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Multidisciplinary biological approach to the optimization of sea bass (Dicentrarchus labrax) rearing in fresh water

Fact Sheet

Project Information

Grant agreement ID: AQ.1.256

Project closed

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1 April 1989

End date
1 May 1992

Funded under
Community research and coordination programmes (EEC) in the fisheries sector, 1988-1992

Total cost
No data

EU contribution
No data

Coordinated by
Università degli Studi di Roma Tor Vergata
Italy

Objective

The main objective of this programme is to set up a multidisciplinary methodology of characterising fin fish stocks used in aquaculture and assessing environmental effects.

This programme is devoted to sea bass Dicentrarchus labrax. This species has a high economic value, may be reared at different salinities and grows rapidly between 18 and 23 C. The adaptability of sea bass to fresh waters and the availability of suitable fresh water sites opens the possibility of commercially rearing this species in non coastal areas.

Captive and wild stocks of sea bass will be used to carry out experimental trials to investigate the effect of temperature, salinity and other environmental variables on mortality, morbidity, malformation, growth rate, shape, and conversion rates. This will make it possible to suggest the appropriate conditions and forms for commercially reared sea bass.
Wild and hatchery fry of sea bass (Dicentrarchus Labrax) were acclimated to low salinities and freshwater using 3 different operational protocols. Wild fry tolerated freshwater better than hatchery fry, in the latter trial with 90% survival. From an aquacultural perspective the interesting result of this study is the identification of the most influential variables associated with survival in freshwater: origin and weight size.

Rearing in freshwater was achieved using sea bass obtained from controlled spawning reproduction. In all trials high mortalities were observed in the first phase probably due to osmotic stress combined to other stress factors. Good daily weight increases were obtained in all the rearing trials in freshwater.

The morphology and the sodium potassium adenosine triphosphatase activity of 3 organs involved in osmoregulation (oesophagus, kidney and gills) in seawater and freshwater acclimated sea bass was studied. The structure of these organs did not show drastic changes regarding salinity when compared with other euryhaline species. The first and most useful marker of functional acclimation to freshwater was oesophagus and kidney adenosine triphosphatase.

The genetic study of natural populations indicated geographic differences, Mediterranean populations of Dicentrarchus labrax being quite different from one another.
The compulsory change of salinity, imposed by the experiment, seemed to produce changes in the genetic composition. Cytogenetic analyses of D labrax and of the spotted seabass, D punctatus showed a very similar karyotype in the 2 congeneric species, composed of 48 subtelocentric and acrocentric chromosomes, gradually decreasing in size.

To express shape modifications in size and weight, a geometrical approach was adopted. After the shock of acclimation to freshwater, samples tend to grow faster than their marine counterpart and they achieve progressively a shape characterized by a strong positive allometry which is essentially perpendicular to the body axis.
The project will be carried out in several phases:

Collection of wild and hatchery stocks of sea bass.

Genetic characterization
The stocks collected will be subjected to protein electrophoresis, cytogenetic analysis, morphometric analysis and mtDNA analysis in order to characterize them genetically.

Planning and arrangement of rearing units.
Environmental variables such as temperature and salinity will be tested in the two types of stocks.

Experimental procedures and ongoing data collection
Fish will be sampled monthly, morphometric measurements taken and mortality, morbidity, malformation recorded and conversion rate computed. Histological and associated physiological traits will be investigated.

Data analysis

Fields of science (EuroSciVoc)

natural sciences > computer and information sciences > **data science**

natural sciences > chemical sciences > inorganic chemistry > **alkali metals**

natural sciences > biological sciences > biochemistry > biomolecules > **proteins**

natural sciences > chemical sciences > electrochemistry > **electrophoresis**

natural sciences > biological sciences > genetics > **chromosomes**

Programme(s)

FP2-FAR - Community research and coordination programmes (EEC) in the fisheries sector, 1988-1992

Topic(s)

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Call for proposal

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Coordinator

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