IN AQUACULTURE, WAVES OF CHALLENGE AND SUCCESS

Limited availability of sheltered sea areas may force salmon farmers to take their cages offshore—in the process raising product quality through higher water renewal rates, according to the Aquaculture Research Station of the Faroes.

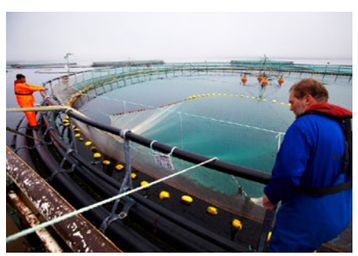
MARIA OLSEN

Managing Director Kristian Petersen; Surveying a fish farm (opposite, bottom); Inspecting salmon for sea lice (bottom right).

WHAT DOESN'T kill you makes you stronger. That old saying has, if anything, long applied to the situation of the Faroese fish farming industry. Less than a decade ago, things didn't look rosy for an industry beset with fish health problems and plummeting profits. The cure came through tougher legal and regulative environment combined with industry consolidation.

Years later, the big success story is making a new set of challenges appear on the horizon. As statutory requirements put strict limitations on the use of sea areas for aquaculture to minimize pollution on the seabed and prevent disease from spreading between fish farms, production of Atlantic salmon could be about to hit a ceiling.

But again, the Faroese are not taken by surprise by the specter of a space crunch. Accordingly, Fiskaaling—the Aquaculture Research Station of the Faroes—is heading two scientific research projects aimed at determining the viability of moving fish farms further out to sea. While one of the two projects is focused on how to optimize fish farming equipment for weather and sea conditions offshore, the other will look into how offshore aquaculture affects the micro environment of fish farming nets as well as fish behavior, fish health and fish welfare.



Both projects are related to other research projects that Fiskaaling participates in, one of which concerns ecological ways to combat sea lice in fish farms, while another is about mapping and simulating the movements of waves and currents in the sea around and among the Faroe Islands.

"The thing is, offshore can be a very different place compared to inshore," said Fiskaaling managing director Kristian Petersen. "This may seem more or less obvious when it comes to sea and weather but in the context of moving fish farms further out to sea, there are a number of industry relevant questions to investigate in detail. For example, to what extent will standard equipment work out there—will it withstand the enormous forces applied to it in the winter? And how about the fish, how will they react to an environment that differs from that of fish farms in more protected areas?"

"The enquiry is quite simple," Mr. Petersen added. "It's about whether it's possible for the Faroese aquaculture industry to expand in the future. So we expect from the project to gain the ability of making a specification of requirements regarding the sort of equipment that will be needed for offshore fish farming in the Faroes."

As part of the project, two fish farming cages will be placed out to sea during this summer, complete with cages, nets, mooring systems and more along with load cells and other measuring tools—however, containing no fish.

LUMPFISH AGAINST LICE: While undeniably, there will be logistical drawbacks associated with keeping fish farms further out to sea, the advantages that come with higher rates of water renewal and lower frequencies of sea lice infection shouldn't be underestimated: reduced delousing costs plus increased competitiveness through improved product quality.

As it turns out, the Faroese aquaculture industry is ahead of its competition when it comes to fish farming in a rough natural environment.

"Other countries have large sheltered sea areas with 2.5m waves seen as extreme conditions for testing equipment," Mr. Petersen said. "In the Faroe Islands, 5m in the winter is not unusual in the fjords and we also know that the equipment used here does withstand such conditions. What we are doing now, however, is raising the bar further by going offshore while nonetheless staying in relatively shallow waters."

Among the questions: Will increased water renewal rates influence the marine environment such as to reduce the risk of pollution, improve fish health, or make salmon less affected by sea lice?

Meanwhile a new weapon designed to keep down the parasitic population infesting farmed salmon has emerged: lumpfish *(Cyclopterus lumpus)*, a promising cleaner fish that seems to thrive on eating sea lice off the back of Atlantic salmon.

Said Regin Arge, a PhD student at Fiskaaling: "We have established best practices for the entire process from hatching lumpfish eggs, to growing larval fish to fry, juvenile and adult. The idea is to introduce a good number of lumpfish into fish farms but first we need to identify the right type of lumpfish individuals. Because these fish are highly individual and some are found to be just as interested in salmon feed as in sea lice. So we will use DNA selection to sort that."

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Fiskaaling — Aquaculture Research Station of the Faroes — seeks to provide an active research environment in order to improve the knowledge base and help ensure the quality of aquaculture.

In our focus on international research we collaborate with other research institutions, domestic and foreign, and work closely with the fish farming industry.

Examples of current projects:

- Proteoglycans (PGs), glycosaminoglycans (GAGs) and collagen in the connective tissue of fish muscle;
- The effect of fish protein/peptides on blood pressure;
- Controlling plankton production in basins/ponds;
- Genetic studies of Faroese cod stocks;
- Open ocean fish farming;
- Quality of aquaculture products and feeds;
- Resuspension of sediments impacted by fish farm wastes.