



Aquainnova

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## CLOSEDFISHCAGE

Development of an innovative, cost-effective environmentally friendly closed cage for sea-based fish farming

### The Challenge

The market for fish, and especially European farmed fish, continues to grow. However, EU catches have dropped in recent years, aquaculture production has remained stable, and the current supply of fish is therefore not enough to cover market demand. Furthermore, as a result of a combination of near depletion of certain EU fishery stocks, reduced annual catch quotas, and reduced fishing fleets, Member States of the Union are becoming increasingly dependent on imports from third countries. ClosedFishCage, through the development of new technologies for sea-based fish farming, aims to improve the competitiveness of SMEs in the aquaculture sector but also to safeguard the potential production of good quality fish, in sufficient quantities, at competitive prices.

In the future the use of sea-based fish farming will have to be increased and the development of new, more appropriate technology needs to be enhanced. Market prospects for aquaculture products will play a substantial role in this development, as decisive factors for the achievement of sufficient fish supplies prevail both in the local as well as the international market. Furthermore, the value of establishing more sea-based fish farms is expected to be evaluated not only according to financial but also to a set of technological, managerial and environmental criteria.

Compared to land-based fish farming facilities, sea-based sites are cost effective especially due to much lower investment costs. As fish farming moves into its 'industrial phase', it becomes even more obvious that technology will be an important factor determining its successful development.

The technological solutions involved in ClosedFishCage will preserve advantages of land-based fish farming while at the same time taking advantage of the much lower investment costs in sea based farming.

### Project Objective

This project aims at developing the only real functional European made closed, escape proof, constant volume, sea-based cage, ensuring better control of farming conditions for fish and more efficient exploitation of ocean-based sea farming opportunities. By using principles from land-based sea farming it will be possible to speed growth rate and increase revenues. As a result, the sea farm will almost encounter the price of existing sea-based facilities and at the same time have the benefits of a land-based facility.

#### EATiP Thematic Area of Relevance

**TA1:** Product Quality, Consumer Safety and Health

**TA2:** Technology and Systems

**TA3:** Managing the Biological Lifecycle

**TA4:** Sustainable Feed Production

**TA5:** Integration with the Environment

**TA6:** Knowledge Management

**TA7:** Aquatic Animal Health and Welfare

**TA8:** Socio-Economics and Management

#### Key Words

sea cage, closed, escape proof, control system, sea-based fish farming

#### Project Information

**Contract number:**

232513

**Contract type:**

Research for SMEs

**Research area:**

SME-1 Co-operative Research (all areas of science and technology)

**Duration:**

24 months (01/09/2009 – 31/08/2011)

**Coordinator:**

Trond Johannessen – Plast-sveis AS  
Somna, Norway

**Tel:**

**+47 90 58 92 28**

**E-mail:**

[twjohann@broadpark.no](mailto:twjohann@broadpark.no)

**Project website:**

<http://www.closedfishcage.com/>



## Key Points

- Identify the physical, chemical, biological, regulatory aspects as well as good husbandry practices of sea based fish farming for target species and link these aspects to the development of a closed cage and water treatment and to the new control technologies.
- Identify and calculate key oceanographic data in order to model the environmental forces on the closed cage to ensure appropriate design and technical solutions that will enable a constant water volume during different weather conditions.
- Development of a closed cage with a volume change of less than 10 % during different weather conditions.
- Development of a water treatment and control unit that will ensure optimal water quality with a change in oxygen level of less than 10 % compared to target setting during the day and a daily temperature fluctuation of less than 0,1 degree C and less than 1 % change in salinity level.

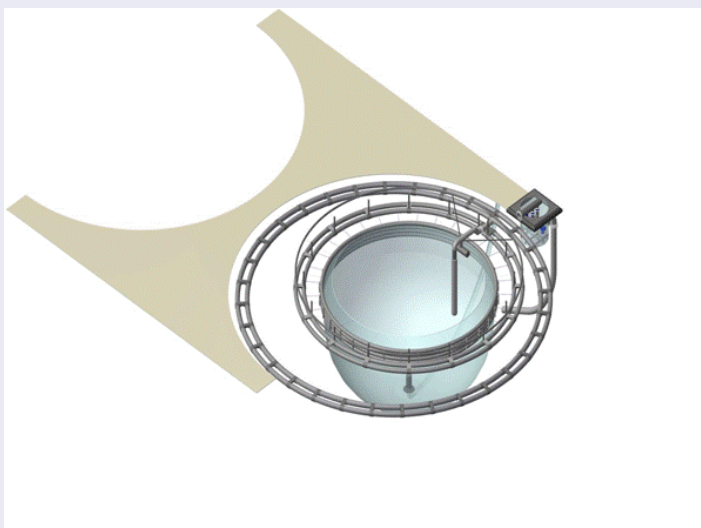
## Key New Knowledge Expected

### ClosedFishCage prototype 1

is a closed and sea-based innovative fish farming cage with the objective of increasing the production rate, producing healthier and better quality fish and having a lower environmental impact.

Combining closed and sea-based cage technology will among others have the following benefits:

- lower production costs per kilo fish
- cheaper cage facilities
- advantages of scale
- higher oxygen levels
- higher sanitary conditions with among others more efficient waste dispersal
- superior growing environment due to among others greater water exchange
- preventing release of spawning products from farmed fish
- preventing exchange of pathogens and parasites between wild and farmed fish



### Innovative elements

- a very durable and flexible polymer plastic net pen,
- a predator guard,
- a control system,
- easy set-up and replacement of damaged cage parts.

## Potential Impacts

The technological solutions involved in the sea-based cage will preserve advantages of land-based fish farming while at the same time take advantage of the cost efficiency of seabased fish farming. Furthermore, the new cage system will be both substantially more cost-efficient and also more environmentally friendly than existing fish farming technologies. Consequently, ClosedFishCage will result in the development of new, more appropriate technology enabling increased use of sea-based fish farming and thus also greatly improve possibilities of fish farming technology.



### SME

- Improved cost efficiency of sea farming.
- Highly reduced investment cost
- Reduced operating expenses

- Less use of drain and pipes
- Reduced volume changes
- Improved waste management



#### **Environment**

Improved security and prevention from escapees, lessen environmental impact of marine aquaculture.

- Escape safe
- Sea lice safe
- Reduced algae risk
- Reduced infection risk
- Improved feed control, no loss in currents and less environmental pollution



#### **Society**

Ensure sustainable production of good quality fish.