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Considerations on the development of bluefin tuna aquaculture

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SUMMARY – The fishing industry has undoubtedly the legitimacy to take part in the process of development of bluefin aquaculture. First because of the pre-eminent role of fishermen in bluefin tuna fishing, especially in the Mediterranean sea, and also because of their capacity to adapt to fishing-based aquaculture by using new fattening practices. A partnership with fishermen is necessary in order to reinforce what has already been achieved with fishing-based aquaculture (fattening) and also to answer many questions of the fishing industry concerning the possible development of a more advanced form of bluefin tuna aquaculture that would be independent of fishing.

Key words: Bluefin, fishery, aquaculture, fattening.

RESUME – *"Considérations sur le développement de l'aquaculture du thon rouge". Le secteur de la pêche dispose incontestablement d'une légitimité pour prendre part au processus de développement de l'aquaculture du thon rouge, tout d'abord en raison de la primauté des pêcheurs dans l'exploitation de cette espèce, notamment en Méditerranée, ensuite, grâce à la capacité dont ils ont su faire preuve pour évoluer vers les pratiques récentes de l'engraissement du thon rouge. Un partenariat est nécessaire avec les pêcheurs pour permettre de sécuriser les acquis actuels de ce type d'aquaculture directement tirée de la pêche (engraissement) et pour répondre aux nombreuses interrogations du secteur à l'égard du développement éventuel d'une forme plus aboutie d'aquaculture du thon rouge, indépendante de la pêche.*

Mots-clé s: *Thon rouge, pêche, aquaculture, engraissement.*

The legitimate role of the fishing industry in the development of bluefin tuna aquaculture

The pre-eminent role of fishermen

The legitimate role of the fishing industry professionals in the development of bluefin tuna aquaculture is firstly the result of their presence in fishing over several decades, not to speak of the recent past, which saw the appearance in France of bluefin tuna fishing with purse seine nets at the beginning of the 60s.

Over the years, the French fleet of purse-seiners established itself in the western Mediterranean and modernised its ships by taking advantage of the constantly improving technology that enabled the conditions of capture and storage aboard to be improved¹.

Progressively, in addition to the requirements of the European market for fresh fish, the French fleet showed it was capable of meeting the stringent demands of the Japanese market; today this market has become essential to achieve profitability for the fishing industry.

The fishermen and the fish merchants are the main actors in the bluefin tuna sector; this position now enables them to claim a genuine pre-eminence in leading the sector in the eventuality of a move toward aquaculture. *In particular, it fully justifies their demand to be the main beneficiaries in terms of the access to sites set aside for aquaculture, which is the pre-condition for future development.*

¹In France, bluefin tuna fishing in the Mediterranean is generally carry out with purse-seiners (20 to 45 meters long, 10 to 15 men on board) operating for about 8 months of the year, from March to November, over a total of maximum 164 days at seas. Fishing is strictly monitored by satellites and controlled through a system of licences witch sets a limit of 43 vessels authorized to catch bluefin tuna with purse-seine in Mediterranean.

This legitimate role of the industry is also based on the fact that, faced with the heavy constraints of the Common Fisheries Policy (CFP) which limit the possibility of the movement of fleets and the size of the boats, and faced with the introduction of quotas by ICCAT², it has managed to cope and to innovate, together with the fish merchants, by moving toward an aquaculture based on the new practices of fattening bluefin tuna.

The ability of fishermen to carry through a transition from fishing to aquaculture: Fattening bluefin tuna

For approximately 5 years now, a part of the tuna captured by fishing boats have been transferred directly from the nets to boats equipped with large tanks and placed in cages; the fish are fed for several months to allow them to grow in size and weight and, especially, to increase their fat content.

Today, the French tuna fishing boats are the main suppliers of bluefin tuna to Spanish fish merchants, who own the cages in Spain.

This change, which corresponds to a form of fishing-based aquaculture, undoubtedly constitutes a qualitative leap in terms of stock management and works in favour of a reduction in the capture of juveniles; it also enables a better development of a resource which is still taken in its entirety from a natural stock whose limits are not really known.

It also reinforces the position of fishermen in *their request*, as direct witnesses to the change in the industry and with the confidence gained from their experience on the sea and empirical observations, *that an independent scientific study be carried out to estimate the biomass of the bluefin tuna stock in the Mediterranean.*

Since it is recognised that the influence of the environment, probably due to climate changes, may affect the abundance of the resource, we believe it is urgent to put an end to the extremely restrictive estimations that use mathematical models based only on capture data³.

What about data concerning the natural mortality of bluefin tuna ocean-wide and in the Mediterranean basin not related to fishing? The influence of factors other than fishing, such as for example the effect of alluvial deposits from the coastal regions of the Mediterranean?

Large numbers of small tuna have recently been observed in the Mediterranean, *so it may also be useful to carry out research on reproduction in fattening cages and to try to measure the potential effects of this on the level of stocks.*

Conditions necessary for a partnership with the fishing industry

Reinforcing what has already been achieved in fishing-based aquaculture (fattening)

The partnership of the fishing sector would appear to have been accepted in principle when the ambition to develop bluefin tuna aquaculture aims to ensure the future of fishing in a healthy complementarity between the two activities.

