are mainly fresh product towards France and Italy. There is no competition from imports for the fresh product on the domestic

market and import flows are very small. On the other hand, competition looks like increasing on the processed market.

10. Considering the current demand, prospects to develop the mussel market are poor. After a period of steady demand, a decrease have been noticed for the last three years which is the answer to the lower quality of the product and the lack of generic marketing policy.

11. As for the oyster, the small market is supplied mainly by imports and prospects of development are poor too.

12. The sectorial management is done at a regional level, because of the autonomy of the regions, and at a local level because of a tradition inherited from the small scale fisheries sector. The lack of coordination between national and regional regulations or the conflicts for power between institutions in charge of the sector are considered sometimes as against the dynamism of the sector. But the main issue seems to be the inability of the professional organization to implement a structural policy in order to reduce the overdensity in the production areas and improve the economic results of the activity.

mussels: external trade
source: EUROSTATS (imports)

volume (tonnes)

1980 to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Denmark	ex-EEC
from World	77 563	27 571	23 295	9 456	6 929	8 880	1 481	42	0
Ex-EEC	20 216	10 710	5	189	611	8 581	115	5	0
EEC	57 439	16 860	23 290	9 269	6 315	300	1 366	37	1 460
France	700	0	83	23	208	247	138	0	594
Holland	34 138	10 657	22 558	0	823	0	78	21	187
Germany	6 581	1 506	152	4 923	0	0	0	0	0
U.K.	5 233	4 054	0	1 160	0	0	0	15	0
Ireland	1 509	153	0	278	0	0	1 068	0	0
Denmark	9 026	400	482	2 875	5 170	38	61	0	87
Italy	186								

1985 to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Denmark	ex-EEC
from World	135 403	37 515	30 594	35 495	12 691	17 296	1 691	27	
ex-EEC	1 777	97	0	0	8	1 544	95	7	0
EEC	133 715	37 418	30 594	35 495	12 683	15 752	1 678	21	1 200
France	492	0	0	71	143	0	195		640
Holland	52 551	21 240	30 111	0	870	116	154	0	
Germany	9 355	0	30	9 090					
U.K.	3 297	3 264	0						
Ireland	5 944	2 939	268	1 570	0	0	1 132	10	
Denmark	36 410	850	185	24 630	10 595	0	104		
Italy	84								190
Greece	198					176			
Spain	25 094	8 932			1 003	15 056			37

1990 to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Ireland	Denmark	Spain	ex-EEC
from World	109 596	34 724	30 602	15 950	12 895	11 007	597	759	1 239	1 813	
ex-EEC	2 874	25			39	1 900			905		
EEC	106 726	34 699	30 602	15 950	12 856	9 107	597	759	334	1 813	
France	1 444				354					892	
Holland	45 982	14 258	30 321		681					637	
Germany	15 234			14 044		830			311		
U.K.	4 628	3 869						759			
Ireland	8 609	8 089					520				
Denmark	12 974		146	1 751	11 077						
Italy	426									193	
Greece	128					128					
Spain	17 016	8 172			719	8 121					

mussels: external trade
source: EUROSTATS (imports)

value (1000 ecus)

1980	to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Ireland	Denmark		ex-EEC
from World		38 086	10 340	16 712	1 762	1 872	4 668	2 568	0	160		
Ex-EEC		11 420	5 230	0	225	331	4 257	1 348	0	26		
EEC		26 669	5 112	16 709	1 536	1 541	412	1 221	134	1 118		
France		752	0	69	0	236	330	109	0	0		581
Holland		20 858	3 832	16 408	0	504	0	79	0	34		218
Germany		1 106	282	73	750							
U.K.		1 060	680	0	260					96		
Ireland		1 231	136	0	164	0	0	889	0	0		
Denmark		1 366	115	116	347	621	75	92				
Italy		252				162		52				249

1985	to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Ireland	Denmark	Spain	ex-EEC
from World		60 943	19 565	20 017	4 749	2 748	10 722	2 700	24	105	116	
ex-EEC		2 127	121	0	12	15	1 232	495	0	0	114	0
EEC		58 815	19 444	20 017	4 737	2 733	9 490	2 204	0	95		3 711
France		587		46		235		190				890
Holland		32 189	11 112	19 875		666	138	246		89		112
Germany		1 218			1 123							
U.K.		991	874		96				13			
Ireland		2 968	1 020					1 397				
Denmark		4 997	844		2 849	980		182				
Italy		2 087									2 087	250
Greece		330					328					
Spain		15 253	5 519			775	8 787	148				

