A REVIEW OF THE ECONOMIC STATUS OF MOLLUSCS - SHELLFISH CULTURE

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Objective : To describe the value of shellfish culture in economic and social terms and evaluate its potential for expansion by identifying and ranking the major constraints and the ways in which research and development can overcome them.

From the various reports given, it appears that the economic importance of shellfish culture differs greatly between the different member countries of the working group. The differences relate to production volumes, which vary widely between countries, and also to methods. One feature widely discussed was that the production figures often included the captured and the cultivated stocks.

In that respect, aquaculture is basically an extensive mode of exploitation which is similar to ranching on land. However the intensity of such interventions varies considerably where natural ecosystem manipulations, to improve or channel their production, are not restricted to seeding but include also removal of competitors and pestsand the provision of artificial "reefs". The example given was of scallop, the production of wild stock having being boosted from 30 000 tonnes 100 000 tonnes by intensive seeding, and elimination of starfish.

Production data

Although large quantities of molluscs are collected in the different countries, there are only few cultivated species with significant production. Table 1 summarizes the national productions for the predominant species, expressed in tonnes of whole weight.

Three species of oysters constitue the dominant productions of the countries represented in the working group : Crassostrea gigas, virginica and Ostrea edulis, the last one with high commercial value, being hit by chronic epizootics in some countries.

The production obtained by cultivation fluctuates widely, depending on the shellfish culture tradition of these countries, and the size of their national markets. For Canada, the culture of O.edulis remain at a very low level. In France, the biggest part of the production is of Pacific oyster, the other species being practically eradicated by epizootic diseases. In Germany, oyster production is barely significant, and the potantial is limited. Italy, without a national oyster market, sends its production to Northern Europe. Japan remains one of the largest producers of cultivated oysters, with an output of more than 250 000 tonnes. For the United Kingdom, oyster culture is at a low level and dependent on the presence of natural beds which are harvested for seed. Furthermore, the local market for live oysters is very small. The U.S.A. produces about 125.000 tonnes of cultivated oysters, which is one-tenth of its oyster production.

For the countries of the working-group, oyster production based on a culture cycle from spat collection to rearing and marketing, accounts for 490.000 tonnes of whole oysters. The potential for expansion could, in biological terms, be roughly of the same level. Such potential will be higher in some countries than in others. The economic aspects of such potentials will be discussed later.

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After oyster, mussel culture is very often the next most important shellfish culture activity. It has been developed more intensively in Europe than elsewhere, and this may reflect the location of market, i.e. that mussel production in American countries and in Japan is comparatively less developed because of market limitations. In Japan development is beginning.

Mussel culture is presently expanding in Italy and Germany, were the average annual production of around 15 000 tonnes in 1982, was doubled in 1983. The United Kingdom only produces 750 tonnes of cultivated mussels mainly because of a natural population harvest. As far as Japan is concerned, mussel production may have been inhibited because some toxicity occurred which compromised human consumption and marketing. It is worth noting that two countries, Spain and the Netherlands, which are not members of the working group, are among the world's largest mussel producers.

Pectinid culture competes with scallop fisheries and depends on natural spatfall. Man's exploitation of these species may move towards population enhancement, using hatchery-reared spats. An actual culture, with technical support and rearing systems, is only found in Japan. In that country, pectinid culture produced 72 000 tonnes in 1982, which makes it an important activity. In many other countries, culture trials are being made, either with hatchery-reared spat or by collection of natural seed. Canada, France, the United Kingdom and the U.S.A. have Research and Development programmes to develop pectinid culture.

The other species of molluscs which are cultivated are living in the sediment, most of which are grouped together as "clams". Only two species have reached a significant production level, these are Mercenaria mercenaria, 6 000 tonnes of which are produced in the United States, and the Manila clam, known under two scientific names (Ruditapes philippinarum and Venerupis semidecussata). The culture is still on a pilot scale, but 1 000 tonnes were produced in the United States and 300 tonnes in France. Generally speaking, clam culture could exhibit a strong development, due to its present high economic value, and because it constitutesanopportunity for diversifying shellfish production.

Total value of shellfish production

The total value, expressed in US $ for all member countries, is higher for the captured species (724 millions US $) ; the cultured species account for 429 million US $. This fact is mainly due to the high proportion of captured oysters in the United States, and to highly diversified catches of different species in Japan.

