Economic viability of production systems sea bass/sea bream in Greece (industrial scale)

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Aspects économiques de la production aquacole

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 14

1995
pages 65-77

Economic viability of production systems seabass/seabream in Greece (industrial scale)

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SUMMARY - The finfish mariculture industry comprises approximately 490 production units operating in about 11 countries of the Mediterranean basin. This new aquaculture industry followed an amazing development over the last ten years and the present (1994) level of production (29,000 t) is forecast to reach 40,000 tons by 1996. At the forefront of this impressive development is Greece with a market share of 42%. The cost of producing fry as well as market size fish will play a significant role for the welfare of the industry. The cost of marine fry production shows considerable variation depending on the size of the hatchery and its output, with investment varying considerably from project to project. Larger hatcheries have a cost advantage if output is high, but a cost disadvantage if output is low. The cost of producing market size fish has dropped on average by 35% in Ecu, over the last 6 year period. Small and especially medium size farms will face a lot of difficulties, in the near future, to compete with an industrial scale operation, vertically integrated, with own financial resources and professionally managed. Fry and market size fish prices decreased by 65% and 53% respectively, over the last 6 year period. Therefore, the profit margin is declining. Demand is expected to extend more severe pressure for lower prices with direct effect on the profitability of the enterprises. On the market side, since the market is becoming more and more competitive, as consumers and trade customers are more demanding in terms of product quality, consistency and reliability of supplies, it is inevitable that more sophisticated marketing methods should be adopted in the near future.

Key words: Cost, finfish, Greece, marketing, Mediterranean, prices, production.

RESUME *- La production industrielle des poissons marins comprend approximativement 490 unités de production lesquelles sont réparties dans 11 pays du Bassin Méditerranéen. La nouvelle industrie d'aquaculture pendant les dernières dix années a connu un développement énorme et le niveau (29 000 t) de la production actuelle (1994) semble vouloir monter à 40 000 t en 1996. A la tête de ce développement impressionnant se trouve la Grèce avec un pourçentage de 42% du marché total. Le coût de production des alevins et du produit final va jouer un rôle trés critique en ce qui concerne le bien-être de cette industrie d'aquaculture. Le coût de production des alevins marins montre une variation considérable selon la capacité de l'écloserie et la quantité des alevins produits, en liaison avec les investissements qui varient considérablement d'un projet à l'autre. Les écloseries les plus grandes ont un coût de production avantagé si la quantité des alevins produits est haute et le contraire si la production est basse. Le coût de production est tombé de 35% en moyenne, durant la période des derniers 6 ans. Dans le proche futur, les petites fermes et, notamment les fermes de capacité moyenne auront beaucoup de difficultés à afronter la compétition avec un mode d'opération industriel, verticalement intégré, avec ses propres sources financières et management professionnel. Les prix des alevins et du produit final ont été réduits de 65% et 53% respectivement, durant la période des derniers 6 ans. Donc la marge est en déclin. Il semble que la demande va exercer une pression plus sévère pour l'obtention de prix plus réduits avec un effet direct sur le profit des entreprises. Du côté du marché, puisque ce marché devient de plus en plus compétitif, les consommateurs et les clients marchants vont être plus exigeants en terme de qualité du produit, de stabilité et fiabilité des fournisseurs. Il est inévitable que les méthodes de marketing les plus sophistiquées soient adaptées dans le futur proche.*

Mots-clés *: Coût, poisson marin, Grèce, marketing, Méditerranéen, prix, production.*

I. INTRODUCTION

As many other agro industries, Mediterranean finfish mariculture developed in relation with technoeconomic and market environment, which explain the present status of this industry and its possible future evolution.

Today the finfish mariculture is taking place in many countries of the Mediterranean basin: Portugal, Spain, France, Italy, Greece, Turkey, Cyprus, Malta, Tunisia, Marocco and Croatia.

