CSIRO Marine and Atmospheric Research

Aquaculture genetics, nutrition and production

Supporting the sustainable growth of marine farming in Australia.

Scientists specialising in Aquaculture Genetics, Nutrition and Production (AGNP) are based at CSIRO Marine and Atmospheric Research laboratories at Hobart, Tasmania and Cleveland, Queensland.

They conduct research with a broad range of capabilities ranging from genetics and nutrition to bio-economic modelling, with a focus on Atlantic salmon, Pacific oysters, abalone, barramundi and prawns.

The research is undertaken with commercial partners and fosters the development of quality products from healthy, genetically-superior animals raised on efficient, sustainable feeds.
It supports the growth of Australia's aquaculture industry which is valued at more than $800 million, and accounts for more than one-third of Australia's total seafood production.

Expertise

Breeding programs: design and establishment of full-pedigree, commercial breeding programs in collaboration with industry partners to improve growth rates, disease resistance, feed-conversion efficiency and product quality.

Quantitative genetics: analyses of pedigree and performance data to provide estimates of heritabilities and genetic correlations between traits of commercial importance for breeding strategies.

Molecular genetics: development and application of genetic and reproductive technologies to support selective breeding including DNA pedigreeing, molecular markers to identify genes of commercial importance, gender and chromosome manipulation, and fertility control.

Immunology: development of DNA vaccine against external parasite amoebic gill disease in Atlantic salmon, and breeding for disease resistance.

Ingredient evaluation and development: nutritional assessment of diet ingredients for different species, analysis of quality variability, and development of new ingredients such as sustainable grain products for specific applications in aquatic animal feeds.

Growth and nutritional modelling: development of mathematical models that predict growth potential and nutritional demands and their application to aquaculture and feed production.

Biochemical and nutrigenomic analysis: assay of different biochemical and molecular parameters from ingredients, diets and animal tissues.

Nutritional requirement assessment: determination of critical dietary requirements for aquatic animal production, quality and health.

Product quality evaluation: using biochemistry and sensory evaluation techniques to understand product quality in terms of consumer preference and human nutrition (such as long chain omega-3 oils), and their improvement through breeding programs, dietary inputs and production systems.

Economic and bio-economic modelling: assessing the economic importance of production input variables and individual commercial traits so that parent selection and consequent advances in performance can be based on economic criteria.

Database design: development of sophisticated databases to store large amounts of data (such as pedigree records and phenotypic measures on multiple traits) in a format suitable for quantitative analyses.

Environmental impact assessment: development, implementation and reporting of environmental impact assessment and monitoring programs.

International development assistance: transfer of technology to developing nations under Australia's aid program, with a focus on improving regional food production sustainability.

CMAR expertise in Aquaculture Genetics, Nutrition and Production is applied to research projects undertaken by the CSIRO Food Futures Flagship.

Facilities

- Biosecure aquaria and laboratories
- Chemistry, biology and molecular laboratories
- Electronics and engineering workshops
- Seawater Aquaculture Facility
- Australian Quarantine Inspection Service accredited Algal Culture Facility
- Australian National Algae Culture Collection

For further information

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