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Intelligence

Alternative feeds, sea lice solutions and animal welfare innovations for aquaculture addressed in Bergen

11 March 2025

By Bonnie Waycott

Addressing salmon aquaculture's primary challenges and opportunities, a call for collaboration emerges at the North Atlantic Seafood Forum

Addressing aquaculture's top challenges and opportunities, a call for collaboration emerges at the North Atlantic Seafood Forum in Norway. Photo of a monkfish in a Bergen seafood market by Jamie Wright.

With sustainability, innovation and collaboration at the forefront, industry leaders, experts and stakeholders gathered in Bergen, Norway, for the 2025 North Atlantic Seafood Forum (NASF).

Over three days, discussions tackled the most pressing challenges and opportunities in aquaculture, from open-net salmon farming and animal welfare to the future of aquafeed ingredients and cutting-edge technologies. *Advocate* correspondent Bonnie Waycott captured the key takeaways from the event, offering insights into the strategies and innovations shaping the future of seafood.

Innovation and technology: Keys to open-net salmon farming

This year's conference opened with discussions on addressing the challenges of open-net salmon farming through technology, best practices and innovation. Oyvind Oaland, Mowi's chief of farming operations in Norway and Iceland, kicked off the "Cage Talk" session by highlighting the important role of post-smolt production in improving survival rates, animal welfare and overall productivity.

"Post-smolt strategies reduce the time and risk at sea, reduce the need for sea lice treatment and enable strategic stocking and adaptation to biological risks, while increasing site capacity and survival," he said.

Oaland also outlined the next phase of Mowi's post-smolt strategy and expansion plans in Norway. These include four projects involving the expansion of existing post-smolt and RAS sites, and the increase of total post-smolt numbers by another 20 million. He also introduced Mowi 4.0 Smart Farming, a plan to boost efficiency through digitalization and automation, including the implementation of remote operations centers, automatic feeding and real-time monitoring of biomass, sea lice and growth performance. Hopes are high that this will significantly impact how Mowi operates.

"We want to improve performance metrics, enhance knowledge generation and improve biological understanding," said Oaland.

Agreeing that innovation and technology can drive sustainable growth, Harald Takle, head of strategy and seawater innovation at Cermaq, believes that open-ocean salmon farming will remain important, but the speed of its development depends on various factors, including advancements in technology. He shared Cermaq's work use of 50-meter-deep skirts in Tofino, Canada, to address sea lice, and described how laser technology in Norway has proven to be an effective sea lice control mechanism, minimizing the need for treatments while enabling better documentation of fish welfare and growth.

"We successfully reduced the number of cage treatments by 17 percent from 2023 to 2024 despite higher-than-average sea temperatures," he said. "Meanwhile, sites with 100 percent coverage of two to three lasers per cage reduced treatments by 80 percent."

Takle also touched upon the importance of full collaboration.

"We must work closely with authorities to establish further regulations toward sustainable growth, and develop science-based, objective knowledge to address challenges by working with researchers and academia," he said. "We also need skilled engineers, academics and more to drive ocean innovation systems that support salmon sector growth. Norway is a good example of this, with a strong innovation system already in place, strong and relevant academia and supportive policies for viable communities along the coast."

Håkon Husby, head of IR at SalMar, explained the need to determine salmon farming site characteristics including oxygen, salinity, sites, benthic impact, temperature and wave height, as these will tell salmon farmers which technology is best suited to a site and how they can be used most effectively.

"We need a knowledge base in order to get the best results by using the best and most suitable technology," he said. "Best results include reduced treatment and mortality, improved quality, increased volume and reduced costs. New knowledge leads to new technology, which becomes a catalyst for further sustainable growth. It is our responsibility to create and drive innovation and make investments to move ahead."

Working together means achieving much more in a smaller timeframe.

Fish feed and nutrition: Cornerstones of better fish health

Aquaculture feed was another hot topic, with Sigve Nordrum, CCO at Aker QRILL Company, outlining health issues facing the salmon farming sector, from gill disease and wounds to sea lice and winter ulcers. He made clear that good nutrition is the key to preventing negative impacts.