II. PRODUCTION

1. Methods

The data presented in this chapter have been obtained by the producers associations of each country. In case that such association was inexistent we have sourced data from reliable local contacts.

2. Results and Discussion

The Mediterranean aquaculture production is characterized by the dominance of 2 main species - sea bass and sea bream, which represent 48% and 50% of total production and by about 10 other species, which all represent only 2% of the total production.

The Mediterranean finfish mariculture industry is presently comprised of approx. 491 production units, out of which 60 enterprises are integrated, with their own fry production (Figure 1).

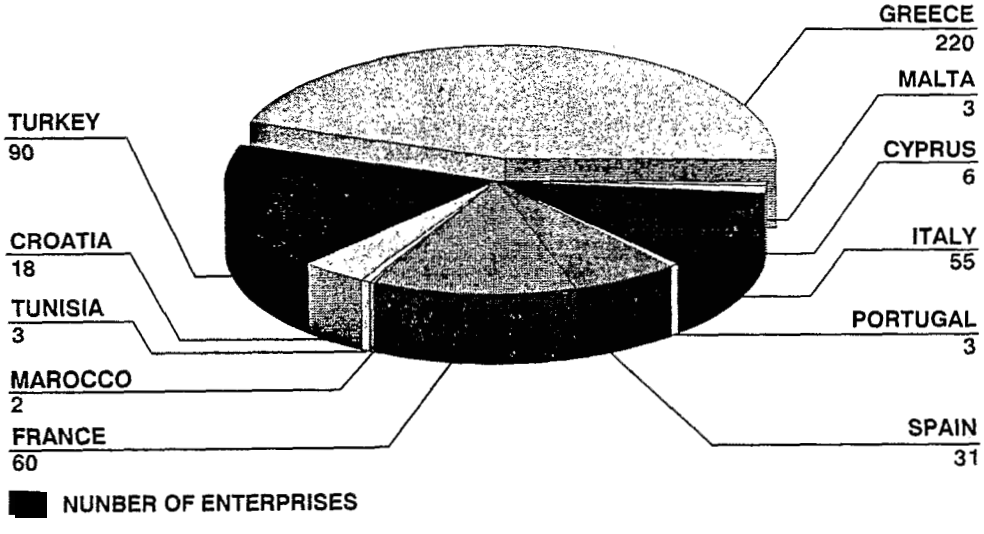

Figure 1. Seabass & seabream industry spread in the Mediterranean.

Intensive rearing of seabass and seabream in the Mediterranean increased its output by approximately 5 times over the last 5 years, with production output around 29.000 tons in 1994 (Table 1). Our forecast for 1996 is close to 40.000 tons.

Table 1. Seabass/seabream production in the Mediterranean

IN TONS	1990	1991	1992	1993	1994
GREECE	1.600	2.500	6.000	8.500	12.000
SPAIN	600	1.200	2.000	2600	3.200
ITALY	1.900	2.500	2.900	3.400	4.000
FRANCE	380	600	1.200	1.400	2.400
PORTUGAL	100	300	380	500	700
TOTAL E.U.	4.580	7.100	12.480	16.400	22.300
TUNISIA	330	450	500	650	700
TURKEY	180	250	1.200	1.500	2.000
MAROCCO	80	200	300	400	650
CYPRUS	50	60	70	220	550
CROATIA	400	400	-	300	1.200
MALTA	-	-	-	300	1.100
OTHER	-	-	100	100	100
TOTAL MEDITERRANEAN	5.620	8.460	14.650	19.870	28.600

Production of fry was equally impressive in performance, increasing at an annual rate of approx. 25% during the period 1991-1994 that reached the production level of 165 mill. fry in 1994 from all Mediterranean countries (Table 2).

