Blood test to detect fish stress

New methods of detecting stress in aquatic species could lead to better fish health and a more sustainable global aquaculture industry

Oceans Institute Member and School of Molecular Sciences postdoctoral research scientist, Dr Catherine Wingate has developed a non-lethal blood test to detect metabolic stress which can be used to monitor the health of aquatic species.

With the consumption of fish in our diets progressively increasing, aquaculture now accounts for more than 50% of the world's fish supply.

Aquaculture can allow us to reduce the number of fish removed from the oceans to meet increasing consumer demand, but there are challenges in the industry that need smart solutions. Farmed marine fish and shellfish species are at increased risk of health issues compared to their wild counterparts.

Inflamark technology developed at UWA is a metabolic stress detecting method. We have shown we can detect various stressors in fish and oysters.

Being able to reliably monitor stress levels of fish provides an early warning system which can be used to improve animal husbandry.

Converting Inflamark from a specialised research technique to a practical on field tool for use by the aquaculture industry will require further validation studies with the technology and a simplification of the blood collection process.

In concept research generously supported by the Oceans Institute's Ocean Supporters, Fisheries Research and Development Corporation (FRDC) and Department of Primary Industries and Regional Development (DPIRD).

> By detecting metabolic stress, we can develop an early warning system to assist the industry in managing their stock for optimal productivity and sustainability, while ensuring animal health and welfare
>
> *-Dr Catherne Wingate*

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Future research and applications for the technology

The aquaculture industry faces numerous challenges, including day to day stock management for optimal product quality and sustainable growth rates. Fish and shellfish are sensitive to pollution, pathogens, temperature variations, parasitism and various animal husbandry practices.

Catherine has discovered biomarkers for yellowtail kingfish, barramundi, rainbow trout and oysters, and validated the impact of temperature variations on all these species. Validation of nutrition alterations, bacterial infection, salinity changes and handling has been completed on some of these species. The method has shown to be sensitive, reliable and accurate in detecting metabolic health changes in fish and oysters.

> *This technology has the potential to fundamentally change the aquaculture industry so that it can work smarter and put less stress on the oceans.*

As a large proportion of aquaculture activity takes place in remote facilities and on offshore vessels, Catherine has undertaken work on a sample collection device to make the technology user friendly. The work, in collaboration with a UWA project, has developed a unique blood collection device that dries the blood in a specialised fixative allowing the samples to be transported at room temperature without loss of sample integrity.

DR WINGATE WORKING ON FISH BLOOD SAMPLES

This approach will remove the need for collection to be performed by a trained scientist, making it far more practical for offshore vessels and remote fish farms.

Monitoring metabolic health of fish and oysters can be used to better manage stock, allowing industry to use research to develop more cost-effective feeds, and develop breeds that are more resilient to climate change and other future challenges.

There are also opportunities for the technology to be used for environmental monitoring of non-commercial aquatic species such as corals.

EXTRACTING SAMPLES FROM OYSTERS

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