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UKRI Biotechnology and Biological Sciences Research Council

ROSLIN INNOVATION CENTRE

Developing AI-Powered Closed-Loop Aquaculture to Replace Imported Tropical Seafood with Sustainable, Locally Produced Fish in Temperate Climates

Raygonal Ltd

Raygonal Ltd is a cutting-edge aquaculture technology company developing AI-driven, automated, renewable-powered systems for sustainable local production of tropical seafood. Founded by a University of Edinburgh alumnus, the company aims to reduce reliance on long-distance imports by enabling tropical fish to be raised efficiently in temperate climates. Its modular land-based aquaculture system supports scalable, low-carbon production with minimal environmental impact.

Based at the Roslin Innovation Centre Field Station, Raygonal benefits from access to land, waste-handling capacity and power infrastructure, essential for enabling rapid development, testing and refinement of its innovative aquaculture technologies

Global aquaculture expansion has intensified pressure on marine ecosystems, wild fish stocks, and long-distance supply chains. In the UK, most tropical seafood is imported from overseas, generating significant carbon emissions, increasing costs, and exposing consumers to supply instability. Traditional aquaculture systems cannot sustainably raise tropical species in Scotland due to high energy demands, limited environmental control, and disease risks. The challenge is to create a viable method for producing tropical fish locally, sustainably, and economically. The objective is to develop a land-based, AI-driven, closed-loop aquaculture system that enables efficient, low-carbon cultivation of tropical species, reducing import reliance and strengthening Scotland's food security.

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The **Campus Innovation Award (CIA)** funded a proof-of-concept project to support the development of an AI-driven, cleantech aquaculture system designed to enable cost-effective, local, and sustainable production of tropical seafood in Scotland. With global aquaculture demand surging and the environmental impacts of long-distance seafood imports increasing, land-based aquaculture systems addressed a key challenge: producing high-yield, antibiotic-free tropical fish in temperate climates using renewable energy, automation, and advanced environmental control. The technology aimed to reduce reliance on imported fish which previously travelled over 10,000 km to the UK, thereby cutting associated carbon emissions and strengthening local food security.

The project enabled the setup of a Tropical Seafood Facility at the Roslin Innovation Centre's field station, allowing the newly formed company to carry out early-stage proof-of-concept testing within the A3 ecosystem. This support accelerated technical development, reduced early financial risk, and positioned the company for a first-mover advantage in sustainable tropical aquaculture.

The project also benefited the Roslin Innovation Centre by securing a future tenant who would contribute to its expanding aquaculture cluster. It created a foundation for future collaboration with Roslin's aquaculture scientists and strengthened Scotland's capacity for sustainable seafood production, supporting national Net Zero ambitions and driving economic growth in rural areas.

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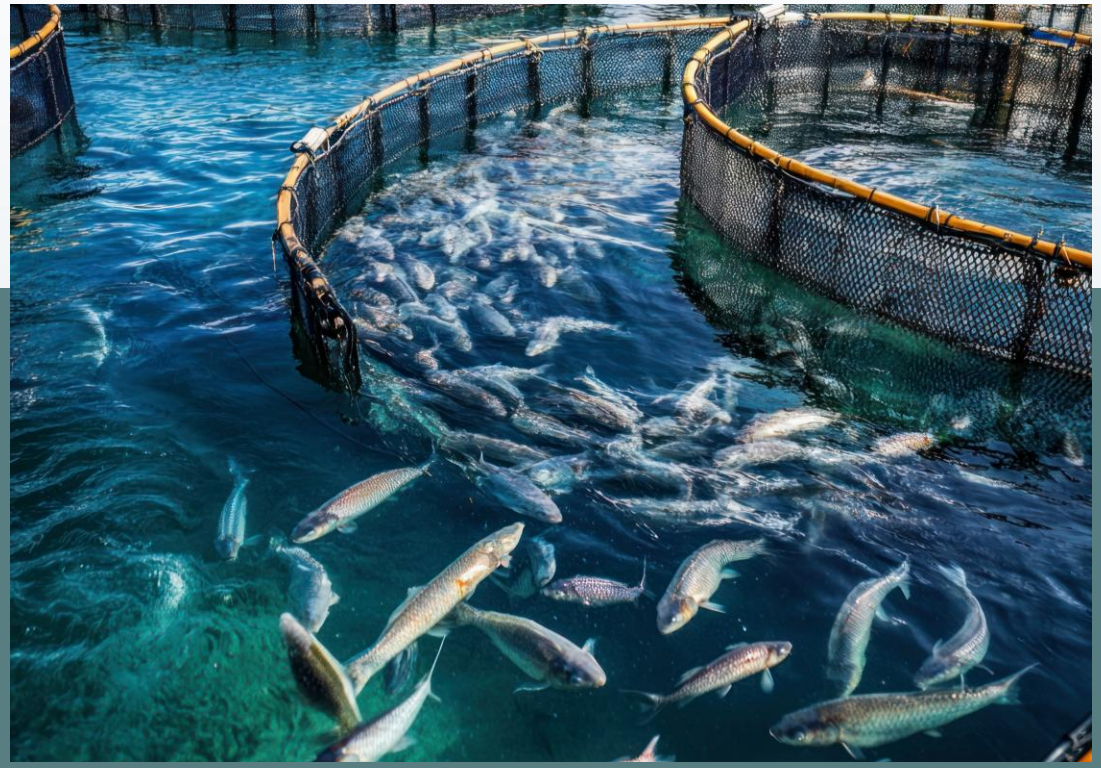

"The funding enabled us to establish our Tropical Seafood Facility, accelerate early proof-of-concept testing, and rapidly advance our sustainable aquaculture technology, significantly reducing risk and opening new opportunities for local tropical fish production."

Aliyu Dala, CEO and founder of Raygonal Ltd.