Table 2. Seabass/seabream fry production in the Mediterranean

IN MILL.	1990	1991	1992	1993	1994
GREECE	14	23	37	60	70
SPAIN	13	17	18	23	28
ITALY	9	11	15	23	20
FRANCE	9	12	15	16	18
PORTUGAL	-	-	3	3	4
TOTAL E.U.	45	63	88	125	140
TUNISIA	3	3	3	4	4
TURKEY	2	2	2	3	5
MAROCCO	-	1	2	2	2
CYPRUS	6	6	6	6	9
CROATIA	-	-	-	-	5
TOTAL MEDITERRANEAN	56	75	101	140	165

At the forefront of this impressive development is Greece. In the last 5 years the Greek production of seabass and seabream increased by 8 times (Figure 2).

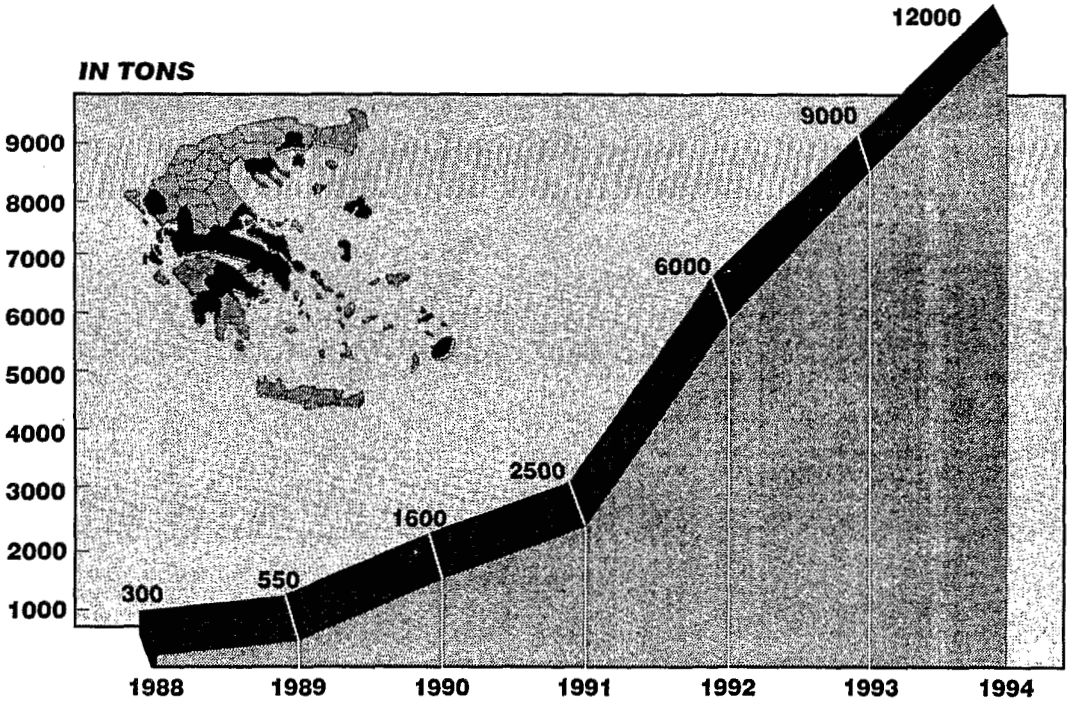

Figure 2. Total seabream & seabass poduction in Greece.

While until 1988 the Greek sector's development was almost exclusively dependent on imports of fry, today 18 hatcheries are in operation, with consolidated know - how, attributing to the self-sufficiency of the fry domestic supply (Figure 3).

