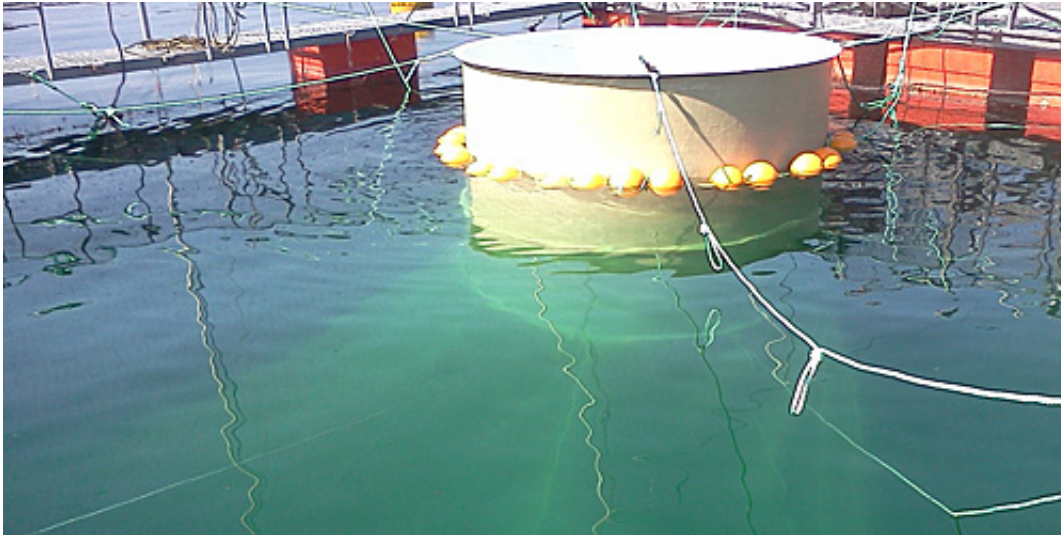


New technology can prevent salmon lice

May 28 2014, by Torkil Marsdal Hanssen And Else Lie



The snorkel cage is adapted to the salmon's natural behaviour and may be suitable for use in most fish production facilities. Credit: Havforskningsinstituttet

The battle against salmon lice is being waged on many fronts, including the technological front. Simple and advanced solutions alike can be effective.

Breeding Director Petter Arnesen at Marine Harvest, the world's leader in the production of [farmed salmon](#), singled out the salmon louse as the greatest threat to the salmon industry when he spoke at the HAVBRUK Conference 2014. Together with salmon farmers and the supplier industry, researchers are hard at work trying to develop technology to

prevent salmon [lice infestation](#).

Snorkel cages

As salmon lice larvae primarily live at shallow depths, it may be possible to keep the parasite at bay by placing net cages below the "louse zone". The problem with this solution is that salmon need access to air to fill their swim bladder.

One innovative approach to the problem is the snorkel cage, developed by researchers from the Institute of Marine Research (IMR) and the University of Melbourne in cooperation with Egersund Net. At a depth of 3–4 metres inside the cage, netting is used to form a ceiling and a central cylindrical passage that extends above the surface of the water. This snorkel is covered by a tarpaulin or plankton cloth, securing a lice-free water passage through which the salmon can swim up to the surface to gulp some air.

Frode Oppedal (IMR) has headed the project as part of SFI CREATE in Aquaculture Technology, a centre for research-based innovation under the Research Council of Norway, hosted by SINTEF Fisheries and Aquaculture.

"This method is extremely promising. It is a preventive, non-chemical approach adapted to the natural behaviour of the salmon and may be suitable for use in most [fish](#) production facilities," Dr Oppedal states.



Salmon lice infiltration within a closed system is not likely to lead to propagation or outbreaks among the fish, according to researchers. Credit: Sjøla Foto

The IMR has developed and tested prototypes in the summer and has seen the incidence of salmon lice decrease by 80–84 per cent. Autumn lice counts of harvest-age fish showed as much as a 72 per cent decrease in the quantity of salmon lice in snorkel cages compared with open systems in use today.