Ester Santigosa, global innovation lead at DSM-Firmenich, also stressed the possibility of improving fish health through nutrition. She explained the positive role of functional feeds in reducing oxidative stress and inflammation and boosting immune function. Functional feeds can also strengthen tissue structure and enhance mucus production, she said, providing fish with more robust defence mechanisms, while the right level of vitamins in feed can go far to improving skin health.

“Always keep the animal at the core of your decisions,” was her take-home message.

Microalgae: Addressing volatility in the fish oil market

The fish oil market is facing growing uncertainty, according to Douglas Martin, founder of MiAlgae, which produces the omega-3 powder NaturAlgae for aquafeed. Global fish oil production fell by 21 percent compared to the previous year, while European output has remained low through 2024. “Is this increased variability a new normal?” he asked. And if so, “how can it be addressed?”

“The availability of omega-3s amidst increasing uncertainty in the fish oil market, and flat fish oil production, is a barrier for salmon farming,” said Martin. “However, omega-3 from microalgae could address this. Microalgae has enabled the aquaculture industry to grow responsibly and reduce its reliance on forage fish. It has the potential to reduce the impacts of the peaks and troughs of fish oil production and pricing.”

Brett Glencross, technical director at IFFO, explored evolving trends in marine ingredients usage, highlighting a growing emphasis on the strategic value of feed ingredients. Over the years, broader assessments have shaped how these ingredients are utilized, driving a stronger focus on sustainability. This shift includes developing more quantitative and transparent evaluation methods, raising the value of these assessments.

“Sustainability is a journey, not a destination, while there is no such thing as the perfect feed ingredient,” he said. “Better appreciating the positives and negatives of any ingredient makes it possible to increase adaptability in responding to the various opportunities.”

Alternative markets: The need to source EPA and DHA

The session *Feed Futures: Markets for Algae and Insects* focuses on a key challenge – creating markets for alternative feed ingredients, such as algae and insects. Panelists explored how the salmon farming sector could build such markets, a critical step to ensuring that new, commercially viable solutions can be delivered at scale.

Håvard Walde, general manager at Skretting, touted the vital relationship between fish farmers and feed suppliers, which fosters predictability and enables long-term decision making. This collaboration is critical in tackling the most urgent bottleneck when it comes to feed: securing a stable supply to EPA and DHA nutrients and the need to source these from alternatives such as algae.

Meanwhile, Norway's salmon farming sector is actively working to diversify its roster of feed ingredients, said Kristin Hurum, HR, sustainability and quality director at Cermaq. With challenges ranging from scalability and market barriers to geopolitical upheaval, she agreed that relying solely on forage fish for EPA and DHA is no longer a viable option.

"And yet, these, and omega-3s, are essential for fish health, and salmon actually *need* omega-3s for health," she said. "In this sense, we must broaden our raw material basket and build on the use of novel ingredients. How can we do this? Collaboration. Collaboration across the value chain, from farmers, retailers and feed suppliers to raw material suppliers, processors and consumers."

Introducing the Aquafeed Initiative – a French retail industry initiative established in 2021 – Marco Custodio, project manager at consultancy the Earthworm Foundation, emphasized the importance of understanding consumer attitudes toward alternative ingredients prior to market creation.

"The Aquafeed Initiative brings together retailers and industrials, coordinated by the Earthworm Foundation, to ensure the supply of farmed fish fed with responsible aquafeeds," he said. "A key objective is to reduce dependence on fishmeal and fish oil. However, European retailers are not supporting the use of alternative ingredients due to concerns over potential consumer rejection. There is a lack of data on consumer attitudes, but this is essential to better understanding how new markets can be created."

Custodio described the Earthworm Foundation's consumer surveys in France, underscoring the need for stronger value chain collaborations in the salmon farming sector. He emphasized the importance of integrating alternative ingredients into industry policies, conducing more consumer studies to align with market expectations and improving transparency and communication with consumers.

A reliable market provides consistent volumes at a stable price, without exposure to volatility, concluded Gertjan de Koning, CEO at Veramaris. The platform for decision-making on alternative ingredients is already in place, added Walde, while Hurum stated that "a commitment to alternative ingredients gives us more options amidst market volatility. This is key to stable feed costs and a regular supply."