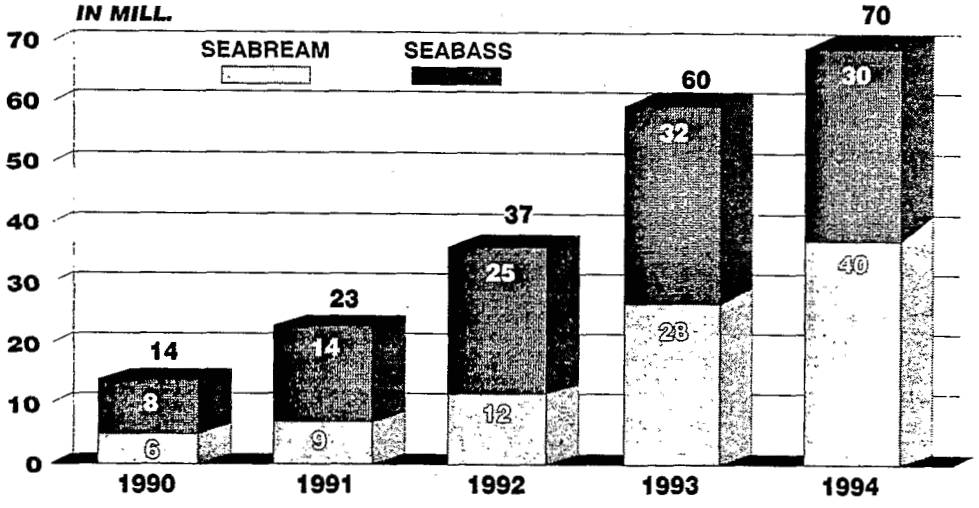

Figure 3. Seabream & seabass fry production in Greece

III. PRODUCTION COST

A. Hatchery Production Costs of Marine Fish Fry.

1. Methods

Cost estimates have been obtained from experience running marine hatcheries, visiting other hatcheries and published financial results from companies operating within the Greek territory or in the Mediterranean area.

Included in these estimates are all the direct production costs of feed, artemia & selco, chemicals, power, fuel, repairs & maintenance, consumables, administration and depreciation on a straight line basis. No account has been taken of financial costs which individual hatcheries may have. These depend very much on the financial resources and policies of the enterprises which operate them.

2. Results and discussion

The production cost of marine fish fry is one of the major contributors to the overall production cost of marine fish and ultimately the viability of the mariculture industry in the Mediterranean. It can be estimated that fry costs contribute between 15 to 25% of ongrowing costs.

The investment cost of building a marine hatchery varies between country and region. Some projects may require expensive water treatment systems and/or elaborate infrastructures. Most hatcheries are producing fry in intensive systems to maximise on their capital investment and thus it is not surprising that mechanical equipment at 32% and buildings at 27% are the largest segments in the investment costs of a typical hatchery. This can be compared with the proportionate investment costs for a shrimp or prawn hatchery (Lee & Wickins 1992) with construction and tanks at 34.1% and 21.2% respectively.

There is considerable variation between investment costs and output (Table 3 and Figure 4) due to the different production systems used and the resources available to the investing enterprises. The cost of building a hatchery is also the major contributor to the operating cost as it must be depreciated over its life time. From the examples in Table 3 this varies from 0.015 to 0.10 ECU per fry with the depreciation proportion of the operating cost varying from 15% to 35%. Therefore, a hatchery's design and construction will greatly effect its final operating cost through its depreciation.

The other large contributor to the typical hatchery operating cost is labour at 30% followed by administrative expenses, fuel & power (Table 4). However the fuel & power portion is large due to the heating requirements of Mediterranean hatcheries. The main hatchery production season is over winter from October to May with ambient water

temperatures low at between 8-15 degrees C and optimum larval rearing temperatures around 20 degrees C.

Table 3. Greek hatchery investments estimated outputs - depreciation cost/fry.

INVESTMENT (Ecu)	OUTPUT	DEPRECIATION (10 Years)	DEPRECIATION / FRY / YEAR (Ecu / Fry)
3.000.000	3.000.000	300.000	0.10
4.900.000	7.000.000	490.000	0.07
770.000	5.000.000	77.000	0.015
2.600.000	10.000.000	260.000	0.026
500.000	1.500.000	50.000	0.033
1.500.000	3.500.000	150.000	0.043

ECU = 300 GRD

Table 4. Seabass/seabream fry production cost structure

	(IN % OF TOTAL) 1994
LABOUR	30
FEED	7
ARTEMIA & SELCO	7
CHEM. & MEDICATION	1
FUEL & POWER	8
ADMINISTRATION	15
CONSUMABLES	5
R & M	4
DEPRECIATION	23
TOTAL	100
AVERAGE PRODUCTION COST (in ECU)*	0.15 - 0.30

* IN GREECE

Hatchery operating costs (Figure 4) show that in general the greater the output of fry the lower the production cost. Thus, the smaller hatcheries will find difficult to compete with well managed hatcheries producing 5,000,000 or more fry when supply becomes greater than the demand and prices fall.

