

New Norwegian-produced fish welfare technology is now in commercial production

August 30 2012, by Torkil Marsdal Hanssen



New Norwegian technology can now provide precise measurements of conditions in the sea cage. Photo: Institute of Marine Research

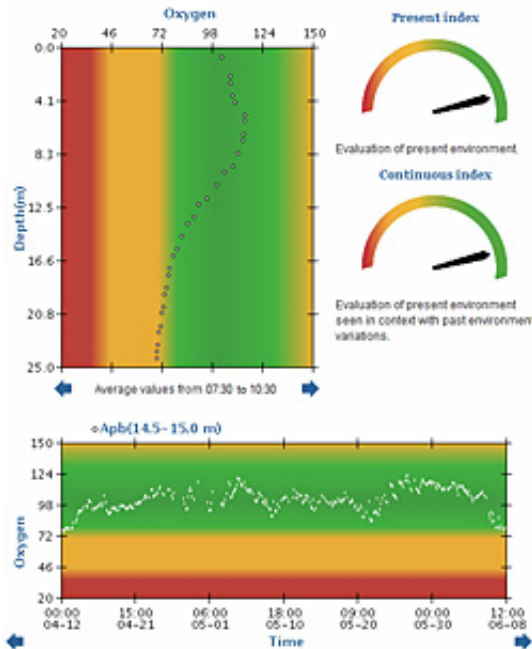
In 2009, researchers from the Institute of Marine Research (IMR), the Norwegian Institute of Food, Fisheries and Aquaculture Research (Nofima) and the University of Oslo began refining, integrating and testing new technology for monitoring the environmental conditions in salmon cages.

A sturdy monitoring device placed inside the cage transmits continual readings from different water depths via the [mobile phone network](#) to a database for automated analysis. This data gives a fish farmer a complete picture of how his salmon are thriving, online and in real time. Today's cages can be as deep as 30 m or more, so an overview of fish welfare is next to impossible without an automated monitoring system.

How it works

A control unit buoy floats in the centre of the cage. At regular intervals, the unit automatically lowers a profiling probe to the depths of the cage to measure temperature, dissolved oxygen, salinity, chlorophyll (fluorescence) and suspended solids in the water (turbidity). A second probe measures incoming [seawater](#) quality and current speed.

To assess the [environmental conditions](#) the fish are actually experiencing and how they are reacting to variations in these conditions, an [echo sounder](#) was developed to record fish density at various depths in the cage each time a water profile is taken. The researchers have even developed instruments that provide detailed data on the breathing patterns of the salmon to indicate [stress levels](#).



A speedometer-type reading of fish welfare makes it simple to monitor environmental conditions in the cage. Screenshot: www.imr.no/welfaremeter

The data from the environmental measurements, fish positioning and stress levels are collated and analysed in models also developed by the researchers. The data are displayed in colours and graphs, or can be viewed on the Welfaremeter, which resembles a speedometer.

Vital feedback

"Assessing fish welfare accurately requires knowing the water conditions down where the fish actually are," explains researcher Lars Helge Stien of IMR.

"We know that [water conditions](#) can vary greatly at different points within a cage, which single-point measurements do not detect. For example, in-cage oxygen saturation could be at a dangerously low level

even when the dissolved oxygen reading just outside the cage is 100 per cent."

The new tools provide a far more accurate picture than was previously possible, making it easier to detect the causes of stress reactions, disease outbreak, increased mortality or appetite loss.

"This technology will enable producers to optimise fish welfare and thus optimise both salmon production and profits," concludes Stien.

Two probe units were purchased by Norwegian producers during the development phase. The first commercial-series units, all of which have been ordered by Chinese producers, are now being manufactured.

Facts about the WELFARE-TOOLS project

When fish thrive, they grow faster and are more disease-resistant and less stress-sensitive. The objective of the project "New tools for online overall assessment of rearing environment, stress level, and fish welfare in Atlantic salmon cage farms (WELFARE-TOOLS)" was to develop technology for a comprehensive monitoring system to ensure the well-being of farmed salmon in their cages.

Provided by The Research Council of Norway

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