Trials to be carried out this summer

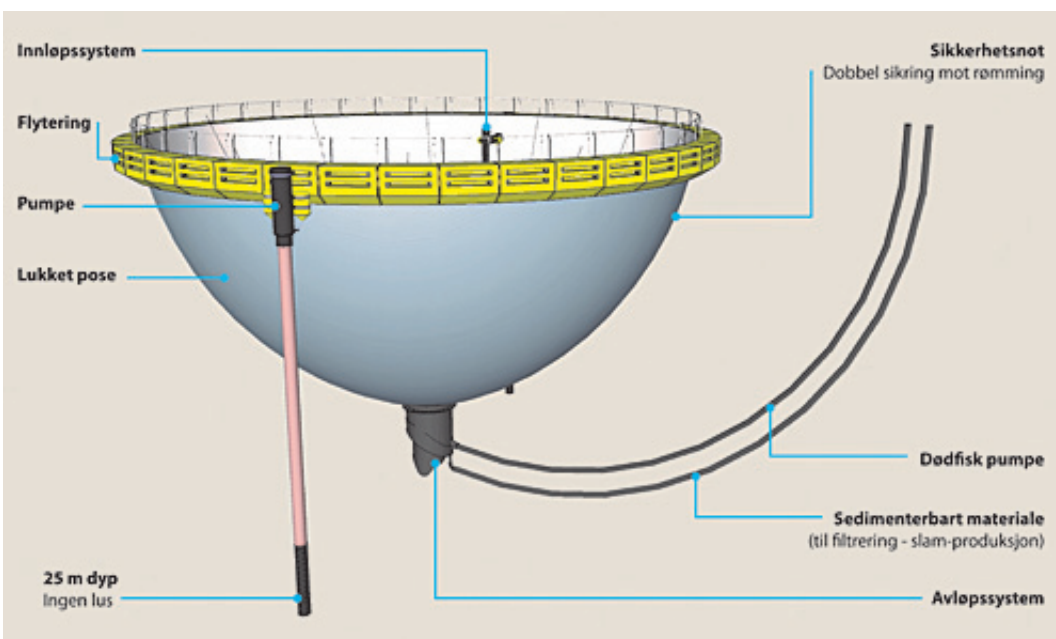
"Appetite levels, behaviour, growth rates and health measurements among large fish were all close to the norm for fish raised in commercial densities. The mortality rate for small fish in the snorkel cages was lower and there were fewer runts than in the control cages," explains Dr Oppedal's research colleague, Lars Helge Stien.

Fish producers in the southwest of Norway will be testing out ten full-

scale (160-metre) snorkel cages from Egersund Net at two sites.

"We are going to record salmon lice numbers as well as the behaviour of the salmon and the fish producers will be gaining experience on how to operate the snorkel cages," Dr Oppedal says. He is currently preparing a new experiment to record growth rates and behaviour for the fish and to measure the quantity of salmon lice and the production efficiency with the snorkel down to a depth of 16 metres. The goal is to find out whether it is possible to establish a lice-free zone where the salmon can still thrive.

Skirts and closures



Conceptual draft of a closed cage. Credit: Akva Design AS

The Norwegian Veterinary Institute, the University of Nordland and the International Research Institute of Stavanger (IRIS) have been following

the production of salmon together in three successively developed versions of closed tarpaulin systems. By placing cages at depths of 25 metres or below it is possible to keep the fish free of lice throughout an entire production period even in areas with high pressure of infection by lice and strong currents.

"Three rounds of experiments have been carried out without any salmon lice present – except on those occasions when we have transported fish by well boat. Surface water with salmon lice likely entered into the cage during the process. But the numbers of salmon lice decreased quickly afterwards. Salmon lice that infiltrate a closed cage do not seem to have much success at propagating or causing an outbreak within the facility," states Arve Nilsen of the Veterinary Institute.

Tests of fish welfare and water quality show that closed cages may provide benefits in terms of both the health and the quality of the fish as well as certain challenges compared with the open systems commonly in use. The risk associated with the closed-cage technology is related to extreme conditions and must be countered through redundant technological security systems and thorough operational monitoring and follow-up.

SINTEF Fisheries and Aquaculture is working together with suppliers and fish producers on quantifying currents in and around the cages as well as the marine forces fish production facilities are exposed to when using a permanent skirt as a louse shield surrounding the cage.

To study water currents, a tarpaulin stretching from the floating collar down to a depth of 5 metres is mounted on a commercial production cage. Forces and currents have also been studied using model-scale tests and simulations. This knowledge will now play a key role in future mooring analyses and when designing the size of closed and semi-closed floating production systems.

Provided by The Research Council of Norway

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