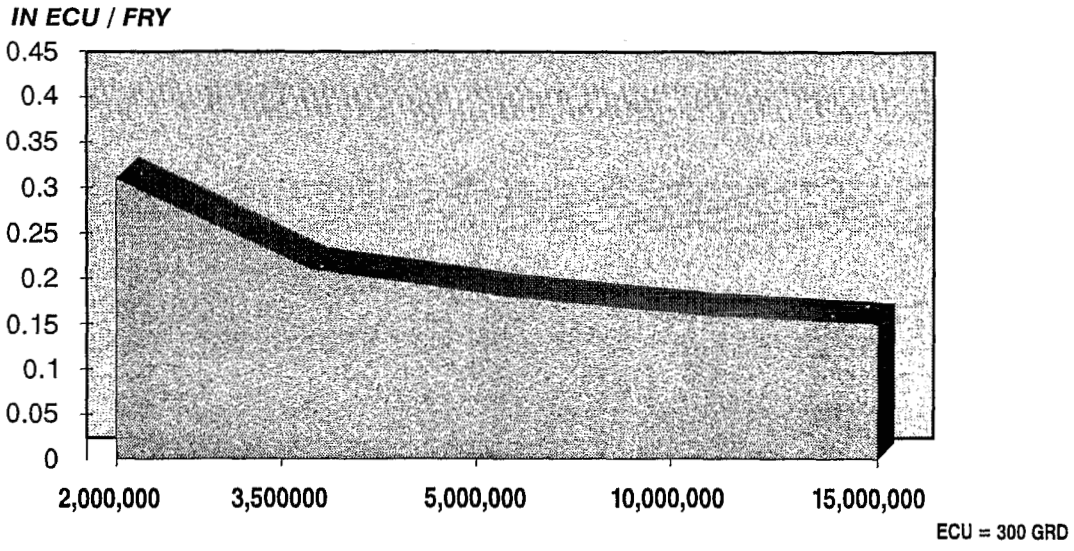

Figure 4. Hatchery operating costs *vs* fry output in Greece.

3. Conclusions

The cost of marine fry production in Greece shows considerable variation depending on the size of the hatchery and its output, with investment varying considerably from project to project.

In general the larger hatcheries have a cost advantage if output is high, but a disadvantage if output is low. The two major contributors to the cost of fry are labour and depreciation. The former requires good management during its operation and the later careful consideration in the project design stage.

B. Production Costs of Market Size Marine Fish.

1. Methods

Cost estimates have been obtained from extensive experience operating marine ongrowing farms within the Greek territory.

2. Results and Discussion

For the calculation of the cost estimates that follow, a number of assumptions have been made, i.e.

(a) Production system: Sea cages

(b) Mortalities + Losses: 20%

(c) F.C.R.: 1:2.5

(d) Mean Growth Period: 18 months

(e) Market Size: 350 g

(f) Annual Production Capacity: 200 t

The production capacity, through economies of scale, reflects to investment costs (fixed assets / t), as well as to labour productivity (t / person / annum) - (Table 5).

