



ANSTO Submission

Inquiry into the Australian aquaculture sector

14 May 2021

Letter of Submission

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Mr Rick Wilson MP
Chair, House Standing Committee on Agriculture and Water Resources
PO Box 6021
Parliament House
CANBERRA ACT 2600
Via e-mail to: agriculture.reps@aph.gov.au

Dear Mr Wilson

As the custodian of Australia's nuclear science, technology, and engineering capabilities and expertise, ANSTO (the Australian Nuclear Science and Technology Organisation) is pleased to make this submission to the inquiry into the Australian aquaculture sector.

Our submission focuses on the development of economical and environmentally friendly feeding strategies, as well as seafood provenance and quality authentication.

Our brief submission seeks to address, at a high level, the issues raised in terms of reference B and D.

Should you or other members of the Committee require further assistance, or should you wish to receive a briefing on information presented in this submission, please do not hesitate to contact me

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Thank you for the opportunity to contribute to this important process.

Yours sincerely

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Steve McIntosh
Senior Manager, Government and International Affairs
ANSTO

About ANSTO

ANSTO (the Australian Nuclear Science and Technology Organisation) is responsible for the operation and management of Australia's landmark nuclear infrastructure and research facilities across its two main campuses (Lucas Heights, in Sydney, and Clayton, on the outskirts of Melbourne). These facilities include the Open Pool Australian Light-water (OPAL) Multi-purpose Research Reactor, the Australian Centre for Neutron Scattering, the Centre for Accelerator Science, the National Deuterium Facility, and the Australian Synchrotron.

ANSTO scientists and researchers, and their collaborators, use this infrastructure to investigate public health, the environment and the nuclear fuel cycle to find solutions to some of the biggest questions in science for the benefit of all Australians.

Introduction

ANSTO is at the forefront of seafood fraud research, using nuclear techniques to provide traceability and quality authentication to protect Australian aquaculture and seafood industries, and consumers. ANSTO's research is also helping the Australian (and regional) aquaculture and seafood industries to develop more cost-effective fish feed and environmentally friendly feeding strategies.

Drawing on these capabilities, this submission seeks to address, at a high-level, the issues raised in the following terms of reference:

- b) opportunities and barriers to the expansion of the aquaculture sector; and
- d) the ability for businesses to access and commercialise new innovations to expand aquaculture.

ANSTO does not have specific or unique expertise to provide substantive comment on the remaining terms of reference.

b) Opportunities and barriers to the expansion of the aquaculture sector

Globally, capture fishery or wild-caught seafood production has plateaued as wild stocks are being fished at maximum capacity. In response to the growing demand for sustainable seafood, the aquaculture industry has rapidly expanded, is one of the fastest growing food production sectors, and now supplies the world with 47% of all seafood. Currently the aquaculture industry in Australia is relatively modest compared to the global market. As such, there is significant potential to develop and grow the industry to positively contribute to the blue economy and provide job opportunities across Australia.

The major bottlenecks to sustainable growth of aquaculture in Australia include the high costs of production and the environmental footprint of aquaculture. Feed is a significant contributor to both production costs and environmental impact, so improving feeding efficiency, and reducing the cost of feeds, is a key priority for sustainably developing the aquaculture industry in Australia.

ANSTO applies nuclear techniques for improving feed utilisation efficiencies for high-value seafood species such as Oysters, Yellowtail Kingfish, and Lobsters. The optimal feed ingredients and

percentages are identified to maximise seafood growth, while minimising production costs and waste from underutilised feed and nutrients. ANSTO undertakes this work in collaboration with the University of New South Wales (UNSW), NSW Department of Primary Industries (DPI) Fisheries and the University of Tasmania (UTAS) with the aim of significantly reducing the environmental footprint and costs of aquaculture production associated with feed. This research is now at the level of maturity where ANSTO is looking for opportunities to present feed solutions to the aquaculture industry.

ANSTO also contributes to a major aquaculture research project, led by UNSW in partnership with the National Fisheries Authority PNG, and funded by the Australian Centre for International Agricultural Research (ACIAR). This project uses nuclear techniques to develop low-cost replacement fish feed ingredients for small-scale fish farmers in Papua New Guinea (PNG). The research helps not only to increase farm profitability, but improves food and nutrition security in PNG.

d) The ability for businesses to access and commercialise new innovations to expand aquaculture.

As aquaculture emerges as a major food production sector, concurrently retailers and consumers are increasingly requesting to know where their seafood comes from and how it is produced. As consumers become increasingly conscious of sustainable food choices and quality seafood, this presents new challenges and concerns around food safety, quality, and regulatory breaches. Recent reports¹ have outlined how fraudulent activity in the supply chain takes place through substitution, mislabelling or adulterating of produce with products of lower quality or value in order to increase profits. Seafood fraud is a widespread issue around the globe and is steadily increasing in places like Canada, the United States of America (USA), Taiwan and Germany². Fraudulent activities can impact human health through the presence of pathogens and banned antibiotics or less nutritious food; the unsustainable use of wild resources; and can erode brand integrity and consumer confidence. Globally, food fraud costs the food industry between \$30-\$40 billion USD per annum.

Developing quick and effective tools to identify the origins (“provenance”) of food can identify and combat food fraud. ANSTO is currently working with industry partners (UNSW, Macquarie University, Sydney Fish Market, NSW DPI Fisheries and the National Measurement Institute) to develop scientifically-robust methods of validating seafood origins using nuclear analytical techniques. The

¹ Golden, R.E. and Warner, K., 2014. *The global reach of seafood fraud: a current review of the literature*. Oceana, Washington, DC, USA, 2014 URL: https://usa.oceana.org/sites/default/files/seafood_fraud_map_white_paper_new_0.pdf

Huang, Y.R., Yin, M.C., Hsieh, Y.L., Yeh, Y.H., Yang, Y.C., Chung, Y.L. and Hsieh, C.H.E. *Authentication of consumer fraud in Taiwanese fish products by molecular trace evidence and forensically informative nucleotide sequencing*, 2014, *Food Research International*, 55, 294-302

Rehbein, H., *New fish on the German market: Consumer protection against fraud by identification of species*, 2008, *Journal für Verbraucherschutz und Lebensmittelsicherheit*, 3, 49-53.

Warner, K., Timme, W., Lowell, B. and Hirschfield, M. *Oceana study reveals seafood fraud nationwide*, Oceana Washington, DC., 2013 URL: https://oceana.org/sites/default/files/National_Seafood_Fraud_Testing_Results_FINAL.pdf

² As above.

aim of this partnership is to build consumer confidence in Australian premium products, nationally and internationally.

ANSTO has developed isotopic and elemental fingerprinting technology that can determine the origin of seafood with higher than 80% accuracy. This fingerprinting method was tested and applied to two high-value products, Barramundi and Tiger Prawns. Fingerprinting effectively identified not only the geographic source of the fish and prawns, but distinguished between aquaculture and wild-caught products, which provides insights into the quality and sustainability of the seafood. ANSTO's current research projects are focused on developing a provenance database and prediction model that can be coupled and used as a tangible validation tool by Australian industry. ANSTO is also currently working to develop an *in situ* scanning technology via X-ray fluorescence technology which would allow for rapid, in-the-field determination of the source of seafood products (with funding support from the Commonwealth Department of Agriculture, Water and Environment). This new innovation would provide accountability, which may act as a deterrent to fraudulent practices in the aquaculture supply chain and encourage the growth of a sustainable aquaculture industry in Australia. Plans for demonstrating the technology to the industry are scheduled from 2023 onwards.