



FISH HEALTH AND WELFARE

- All good farmers take a proactive and holistic approach to safeguarding the health and welfare of their stock. At Huon, this involves feeding quality diets, good site management (ie separation of year classes, in-situ net cleaners to reduce biofouling and maintain high water flow and good dissolved oxygen levels and lift-up system for retrieval of morts), fish husbandry, biosecurity measures and of course, vaccinating our stock.
- Effective management of fish health, welfare and biosecurity is critical to successful aquaculture. Huon takes fish, welfare and biosecurity very seriously which is why Huon employs veterinarians and fish health experts. In addition to our veterinarians, Huon employs people with University qualifications encompassing one or more of the areas of aquaculture production, environmental science, fish health, welfare and biosecurity training.
- Our stock is checked and monitored daily (via the Feed Control Room – read Feed Systems Fact Sheet) for behaviour, appetite and general health while specialised animal health and welfare checks are undertaken before any major husbandry activities such as bathing or transfer.
- Huon maintains a comprehensive Veterinary Health and Biosecurity Plan (VHBP) that forms the basis of all Huon's protocols and procedures to address fish health, welfare and biosecurity matters, plus Huon participates in Tasmanian Salmonid Health Surveillance Program (TSHSP).

VACCINE DEVELOPMENT & MANAGEMENT

Vaccines play an important animal welfare role in preventing disease and helping to maintain healthy stock. The approach to vaccines and vaccination in fish is the same as that used for other food animals, pets and people.

Vaccination is a key strategy in the sustainable production of farmed fish in Tasmania. Millions of dollars have been invested in vaccine development and across the salmon industry vaccines are now commercially used to successfully control up to five serious disease pathogens.

Fish, just as any other animals, are susceptible to infectious diseases caused by naturally occurring viruses, bacteria or parasites. The effects of disease are more pronounced and can have greater impact when animals are kept together, such as in a pen. Vaccination is a preventive measure intended to protect farmed animals from becoming diseased. This means that fish are vaccinated before they are at risk of becoming infected. **Using effective vaccines can eliminate the need for antibiotics as a means of treating disease.**

Vaccines contain either killed microorganisms or parts of microorganisms. When these are introduced to fish their immune system is activated. Fish, like other animals, have a well-developed immune system that protects them from disease. Vaccination trains the immune system to protect fish from disease. Fish have a full repertoire of immune functions including antibodies, cell-mediated activity through to the production of interferons. All these components of the immune system are activated by vaccination and help protect the animal from disease. Protective immunity develops 4-6 weeks after vaccination.



For injection vaccines in Tasmania, protection is life-long.

Most fish are vaccinated by injection. At the time of vaccination, fish are gently sedated and then a tenth of a millilitre (about the size of a drop of water) is injected into the body of the fish. There are times when smaller fish, 5-10g in size, need to be vaccinated. Injection is impractical for fish this small, so they are dipped in a bath of the vaccine for 30 seconds.

Most of the fish disease in Tasmania occurs at sea. Between 6-8 weeks before fish become smolt and are sent to sea, they are vaccinated. For hatchery diseases, fish are vaccinated once they are considered immune competent and able to benefit from vaccination, typically when they reach 5g.

The salmon industry in collaboration with the Tasmanian government and the Fisheries Research and Development Corporation (FRDC) has invested millions of dollars in the development of the Centre of Excellence for Aquatic Animal Health and Vaccines (CEAAHV) in Launceston. This is a world-class aquatic animal diagnostics and health related research facility which plays an important role in assisting the Tasmanian industry to stay at the forefront of fish health, welfare and biosecurity.

For more information on fish vaccines used in Tasmania refer to <https://dPIPWE.tas.gov.au/biosecurity-tasmania/animal-biosecurity/animal-health-laboratories/centre-for-aquatic-animal-health-and-vaccines>

Also read page 11 <https://www.huonaqua.com.au/the-huon-story-edition-three/>

HUON'S VETERINARY HEALTH AND BIOSECURITY PLAN

See Biosecurity Fact Sheet for details.

TASMANIAN SALMONID HEALTH SURVEILLANCE PROGRAM (TSHSP)

The salmon industry's focus on good fish health, sustainable production within a biosecurity framework, is supported through the provision of excellent aquatic animal health services. These primarily take the form of the Tasmanian Salmonid Health Surveillance Program (TSHSP), diagnostic services at the Animal Health Laboratory in Launceston and research at the Centre of Excellence for Aquatic Animal Health and Vaccines (CAAHV) to develop effective bacterial and viral vaccines and improved diagnostic tests.

The TSHSP has been operating for 28 years since it was initiated in 1992. The TSHSP is jointly operated and funded by the Tasmanian salmonid industry and DPIWPE with an annual review to ensure it provides the best and most cost-effective outcomes.

The purpose of the TSHSP is to support the sustainability of the Tasmanian salmonid industry, the industry's biosecurity advantage and access to domestic and international markets. The TSHSP is the principle mechanism for Biosecurity Tasmania to critically assess endemic disease incidence and the impact of disease on Tasmanian salmonid production. Objectives of the TSHSP are:

- Investigation for evidence of a range of salmonid diseases exotic to Tasmania (List A diseases), but not necessarily exotic to Australia.
- Monitoring of incidence of endemic diseases and their causative agents to support regional biosecurity management within Tasmania.
- Monitoring of farmed stock for early detection of new or re-emerging pathogens.
- Investigation of significant or unusual morbidity or mortality events in farmed salmonid species to identify the cause, either infectious or non-infectious.
- Collection of disease incidence data for Biosecurity Tasmania to support evidence based policy, state-wide biosecurity management and regional biosecurity agreements between salmonid aquaculture companies in Tasmania.