Table 5. Economies of scale

FIXED ASSETS

PRODUCTION CAPACITY (t)	< 50	50 < - <100	100 < - <200	>200
AVERAGE INVESTMENTS (Ecu / t)	3.000	3.300	3.000	2.600

LABOUR PRODUCTIVITY

PRODUCTION CAPACITY (t)	50	100	150	200	500
LABOUR PRODUCTIVITY (t /person / annum)	11	12,5	16,5	20	26

Production cost structure remained more or less unchanged in proportion between 1989 and 1994, with the exception of the fry cost contribution, that decreased due to severe drop in fry prices. Meanwhile, a 35% decrease in Ecus have been achieved during this 6 year period (Table 6).

As with hatchery operating costs, ongrowing costs are lower in larger scale farms. The cost difference is becoming more significant in vertically integrated (own fry production), financially sufficient and very well managed operations, as indicated in the right end of Figure 5.

Table 6. Ongrowing seabass/seabream production cost structure

(IN % OF TOTAL)

	1989	1994
FRY COST	29	22
FEEDING COSTS	29	31
WAGES	11	12
INSURANCE	4	4
ADMINISTRATION	5	9
CONSUMABLES	1	2
INTEREST ON DEBT	15	12
DEPRECIATION	6	8
TOTAL	100	100
AVEGAGE PRODUCTION COST (IN ECU)*	7 - 10	5 - 6

* IN GREECE

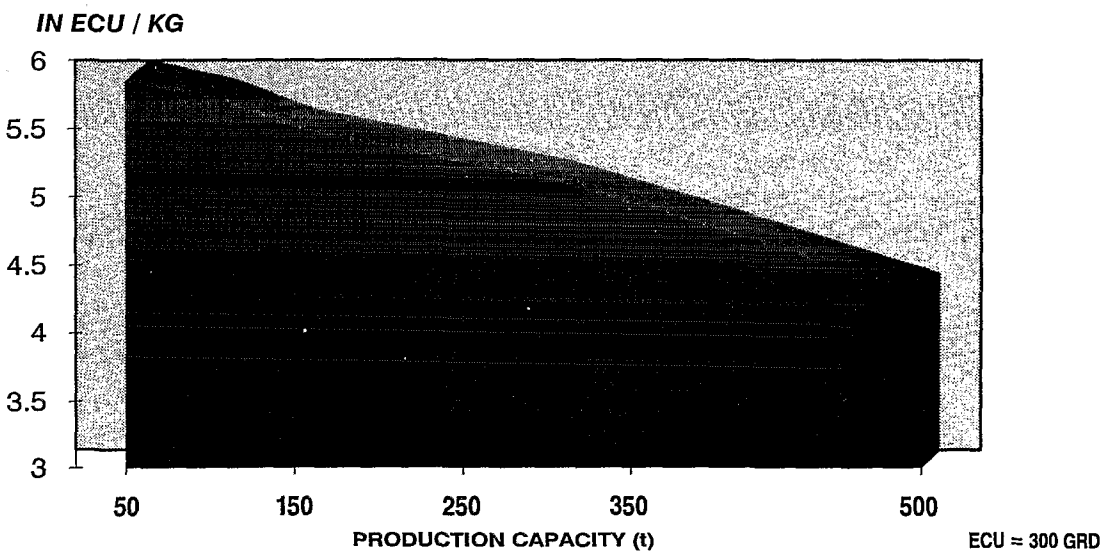

Figure 5. Ongrowing cost *vs* production capacity in Greece.

3. Conclusions

During the last 5 years a number of innovations have been implemented on the production cycle, that had positive influence on the production cost.

Small and especially medium size farms will face a lot of difficulties, in the near future, to compete with an industrial scale operation, vertically integrated (own and competitive fry production), with own financial resources and professionally managed.

IV. PRICES

1. Methods

Price data for fry and market size fish have been obtained by the Federation of Greek Maricultures.

2. Results and Discussion

(a) Fry Prices

Fry prices of both species decreased by approx. 65% between 1989 and 1994 at current Ecu value (Figure 6).

