MARINE RESEARCH NEWS

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New technology for sustainable aquaculture

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Salmon lice larvae have evolved to position themselves in the upper part of the water column to increase encounter probability with potential hosts. Keeping farmed salmon in the deep is therefore a way to reduce sea lice infestations.

SUBMERGED SEA CAGES

Submerged sea cages are in their simplest form standard sea cages with a roof sewn into the net keeping the salmon below a given depth. But they add additional welfare challenges for salmon which has a physostomous swim bladder and therefore must go to the surface to gulp air to refill and maintain buoyancy in the deep. Experiments at IMR's research station in Matre have shown that providing the salmon with an air-pocket functions well.

SNORKEL SEA CAGES

Snorkel sea cages or Tubenot™, are standard sea-cages with a net roof that keep the salmon deep in the water, but instead of an air-pocket, the salmon have access to the surface via an enclosed lice-proof tarpaulin tube ("a snorkel", Figure 1). Experiments at IMR's research station at Austevoll have shown a clear relationship between roof-depth and lice infestation levels. A commercial case study of snorkel sea cages showed that 10 meter deep snorkels reduced new sea lice infestations by 84%, and total lice control cost by 29%.

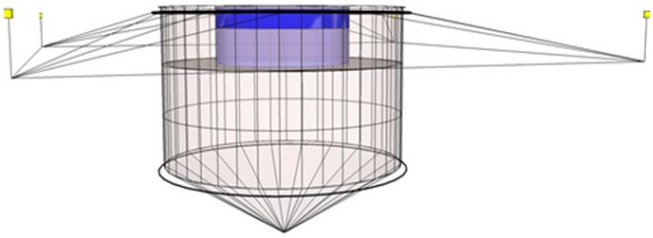

Figure 1: Snorkel sea cage, or Tubenot™, is now a commercial product by Egersund Net ASA. The technology is being tested out under commercial conditions in cooperation with Bremnes Seashore ASA and the Institute of Marine Research.

ECHOFEEDING

Waste feed is a lasting problem in open sea-cage farming of salmon, and most farmers rely on tedious visual observations for feeding control. Hydro-acoustics are very suitable for objective assessment of fish feeding response, provide historical data and require minimum of maintenance as biofouling is prevented. In short, Echofeeding consists of an upward-facing echo sound transducer

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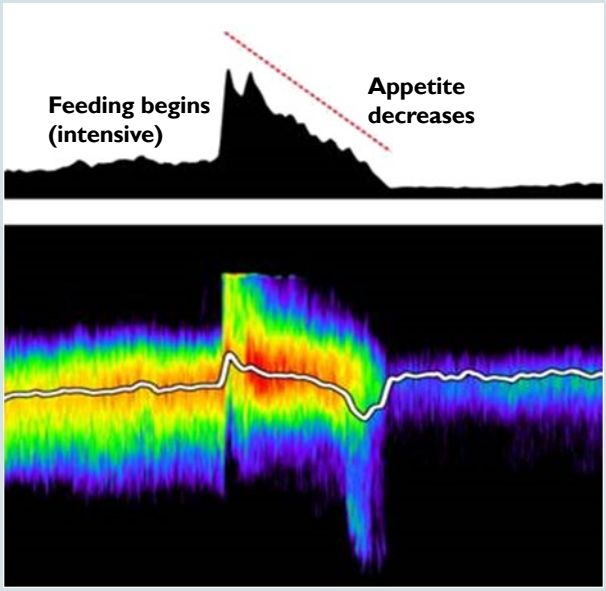


ECHOFEEDING

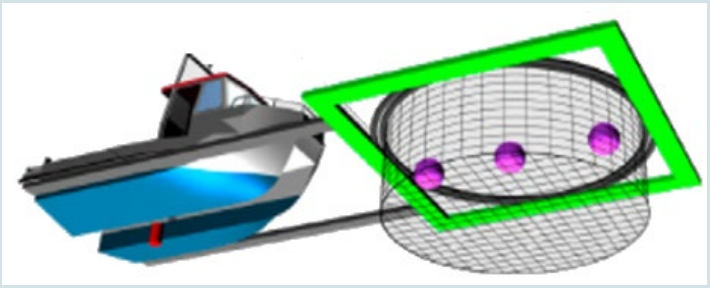
Figure 2: Upper panel: Total echo strength in the feeding area. Lower panel: Vertical distribution of biomass in the feeding area (black indicates zero and red indicates high) (Data from NFR project 267815).

which monitors fish density within a defined feeding area, and via the echo sounder continuously transmits data to a computer program which calculates fish biomass in real time (Figure 2). Based on pre-programmed biomass limits, the software judges whether to continue or stop feeding. The method is currently being tested and documented in cooperation with CageEye AS.

SFI EXPOSED AQUACULTURE OPERATIONS

Utilization of more exposed farming sites require knowledge of fish coping ability with higher water current speed and stronger waves. This is the focus of Project 5 in the Centre for Research-Based Innovation for Exposed Aquaculture Operations (NFR-SFI 237790). Tests performed in a large swim tunnel show that salmon swimming capacity and the physiological cost of swimming activity varies extensively with fish size, acclimated temperature, AGD infestation level, and water oxygen and salt content. Using an experimental push-cage (a sea cage pushed in front of a boat, Figure 3), the current speed tolerance and behavioural strategies at group level are investigated in group sizes and environmental conditions relevant for farming. Results from the push-cage confirm observations made at exposed farming sites.

Figure 3: Conceptual drawing of the push-cage setup.



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