



LAND-BASED SALMON FARMING

- Land-based salmon farming is not successfully happening (in commercial volumes) in any country in the world. The world's largest producer of salmon, Norway, is just taking small, tentative steps into the world of land-based farming. Norway estimates it will produce less than 1% of its total salmon production from land-based farming in the coming year.
- There is no likelihood of land-based salmon farming in Tasmania for a range of reasons including:
 - 1 - Tasmania does not allow the discharge of saltwater waste onto land OR the ocean and as salmon need to spend part of their lifecycle in saltwater, this restricts how long they can be farmed on land;
 - 2 - the natural resources (land, electricity and water) required to house enough facilities to hypothetically cease sea-based operations is not feasible nor is it financially viable. The industry would require the same energy needs as that of a city of 1.2 million people. If Huon were to hypothetically farm the equivalent volume of fish on land as we currently have at sea, we would require at least 40 additional Whale Point facilities and there is not sufficient electricity produced in Tasmania to power these facilities.
 - 3 - IF land-based salmon farming became commercially viable it would make sense to establish these facilities closer to market areas on the mainland. As a proud and fiercely Tasmanian company, we want to avoid moving our assets and employees to the mainland and keep Tasmanians employed in Tasmania.
- So, is Huon doing anything to explore land-based farming?
- Huon Aquaculture's \$43.7M Whale Point nursery, which commenced operations more than two years ago, is Australia's first land-based salmon farming facility and enables fish to be grown larger on land before they are transferred to sea. This facility improves the efficiency of our production cycle by reducing the time the salmon spend at sea (from 14 months, to between 9-10 months). This also enables marine lease sites to be fallowed for longer.
- It is Huon's view that the experience and reliability of completely growing salmon entirely on land (in commercial volumes) is not yet proven. We believe that a balance of growing our salmon on land and at sea will allow us to continue to farm sustainably and employ more local people. We also believe that future salmon production methods should be seeking to reduce environmental impacts, not increase them, which would be the case if salmon farming was 100% land-based.
- For this debate to be balanced, consideration also needs to be given to the conversion of terrestrial land to livestock farming, which is less sustainable than salmon farming due to higher conversion ratios which then generates a higher carbon footprint. How much native bushland has been cleared for agriculture compared to the size of aquaculture farms? No one has ever said that aquaculture does not have an impact – all farming does - but when compared to the impacts of terrestrial farming (land clearing, emissions, run off etc) it wins the sustainability argument, and the population has to eat.



LAND-BASED DRAWBACKS

Location:

In the event that 100% land-based salmon farming becomes commercially viable, it would make sense to establish these facilities closer to market areas on the mainland. As a proud and fiercely Tasmanian company, we want to avoid moving our assets and employees to the mainland. While we have no intention to move our operations, our Whale Point nursery allows us to continue to gain experience in this new technology. We believe a balance of growing our salmon on land and at sea will allow us to continue to farm sustainably in Tasmania and employ more people locally.

Land-based facilities would only require around 10% of the current workforce (thereby rendering thousands of people unemployed in addition to the loss of a range of other jobs which exist to supply and contract to the Tasmanian salmon industry).

Stocking Density:

A pillar of the RSPCA Approved Farming Scheme is to provide conditions where animals can be free to move and express their natural behaviours.

Salmon have evolved to migrate from freshwater to seawater and as a result, we mimic this in our farming operations. In addition, maintaining salmon in freshwater for their entire lifecycle would not be in accordance with RSPCA fundamental welfare requirements (ie this limitation could be compared with not allowing nesting boxes for chickens). Plus, for land-based salmon farming to be commercially viable, the salmon would need to be held at high stocking densities. This would be up to 15 times higher than our current maximum sea pen stocking levels (which is maximum 98% water to 2% fish) and could have implications for their health and wellbeing. Due to higher stocking densities, salmon would be unable to exhibit natural behaviours which is contrary to the philosophy that guides our farming.

Salt Disposal:

Theoretically, salmon can be grown on land in saltwater however, this raises an issue of how to dispose of waste collected within the facility. Current Tasmanian legislation does not permit the disposal of saltwater waste on land, nor can the waste be recycled for fertiliser or compost due to its very high salt content. Nor does current legislation permit the disposal of saltwater waste into the ocean. This would mean a halt to Huon's existing program whereby every year we recycle hundreds of tonnes of the fish poo from our freshwater facilities into compost for local farmers.

Electricity:

As the water within land-based facilities needs to be constantly moving to provide an optimal environment, a key resource needed for land-based farming is power and running costs are high. Putting aside all the drawbacks, if Huon were to hypothetically farm the equivalent volume of fish on land as we currently have at sea, we would require at least 50 Whale Point-equivalent facilities and we question whether there is sufficient electricity produced in Tasmania to power these facilities. Additionally, in a land-based salmon farm, any electrical outages can result in the stock loss of an entire production cycle.

Plus, in Tasmania, the majority of power is hydro-sourced, which is not favoured by certain political parties (the issue then becomes about more dams versus on-land salmon farming).

GLOBAL ATTENTION

In recent years, global headlines have been made around land-based salmon farming. In Huon's view, it is an exciting prospect which we continue to be informed but it has not yet been proven to be financially viable. Even using aggressive growth estimates, industry analysts believe that over the next five years only 150,000 tonnes of salmon will come from this farming method – less than 4% of the current total global salmon production.

Growing salmon on land before they are transferred to sea has many benefits, primarily the ability to provide a stable environment favourable for best performance, however, farming entirely on land has many



drawbacks in terms of the availability of resources, sustainability and questions around eating and flesh quality attributes if taken all the way to harvest. The majority of fish grown-out in RAS currently are small sized (less than 3kgs) whereas most markets, particularly international customers, require fish of 5kgs or larger.

In 2020, many countries have commenced building new land-based facilities – the test will be if these facilities can farm commercially viable quantities while still meeting environmental requirements as well as the requirements of customer tastebuds (land-based facilities can [face muddy or earthy flavour issues known as 'off-flavour'](#)). This is caused by metabolites released by microbes that grow within the land-based systems).

Even the world's largest producer of salmon, Norway, is only just taking small, tentative steps into the world of land-based farming. Just one company, Salmon Evolution, is involved in land-based salmon farming – it is still constructing a \$214M facility (as at early 2021) which will only produce 9,000 tonnes of fish in the first year of operation hopefully rising to 36,000 tonnes. For a country that overall produces 1.7M tonnes of salmon, this is just 0.5% of total production. Atlantic Sapphire harvested 166 metric tonnes HOG from its Miami facility in 2020 (compared with Huon's 25,566 tonnes).