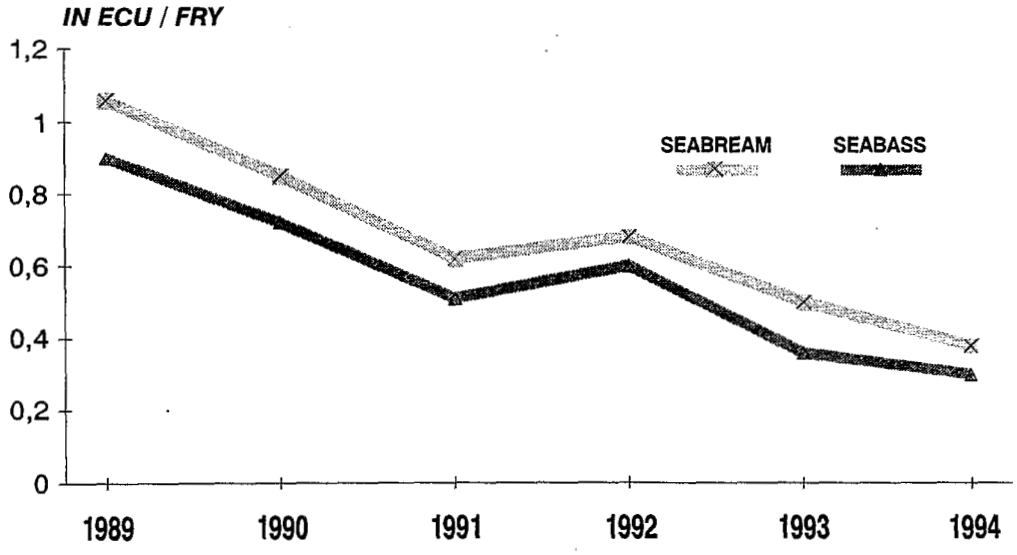

Figure 6. Seabass/seabream fry prices evolution in Greece.

(b) Market Size Fish Prices

The ex-farm prices of both species decreased by approx. 53% between 1989 and 1994 at current Ecu value (Figure 7).

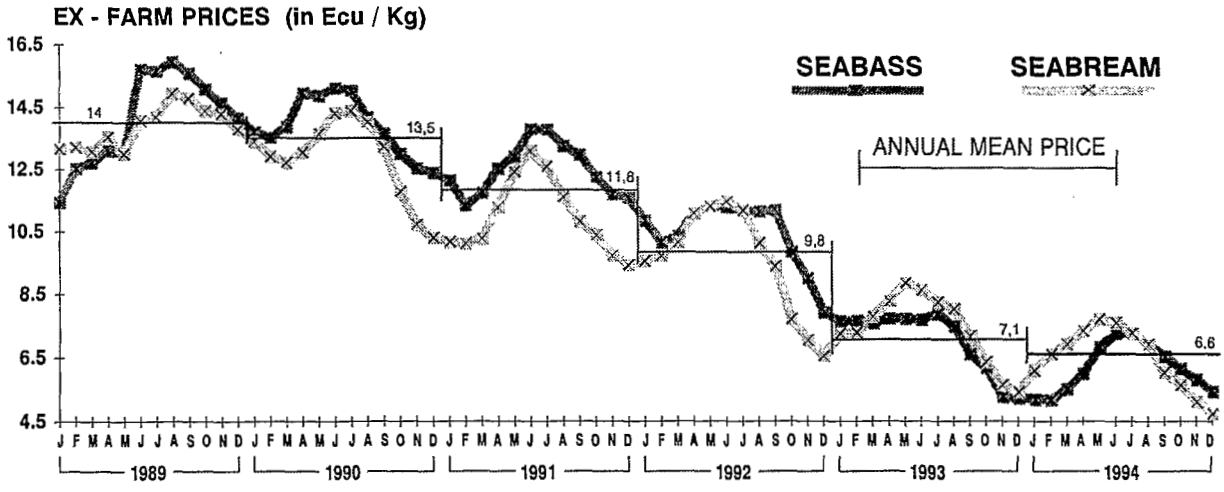

Figure 7. Seabream & seabass price evolution in Greece.

