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## RAS: Steelhead VS Salmon

**W**hen the leader of the Recirculating Aquaculture System (RAS) movement speaks, it makes sense to listen. So, recently, when Atlantic Sapphire shared its interest in growing steelhead trout on a 2Q21 earnings call, our team was compelled to learn more.

Those plans may now be on hold as the company deals with the devastating loss of its Denmark facility, but it did spark an interesting discussion for our team: Does trout or Atlantic salmon support a stronger business case for Recirculating Aquaculture Systems (RAS)?

Trout, interestingly, has a lot of compelling reasons to be an exciting RAS farmed fish that this paper will explore in more detail. But first let's cover some common misconceptions about trout.

## IS IT RAINBOW OR STEELHEAD?

Rainbow and steelhead trout share the scientific classification of *Oncorhynchus mykiss* and are a part of the Salmonoid family.

**Figure 1**

R&D: Trials On Rainbow Trout In Denmark

First Half 2021 Update



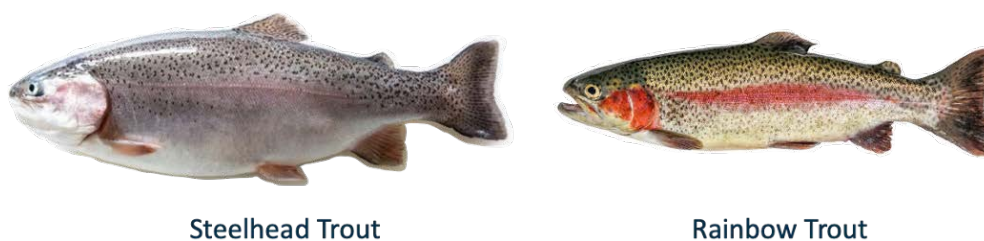
They are sometimes referred to interchangeably by the market. Atlantic Sapphire’s presentation from 2Q21, for instance, confusingly discusses rainbow trout trials in Denmark, but compares a steelhead fillet to one of Atlantic salmon.

But the two fish are not the same.

*Oncorhynchus mykiss* is a North American native found in the Pacific drainages from Alaska to Mexico. It is a hardy fish that is easy to spawn, fast growing, and can tolerate a variety of environmental conditions.

Rainbow trout inhabit freshwater lakes and streams, while the anadromous strain, which can survive in the ocean, is known as Steelhead trout. Rainbows tend to be smaller than Steelheads due to the different environments they inhabit over their lifespans. A Steelhead can grow to 7-10 kilograms (kg) within 3-years versus 4.5 kg for a Rainbow over the same period.

**Figure 2**



They can also have distinct appearances from each other. Many Rainbow trouts have multi-hued skin colors that can be blue, green, or yellowish. They also tend to have a pink-red stripe running from their gills to the tails. Steelhead, meanwhile, holds a silvery color across its skin. Figure 2 shows the considerable difference in appearance between a typical Steelhead trout and a Rainbow.

Both fish can withstand temperature variations from 0 to 27 °C but spawning and growth is optimized in a narrower range of 12 to 21 °C. Steelhead flesh has a redder-pinkish color that can be comparable to Atlantic salmon fillets, while Rainbow flesh is whiter and paler.

The two fish taste and can be cooked differently as well.

Steelheads are known to taste like a more subtle Atlantic salmon and can, in fact, replace salmon in various dishes. Rainbows meanwhile have an earthen or muddier taste profile like a catfish or carp.

Farmed Steelhead are harvested at 2-4 kgs, so consumers can enjoy large fillets and portions. Farmed Rainbow is often sold and eaten as a whole fish because of its smaller size, and fillets can be thinner and less meaty. Naturally, this difference impacts the way you might cook, season, and eat the two fish.

The point is that while Steelheads and Rainbows share the same scientific classification, they are very different fish with very different markets.

### KEEPING IT SIMPLE FOR RAS

Albert Einstein is attributed to the philosophy that: “Everything should be as simple as possible – but no simpler.”

It’s an elegant statement that reminds us that when we evaluate a business, we want its solutions to be simple as possible. Added complexity usually leads to difficulties that even the most diligent can fail to recognize.

So, when it comes to the capital and the knowledge-intensive industry of RAS farming, Steelhead’s simpler production process in comparison to Atlantic Salmon may just make it the more favorable fish.