In this respect, it can already be seen that present practices for fattening large tuna (80 kg to +150 kg and more) and growing up smaller tuna (10-15 kg to 30-40 kg) are already contributing to ensure this complementarity between "fishing" and "aquaculture" within an operational commercial sector where the fisherman no longer appears simply as a predator but as a breeder or a farmer of the sea.

Fishermen and fish merchants have shown their capacity to develop an original "savoir-faire"; today, the bluefin tuna is the only species where the fishermen has managed the transition to aquaculture.

²International commission for the conservation of the Atlantic tunas (ICCAT).

³The last evaluation of bluefin tuna stock was made in 1998, the time at which the ICCAT introduced quotas.

This is undeniably a major advance which fully justifies the fact that research is contributing to the development and the consolidation of this kind of activity where the benefits in terms of jobs and local economic development can already be seen.

However, the development of this type of fishing-based aquaculture has also raised many questions, particularly as regards the *crucial choice of the most appropriate sites* whether from a legal (legal status of the water, management of the uses, etc.), environmental (quality of the water, impact of the waste, etc.), or socio-economic viewpoint (transport links with the transformation, the logistics of transport, etc.).

A cartography of the most appropriate potential sites in the Mediterranean should be produced rapidly, together with a guide for setting up and implementing good practices for bluefin tuna aquaculture.

In order to consolidate fishing-based tuna farming, a form of aquaculture which has the advantage of already existing, the fishing industry also expects of this research that it consolidates what has already been achieved and advances our knowledge in certain areas, for example feeding tuna – its nutritional requirements are not well understood –, the prevention of illnesses or the improvement of slaughtering techniques, etc.

This progress is necessary if we are to set the present day practices of growing and fattening on the path to a responsible and sustainable aquaculture entirely respectful of the environment and which meets the demands of consumers in terms of the quality of the products, of course, but also ethical aspects such as the well-being of the animal.

Questions on making aquaculture independent from fishing

The prospects for the development of a bluefin tuna aquaculture independent from fishing, requiring that cages be stocked with fish produced from a broodstock entirely bred in captivity, have inspired a certain scepticism within the fishing industry.

Although such a profound change is not expected to occur – in the opinion of some scientists – for another 10 or 15 years, it is important to begin now to look for the main potential risks for the future of the fishing industry.

Here, the questions are many, derived for the most part from experience acquired in the aquaculture of bass and sea bream in the Mediterranean, where the fish produced were directly in competition with fish captured in the sea.

Generally speaking with aquaculture of this kind, independent from natural production, the fisherman, unless he has the necessary capital available, can no longer be entirely responsible for his own development.

The first questions are of a socio-economic nature and obviously concern the *impact of an uncontrolled aquaculture production on the bluefin tuna market and the sector as it is today*: price setting, commercialisation circuits, the present-day structure of the sector and of course the place of fishermen within a bluefin tuna sector which would be dramatically different and where there would clearly be a radical change in the size and the origin of the capital required. All of these elements will need to be carefully examined and accurate simulations performed.

Other questions concern the measurement of the *real impact of this type of aquaculture on the environment*, particularly in terms of the localisation of the cages and the stocking density: what will be the impact of the waste, of the use of chemical products, antibiotics and feed products?

Again, these are all questions that will require answers, not only for the fishermen but also for the community as a whole.

There is no reason to believe that an aquaculture which controls the reproductive cycle of the bluefin tuna cannot also contribute to restocking the populations of wild fish: What would be the effect of "sea ranching" on the fisheries, on the integrity of the species and on the biodiversity of the

surrounding ecosystems? These parameters will also have to be examined carefully on the basis of the best scientific information available.

Finally, nothing can be achieved without transparency and a dialogue with the main actors: to nourish the debate and help in the decision-making it will also be necessary to carry out *studies on the conditions in which the space required for this aquaculture is to be acquired, in close collaboration with the others who also use the sea along the coast* (tourism, fishing, navigation, etc.).

Conclusions

In France, the fishing industry has managed to develop, in a partnership with those downstream in the sector, a form of aquaculture of the bluefin tuna dependent on fishing and based on growing and fattening; these activities – which exist thanks to fishing – must be encouraged since: (i) they guarantee *the future of fishing and its jobs*, while contributing to a *better management of the stock*; and (ii) they also guarantee a supply of *wild fish* – the veritable wealth of the Mediterranean – whose *natural quality* is improved by the fattening which is carried out to meet the demands of the Japanese market.

This development will not transform today's fisherman into tomorrow's aquaculture farmer; it simply shows the capacity for diversification of the sector, the capacity to move toward a complementary activity which will still be dependant on the natural environment.

It also provides an additional justification for the industry to ask for a *scientific evaluation of the biomass of the stock of bluefin tuna in the Mediterranean to be carried out independently of the fishing industry*.

The development of an aquaculture independent from fishing through the control of the reproduction "right from the egg", would still appear to be unlikely; nevertheless, if such a prospect were to be envisaged, it should be remembered that the French fishermen are, and intend to remain, the main suppliers of broodstock, and that France – which has a recognised scientific expertise in this field – must take a central role in this specialised research.

Here again, the industry has defined as a precondition that a large series of impact studies be undertaken both on the current bluefin tuna sector and on the marine environment and the territories that this new kind of activity intends to appropriate.