In three countries shellfish cultures alone account for more than 100 million US $ per year (that is USA, Japan and France), while the income for shellfish culture and harvest is very much smaller for Canada, Germany, UK and, to a lesser extent, Italy. It is worth noting that biological potential for shellfish cultivation is generally high in those countries with low current levels of production by the same ratio. Such biological potentials are very high for oysters and clams in Canada and the UK, and for mussels in France, Italy and Japan. Today, mussel culture in Japan is at a very low level.

Employment figures

It is rather difficult to give precise figures of direct employment for the shellfish culture industry because of lack of reliable statistics and of part time employment due to climatic and market variations. As an exemple, half of the French oyster production is usually sold during the last two months of the year. Therefore, in all countries and for most of the products, one has to consider a certain proportion of part-time jobs. Japanese data were given in

units of production, one unit being assessed as 2.5 people. In many countries, shellfish farming is a family business and the actual employment numbers are probaly probably under-estimated.

Accepting that a full time job corresponds to 2 part-time jobs, the total manpower for shellfish cuture corresponds to approximately 200 000 people, but such manpower is unevely distributed across the national production levels. Shellfish cultures in France and Japan are operated with large numbers of workers, whereas in the U.S.A., few shellfish cultivators are able to ensure large productions. In the smaller producer countries, which are still on a developmental stage, the ratio between production and manpower seems to be affected by size-related effects since the production units are generally smaller.

Constraints (Table 2)

Shellfish culture quite often is subjected of different constraints, which can be classified as follows :

- environmentally related constraints
- technological constraints
- economic constraints

Climatic conditions are not usually considered as constraints. Not all species can be reared in a given area, because of their ecological requirements for satisfactory growth and reproduction but the diversity of species is sufficient to quarantee a suitable organism for most sites. An exception may be found in Canadian oyster production, which takes place in subtiadl areas, covered by ice during winter.

Some constraints are common to all countries. First of all good quality water is a continuing requrement as soon as shellfish production begins. Toxic products or pathogenic organismsrequirement as soon as shellfish production begins. value of the molluscs. Antifouling paints containing some TBT (tri butyl tin) have been reported to be responsible for shell abnormalities and spat collection failures on the French coast. In Japan, toxic plankton may produce mass mortalities of various bivalve species. The second point is also related to human health considerations and any problem occuring in a population may lead to consumer resistance and loss of markets, as appears to have happened in Italy.

Most of the countries indicate the existence of some need for technological improvements. This is related to a low level of mechanisation for a labour intensive activity.

Other constraints are related to the volume of the national production. The biggest producers all mentioned the occurence of epizootic diseases and red tides, and overstocking is also a problem encountered in such countries.

Site accessibility and availability seem not to be so clearly linked with the scale of national production, probably because of two different reasons.

National regulations vary greatly and while it is apparently very difficult to obtain a permit for mollusc cultivation in the United States, Japan did not mention any difficulty concerning site accessibility, in spite of a very large mollusc production. In some countries the large number of people involved in mollusc cultivation is reflected by their economic and social strength, so that competition for space or environmental quality may actually assist shellfish culture activities.

Last, but not least, the economic possibilities and restrictions seem to be specific for each country. In the United Kingdom, the market for shellfish products remains limited, and the possibility of product transformation in ready-to-cook meals has been suggested as a mean to promote it. But advertisement campaigns could push the demand beyond the present production possibilities, and increase sea food imports. Another example of marketing problems has been revealed in Italy, where human health was threatened by contaminated mussels. Despite the passage of several years, the consumers' fears are still alive, and the Italian demand remains low, even though sea food comsumption was an old tradition, especially in the southern part of the country.

Biological potential should not be confused with economic possibilities, even for the countries having a large market as long as profitability is the main aim. To maintain and increase the national income from shellfish culture, the efficiency of production management should be improved. Today, the most important point seems to lie with production statistics. First, the capture yield should be separated from the cultivated harvest and reliable statistics should be obtained on actual production. This should concern local production in each area for each species, and take into account the transportation between different areas or countries. Such statistics could allow better management either for the differents areas or for the various products, at a nationwide level. Finally the design and implementation ofa good national data network collection is recommended.