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Responsibility

Novel chemical-free approach could create a circular model for treating aquaculture waste

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By Responsible Seafood Advocate

Initiative could open up a new avenue for seafood producers to deal with aquaculture waste in a more circular way

A novel chemical-free approach to treating aquaculture waste could see co-products returned to the sector to fuel the growth of ocean life such as marine worms and seaweed.

Led by researchers at the Scottish Association for Marine Science (SAMS), with funding support from the Sustainable Aquaculture Innovation Centre (SAIC), the initiative could open up a new avenue for seafood producers to deal with waste in a more circular way. Scottish Sea Farms, water technology supplier Power and Water, and waste services company Tradebe are also supporting the research.

While most waste from aquaculture is already recycled, the results of this study could see byproducts being repurposed within the farmed salmon sector, including as a protein-rich feed ingredient.

“Aquaculture waste is not typically considered as valuable as co-products from other sectors, but there



Dr. Georgina Robinson, lead researcher and UKRI Future Leaders Fellow at SAMS, holds a polychaete. Photo courtesy of Sustainable Aquaculture Innovation Centre (SAIC).

is a range of opportunities to be explored that could change that attitude,” said Dr. Georgina Robinson, lead researcher and UKRI Future Leaders Fellow at SAMS. “By taking a circular approach, we can use the co-products to aid the growth of other organisms that will, in turn, benefit the sector as a sustainable feed ingredient. This is the first time the water treatment system has been used for freshwater waste and the results of the project could show huge potential for it to be adopted more widely.”

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Water treatment equipment designed and supplied by Power and Water will be used at Scottish Sea Farms’ Barcaldine Hatchery near Oban for the duration of the project. Using an electrochemical process and ultrasound technology, it will first extract excess water from waste matter before the remaining nutrient-rich material is fed to marine worms – or polychaetes – to boost their growth.

“Re-purposing fish waste into valuable byproducts is a core part of our day-to-day operations at Barcaldine Hatchery,” said Ewen Leslie, head of freshwater engineering and project lead at Scottish Sea Farms. “This new collaboration has the potential to build on this by diversifying and growing the range of byproducts that can be delivered.”



Polychaete worms reduce waste, provide food in aquaculture

Adaptable and diverse, polychaetes can adapt their feeding behaviors to environmental conditions. *Nereis diversicolor*, a marine polychaete that can tolerate wide temperature and salinity ranges, is a good candidate for RAS enhancement.



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A second stage of the research involves assessing the nutritional profile of the worms, including protein and fatty acids, to gauge their suitability as an aquaculture feed ingredient. Polychaetes are already used in seafood production as a key feed source for shrimp at the breeding stage, and other studies have explored their role in terrestrial animals' diets. The remaining wastewater will then be filtered further using natural seaweed to absorb any nitrogen and phosphorous.

The final stage of the research includes an assessment of the environmental impact and mitigation of greenhouse gas emissions, with the new approach compared to existing waste disposal methods. Liquid aquaculture waste is transported and spread to land in rural locations after treatment.

SAMS plans to bring the circular concept to the market under a spinout, called N-ovatio-N, early next year.

“This project is about tackling the sector’s waste at the source and creating a viable, circular model,” said Heather Jones, CEO of SAIC. “In addition to the environmental benefits, it will demonstrate some of the higher-value commercial possibilities for co-products. By supporting and encouraging collaborative research initiatives like this, we can minimize the environmental footprint of aquaculture while also boosting its economic impact.”

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