The Program supports domestic and international market access for the salmonid industry. The integrity of the incidence data is based on the large range and breadth of submissions to the Tasmanian Animal Health Laboratory in Launceston.

The Tasmanian Animal Health Laboratory, through the Centre of Excellence for Aquatic Animal Health and Vaccines (CAAHV) in Launceston, also contributes to research on endemic aquatic diseases including vaccine and diagnostic test development. This also includes collaboration with the CSIRO Australian Animal Health Laboratory in Geelong which is Australia's sentinel animal health facility recognised internationally.

CENTRE OF EXCELLENCE FOR AQUATIC ANIMAL HEALTH AND VACCINES (CEAAHV)

The Centre of Excellence for Aquatic Animal Health and Vaccines (CEAAHV) is a tri-partite arrangement between the salmon industry, Biosecurity Tasmania of the DPIPWE and FRDC. Each partner derives significant benefit from the CEAAHV activities that they have commissioned. The specialised facilities are the result of co-investment by the three partners in 2013.

Establishment of the CEAAHV was key to meeting the salmon industry's need for solutions to known and new disease threats. The resources available to the CEAAHV are highly specialised to meet the need for developing bacterial and viral vaccines.

CEAAHV developed the Atlantic salmon and rainbow trout vaccines used in Tasmania to ensure they are effective for local conditions and diseases. Production of the vaccines is carefully controlled to meet the requirements of the Australian Pesticides and Veterinary Medicines Authority (APVMA), which is the national regulator responsible for ensuring that vaccines are safe for use in food animals.

ANTIBIOTICS

Vaccines are important in preventing disease outbreaks but cannot control all losses. Medication such as antibiotics is used as a last resort to avoid significant animal welfare issues and stock losses.

We have the attitude that antibiotics should only be used as a last line of defence. This mind-set means that we are continually working to develop proactive diet regimes and vaccines to allow our salmon to combat known illnesses and lead healthy lives.

If our vet feels there is a need to treat fish with antibiotics it is supervised, reported and strictly regulated by government. The antibiotics are allowed to pass through the fish long before it is harvested in accordance with regulatory requirements. See Huon's website for publication of antibiotic use including quantities and pens treated <https://www.huonaqua.com.au/our-approach/our-operations/fish-health-welfare-and-biosecurity/antibiotic-use/>.

Any antibiotic use is reported to State Government in real time.

Huon also participates in an annual national residue survey to monitor levels of therapeutants, ensuring we comply with a maximum residue limit, which refers to the highest concentrations of a chemical residue that is legally permitted or accepted in a food, based on good agricultural and chemical use practices.

<https://www.agriculture.gov.au/ag-farm-food/food/nrs>

Also see Fact Sheet – Antibiotics - <https://www.huonaqua.com.au/wp-content/uploads/2022/01/Antibiotics-Fact-Sheet-FINAL.pdf>



BATHING

Tasmania is a unique environment for salmon farming due to a single-celled microscopic organism that is native to Tasmania. These amoeba multiply (called Ameobic Gill Disease or AGD) and reduce water flow at the gill surface that then limits oxygen supply to the fish and can cause death if not treated.

They are unique to the saltwater marine environment and cannot tolerate freshwater, whereas salmon can adapt between salt and fresh. Bathing our fish in fresh water destroys the amoeba. There is no vaccine or treatment therapy available to treat the amoeba; just freshwater.

We bathe our fish in industry-tailored wellboats designed to transport and bath the fish in a seamless, low-stress environment. Using wellboats to bath our fish also allows Huon to transport all the fish into an enclosed system. This method greatly reduces the potential for disease transfer, improving our biosecurity practices and impact on our fish. Growing fish, on land, to a larger weight also helps increase fish resilience to AGD.

Huon was the first company globally to use a wellboat for the purpose of bathing fish in freshwater. What this means is that rather than needing to tow large liners full of freshwater, fish are transferred into the wells of the boat to swim around for a few hours before they are returned back to a pen.

HARVESTING

Harvesting fish humanely is crucial to not only for fish welfare, but also for ensuring high quality salmon as stress during the process results in softer and gaping flesh.

We have worked closely with Baader Seafood Innovations to help them develop a method of harvesting that is considered world's best practice and is RSPCA UK awarded. This collaboration led to world first technology that uses automatic stunning and bleeding machines to harvest our salmon.

Our harvest machine works by utilising the salmon's natural instincts to swim against the current. They then swim down a slide and are automatically stunned and bled. An added benefit of this technology is that the pre-rigour time is longer (approximately eight to 12 hours), which is crucial to achieving the premium Huon quality salmon our customers have come to expect.

Throughout the company, staff are encouraged to develop their ideas to improve farming operations. One such instance was the development of our harvest pen system. Implemented in April 2016, the square pen system integrates more easily into our harvest barge and pod system while also allowing fish to be calmly corralled into a corner and held, lessening the stress on the fish.