GreenFish wins the NCE Seafood Innovation Award

Icelandic AI research and deployment firm GreenFish was named the winner of the annual NCE Seafood Innovation Award. Its software tool uses artificial intelligence (AI), big data analytics, supercomputing and satellites to predict the location, quantity and quality of both pelagic and bottom fish species, with an eight-day forecast period. As a result, it reduces carbon footprint, increases the value of catch and reduces discard by guiding fishing vessels to the most economical fishing zones.

“Fishermen rely on experience and historical catch data to find fish,” said Sveinn Sigurður Jóhannesson, who founded GreenFish and ideated the tool. “However, this requires a large amount of fuel and releases a lot of carbon emissions, while catching unintended species or undersized fish leads to discarding.”

Jóhannesson aimed to address the lack of technological development in Iceland’s fishing industries and offer a solution specifically designed for captains. His goal was to offer a practical and user-friendly tool that enhances decision-making and boosts overall efficiency.

“It is an immense honor for us to receive the 2025 Seafood Innovation Award,” said Jóhannesson. “Our tool is essential for better decision-making and should be standard for all fisheries decision makers.”

Better animal welfare: Building trust and collaboration

The salmon farming sector faces rising demand, stricter regulations and scrutiny over sustainability. Ensuring long-term stability hinges on prioritizing animal welfare, said Geir Fuglerud, CEO of supply chain and product assurance at DNV, as he kicked off the session Salmon Summit: Salmon Welfare in Aquaculture. With significant pressure from climate change and negative public perceptions of salmon farming, advancing fish health and welfare must be at the cornerstone of future developments.

“To maintain social licence to operate, industry must demonstrate tangible improvements,” he said. “Trust from consumers, regulators and investors is key and fish health and welfare is at the heart of the trust equation.”

Prioritizing animal welfare is key to the long-term success of the salmon farming sector – but has fish health and welfare been sacrificed on the road to success? Edgar Brun, academic director of Fish Health and Welfare at the Veterinary Institute, posed this question as he opened the first panel, An Industry at Risk.

He warned that while increased productivity may bring financial gains, it comes at a cost if animal welfare declines or mortality rates rise. Too often, the industry focuses on addressing signs rather than addressing root causes. Future growth, he emphasized, must be grounded in a deeper understanding of salmon biology. After delivering a blunt assessment on the state of salmon health, Brun called out poor crisis management in the sector and a reluctance to engage with critics.

Panelists shared their views, with collaboration a key message. Bård Skjelstad of the Norwegian Food Safety Authority stressed that despite the challenges, good welfare is the only option.

“We need to understand what is going on in terms of welfare and put this into work, but not in a small, adaptive way,” he said. “We need to be ready for major changes and make a commitment to adapt. Meanwhile, some applications can be narrow in what they address, but we can all work on this together to make them more broad.”

Looking ahead, Tonje Osmundsen, research director at NTNU Social Research, is optimistic about fish welfare.

“It will look a lot better, but we must work closer together with regulatory authorities and look at internal operations in production,” she said. “We must also remember that farmers’ perceptions differ from those in the board room. I hope that in future this gap will close. Having said that, I believe that aquaculture is ready to take this seriously.”

During the second panel discussion, Sustainable Growth through Industry Change Management, Hilde Talseth, CEO of leading broiler chicken producer Norsk Kylling, echoed Osmundsen's view that farmers – who interact daily with the animals – are the true experts in identifying health and welfare issues firsthand, so building trust with them is key. Skjelstad added that the salmon farming sector must also foster greater collaboration to drive meaningful progress.

"There is still some competition and sometimes sector players are not learning from one another so in this sense more needs to be done," he said. "Technology can also play a key role in solving the challenges, but there are regulatory barriers, so the sector needs to engage in and encourage proper projects, not restrain them."

"Working with marine institutes and food safety authorities is key," added Sondre Eide, a third-generation fish farmer and CEO of Eide Fjordbruk. "Working together means achieving much more in a smaller timeframe."

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Correspondent Bonnie Waycott became interested in marine life after learning to snorkel on the Sea of Japan coast near her mother's hometown. She specializes in aquaculture and fisheries with a particular focus on Japan, and has a keen interest in Tohoku's aquaculture recovery following the 2011 Great East Japan Earthquake and Tsunami.