1990	to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Ireland	Denmark	Spain	ex-EEC
from World		73 822	18 973	38 471	3 335	3 162	7 571	402			1 593	
ex-EEC		1 391				40	1 159				24	
EEC		72 428	18 944	38 471	3 335	3 122	6 413	402			1 549	
France		539				539						
Holland		48 813	9 197	38 283		730		136			467	
Germany		3 193			2 790		403					
U.K.		1 418	1 195									
Ireland		3 426	3 088					239				
Denmark		1 755		70	412	1 194						
Italy		120									120	
Greece		246					238					
Spain		11 574	5 253			581	5 736					

Oysters: external trade in Europe
source: EUROSTATS (import country)

Volume (in tonnes)

1980 to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Denmark	ex-EEC
from World	4 421	1 502	1 385	867	244	308	93	20	0
ex-EEC	330	101	15	103	0	82	23		
EEC	4 093	1 401	1 371	764	244	226	70		501
France	1 327		568	381	153	201			325
Holland	823	36	729		58				10
U.K.	554	237	50	213					
Ireland	57						57		
Italy	1 101	1 092							129

1985 to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Denmark	Spain	ex-EEC
from World	4 625	351	1 046	89	358	778	173	46	1 798	
ex-EEC	118	10	0	0	4	38	60	0	0	
EEC	4 537	351	1 046	89	354	759	113	46	1 798	900
France	1 560		336		212	700			301	250
Holland	908	47	677		124			40		
U.K.	326	133		43					122	
Ireland	298	133		38			90			
Italy	406	17							385	170
Greece	989					40			948	
Spain	19					19				

1990 to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Denmark	Spain	ex-EEC
from World	11 511	382	1 534	274	430	5 282	386		3 120	0
ex-EEC	1 618	6	0	88	10	496	100		915	0
EEC	9 882	377	1 531	185	419	4 786	286		2 205	0
France	6 110		663	45	312	4 612			442	
Holland	1 134		823		93				100	
U.K.	476	232		45					199	
Ireland	394	79		71			201		44	
Italy	880								872	
Greece	803					165			638	
Spain	60						40			

Oysters: external trade in Europe
source: EUROSTATS (import country)

value (in 1000 ecus)

1980	to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Denmark	ex-EEC
from World		11 340	1 858	4 929	2 596	1 003	539	314	79	
ex-EEC		620	332	36	106	4	55	69	18	
EEC		10 721	1 526	4 893	2 490	999	484	245	62	1 091
France		3 591		1 471	1 195	483	431	30	61	844
Holland		3 477		3 045		365				62
U.K.		1 887	719	272	697	125	51			60
Ireland		1 041	103	65	565			202		
Italy		667	639							93

1985	to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Denmark	Spain	ex-EEC
from World		13 022	1 320	4 565	346	1 410	1 649	565	89	2 299	
ex-EEC		429	63	0	0	21	68	253	24		
EEC		12 674	1 305	4 565	346	1 390	1 611	313	65	2 299	4 813
France		3 880		1 000		704	1 529			612	750
Holland		4 330	268	3 333		547				126	170
U.K.		970	369	119	166					228	
Ireland		1 167	490	112	157	121		243			138
Italy		514								412	20
Greece		1 671								1 616	
Spain		78					30				

1990	to	EEC	France	Belgium	Holland	Germany	Italy	U.K.	Denmark	Spain	ex-EEC
from World		26 558	1 845	5 651	1 146	1 572	8 270	1 257	150	6 386	
ex-EEC		1 863	23	12	207	59	441	333	0	785	
EEC		24 694	1 822	5 639	939	1 513	7 829	924	150	5 601	
France		12 374		2 345	277	1 025	7 448			1 498	
Holland		5 017	293	3 294		385			133	912	
U.K.		2 178	1 070		202					573	
Ireland		1 808	438		442	102		618			
Italy		1 010								1 010	
Greece		1 974					365			1 608	
Spain		222	59					154			