3. Conclusions

We are experiencing the same phenomenon happening for bass and bream as it did for salmon and it would be impossible to avoid the repercussions that the salmon industry faced. Prices of the farmed salmon in Northern Europe was cut down in half in less than 10 years. The same has happened in bass and bream prices, but in less than 5 years (from an average of 14 Ecus in 1989 to 6.6 Ecus in 1994).

V. MARKETS & MARKETING

1. Methods

In this chapter the author express his personal views based on experience obtained from marketing aquaculture products over the last 12 years.

2. Results and Discussion

(a) Markets

The developments during the last couple of years indicate that from the total Greek production of seabass and seabream approx. 70% is exported and the remaining 30% is consumed in the domestic market.

The export activity of the Greek mariculture industry had almost exclusive orientation towards the Italian market. Only last year (1994) a few exporters tried hard to penetrate new markets. The outcome of those efforts resulted in

realizing 10% of the exports in the new markets (U.K., Germany, France, etc).

The prospects, at least in the short-term, are definitely better in Southern European States. Demand in the North is limited to specific ethnic groups, mainly because our species are not known to the average consumer. Good markets exist for limited quantities, through specialized importers, but it is inevitable that demand enlargement will need advance marketing action.

(b) Marketing

Today, the Mediterranean aquaculture industry is using almost exclusively the traditional marketing channels.

During the last 3-5 years we are watching the invasion of the supermarkets to the fresh fish trade. They are increasing year after year their market share all across Europe, while the traditional channels (mainly fish mongers) are loosing the pace. With their supply power and the huge turnover, they can offer substantially lower prices than traditional fish shops. Those powerful supermarket chains will squeeze Mediterranean aquaculture producers for lower prices, as they are continuously doing with other manufactures and producers.

3. Conclusions

For future growth, the Mediterranean aquaculture industry should put a lot of emphasis adopting more sophisticated methods of marketing. This is "a must" for penetrating new markets, but it is also necessary for enlarging the existing ones.

The strategy of investing in advance marketing channels, abandoning gradually the traditional whole-sale system, implies also differentiation of the product, either by primary processing or by branding it - quality scheme being part of it.

Of course it may even not be appropriate for the fish farming business to go this far. It make more sense for them to let others, whether they are formed as the marketing arm of groups of producers or as other businesses to whom the producer sells on contract to do the marketing on their behalf, so that they can concentrate on their core strengths in production. This increases their dependence on others which has risks. On other hand it is less risky to be an attractive supplier of a good quality product than to be second rate in marketing because you do not have the resources to do it properly (Susan Shaw & Juliette Gibbs 1993).

REFERENCES

(i) Apostolopoulos J.S., Tsouknidis A.D., Christopoulos C.J. (1994). Farming of seabream - seabass in Greece, Agricultural Bank of Greece.

(ii) Gatland P.J.D. (1995). Cost Estimates of Hatchery Production of Marine Fish Fry in the Mediterranean. Preparation for Larvi '95.

(iii) Lee D.O.C. & Wickins J.F. (1992). Crustacean Farming, University Press, Cambridge.

(iv) Shaw S.A. (1990). Marketing for Fish Farmers. Fishing News Book.

(v) Shaw S.A. & Gibbson J. (1993). Marketing Strategies and Structure in the Development of Marine Finfish Aquaculture in Europe. World Aquaculture Society, Torremolinos, May.

(vi) Stephanis J. (1991). Modern Approach in Managing Fish Farming Operations, Alieftika Nea, May 1991, pp. 75-88.

(vii) Stephanis J. (1992). Evolution of Production Cost, Prices and Profit Margin, Alieftika Nea, March 1992, pp. 62-68.

(viii) Stephanis J. (1993). Maricultures in the Mediterranean, Present Status and Potentials, Agriculture-Stock Breading, June-July 1993, pp. 4-8.