THE ROLE OF SCIENCE AND RESEARCH IN AQUACULTURE

MAURICE HERAL

MAJOR CHALLENGES TO THE INDUSTRY

- **The development of Aquaculture has been identified as a world challenge to contribute to produce proteins to feed the 9 billions humans,**

- **It must be developed in a sustainable way by taking care of the global environment , including all the interactions with the marine and freshwater ecosystems, particularly towards the wild fishes with:**
  - **a social recognition of the consumers and their request,**
  - **in a profitable industry.**

- **. Aquaculture systems must answer to opposite forces such increase productivity, decrease the prices, limit environmental impacts in a context of global exchange and increase the cost of energy.**

IT IS A COMMON CHALLENGE !

- **FOR THE INDUSTRY**
- **FOR RESEARCH LABORATORIES**

- **COMMON COLLABORATIVE PROJECTS COFUNDED BETWEEN PRIVATE PARTNERS AND PUBLIC RESEARCH:**

- **ALL THE ENVIRONMENTAL MATTERS ARE RESEARCH TOPICS DIRECTLY IMPACTED BY THE MANAGEMENT OF THE FARMS**
- **FOR BREEDING IMPROOVEMENT? PRIVATE KNOWLEDGE IS OFTEN HIGHER IN PRIVATE COMPANIES THAN IN PUBLIC HATCHERIES**
- **FOR DESEASES PREVENTION STRESS, TRANSFER, REARING TECHNICS, TREATMENTS ARE UNDER THE CONTROL OF THE FARMERS**

Impact of Global Change

- **Climate related: Temp and var Temp, S% , PH acidification**
- **Urbanisation on coastal zone: eutrophication,O2**
- **Droughness: decrease of resources and productivity**
- **Sanitary and Zoosanitary impacts : Vibrios and virus**
- **Increase of organic matter: harmfull algal blooms**
- **Decrease of coastal and inland water qualities, pesticides ,PCB**
- **Increase frequency of storms**

Aquaculture research answers to global change

- **Regional answer to global change,**
- **Change of species repartition, select species in their middle of distribution area,**
- **New species for aquacuture**
- **Adaptation of phenotypes better adapted to new conditions,**
- **Selection of better fitness,**
- **Stress physiology , adaptation for resilience of aquaculture production**,

Energetical problems

- No more petroleum in 30years,
- Increase the costs of energy,
- Decrease the consumption in all the chain,from the fishery to the consummers
- Developp the use of renewable energy, associated with wind farms, hydaulic electricity, solars and photovoltoics
- Recycling of nutents by production of algae for biodiesel
- Aquacuture could be one the industrial sector leader on these green technogies
- Consequences on long term: evolution of transportation costs:reduction of importation , more regional production

The other main research axes(1)

- **To feed the world the future is with the, algae, the herbivorous shellfish and finfish**
- **Obtain low cost white fish such as catfish,carps, tilapia, mullet …**
- **Increase quality and the flesh and transformation of the products to create added values**

The other main research axes(2)

- **Transform the carnivorus in herbivorus :**
- **Nutrition efficiency,**
- **Move from fish meals and oil to vegetables**
- **Modification of the vegetables for their content in fatty acids to keep the unsaturated fatty acids good for nutritional value and human health**
- **Selection of phenotypes with more adaptation to digest vegetables component**;

The other main research axes(3)

- **Resistance to deseases;**
- **Selection of resistant strains submitted to pathological challenge**
- **Selection of resistant strains based on immune gene selections**
- **Decreases of antibiotics substances in favour of probiotics approaches**
- **Increases efficiency of vaccinations protocoles**

The other main research axes(4)

- **Environmental impacts**
- **Genetic pollution**
- **Deseases reservoirs and deseases transfert**
- **Communication on the results on a non pollutant industry**
- **Integrated Coastal Zone Management with marine planning for aquaculture**
- **Offshore technology**

The other main research axes(5)

- **Save the oysters,**
- **Massive summer mortalities everywhere in the world for spat and juveniles**
- **With an herpesvirus associated to vibrios in Europe**
- **Selected resistant strain is the only way to survive**
- **Change the cultural practices to reduce the stress**

CONCLUSIONS

- **To face with the new challenge to contribute to the human nutrition , aquaculture has to come back to its origin (the chinese carp system or the oysters with the romans) but at a very large scale**
- **In the changing world (climate, energy…) aquaculture has to improove its adaptation throught increase of public research mainly on nutrition, genetic and deseases**