Steelhead, for instance, grows faster and can be stocked more densely in grow-out tanks than salmon. They can also achieve its reddish flesh color, important for consumers and marketing, earlier than the flesh coloration of salmon.

These are important differences from an investment perspective because more density in grow-out tanks lead to lower capital expenditures per unit weight grown. Feed costs are lower too if you are able to harvest steelhead earlier because they achieve attractive consumer attributes more swiftly. An investment advantage since feed on average is 50% or more of a farm’s production costs.

Steelheads are also hardier than salmon. They can survive wider temperature fluctuations with less oxygen meaning that production teams have a greater margin for error, something that investors worry about. Production in Steelhead is further simplified by the fact that you don’t need salinization systems to grow-out the fish.

Steelheads can reach 2-4 kgs for harvest using a freshwater RAS facility alone. This continues to benefit capital expenditures per kg, but even more importantly, considerably reduces production risk.

**Table 1.**

	Egg-to-harvest	Stocking density	Spawning and growth temperature	Flesh color	Taste profile	CAPEX/kg	Feed/kg	OPEX/kg
<b>Steelhead</b>	16 months	30-40 kg/m3	12-21 degrees	Reddish	More subtle	Lower	Lower	Lower
<b>Atlantic salmon</b>	36 months	20 kg/m3	6-16 degrees	Orange	Saltier	Higher	Higher	Higher

For an Atlantic salmon RAS farm, salinization processes can be the most fraught. Too little salt and salmon can have poor growth rates; too much and mortality rates across your cohort could spike. Again, simplicity is the key.

Table 1 compares the major differences between Steelhead and Atlantic salmon for a RAS facility. These differences can lead to improved returns on capital for a Steelhead RAS farm when compared to a similarly sized Atlantic salmon one.

This of course assumes that Steelhead prices are similar to those of Atlantic salmon, which based on our research is accurate. There are even instances where Steelhead will sell at a premium to salmon depending on its quality, color, and production methods.

This doesn't mean that we should avoid complex RAS businesses with species and production cycles that require varied systems. But investors and entrepreneurs alike should pause to consider the significant hurdles entwined with more system complexity.

RAS farming is already capital and knowledge intensive. Growing Steelhead may be better for full grow-out on land when compared to Atlantic salmon because of the biological differences between the two fish.

## GOODBYE TO ATLANTIC SALMON RAS?

Don't bet on it.

Atlantic Salmon is a well-established fish with consumers. The Food Agricultural Organization (FAO) estimates that in 2020 production was over 1.4m metric tons (MT) with demand continuing to grow. Meanwhile, trout production was only 600,000 MT and the statistics included a variety of trout products from Steelhead, Rainbow to Brown trout.

Atlantic salmon has a much more established industrial ecosystem as well. The top aqua feed suppliers in the world count salmon feed as one of their key revenue generators. There are thousands of employees trained in the rearing and business of Atlantic salmon with dozens of service companies supporting the industry.

And, in investing, it is often familiarity that spurs continued interest. Therefore, we expect to see

Atlantic salmon RAS developments continue to dot the investor landscape.

But for those entrepreneurs and investors looking for a simpler opportunity, Steelhead might be an attractive alternative to the mainstream.

## SOURCES

1. Fao Fisheries & Aquaculture oncorhynchus mykiss. (2005, June 15). Retrieved November 22, 2021, from [https://www.fao.org/fishery/culturedspecies/Oncorhynchus\\_mykiss/en](https://www.fao.org/fishery/culturedspecies/Oncorhynchus_mykiss/en).
2. *Steelhead (salmon trout)*. Inland Seafood. (n.d.). Retrieved November 22, 2021, from <https://www.inlandseafood.com/seapedia/steelhead-salmon-trout>.
3. *AUGUST 2021 OPERATIONAL UPDATE & PHASE 2 INTRO*. Atlantic Sapphire Home Page . (2021, August 26). Retrieved from <https://atlanticsapphire.com/wp-content/uploads/2021/08/20210826-Atlantic-Sapphire-ASA-First-Half-2021-Operational-Update-and-Phase-2-Intro.pdf>.
4. In honor of Albert Einstein's birthday - everything should be made as simple as possible, but no simpler. Championing Science. (2019, March 16). Retrieved November 22, 2021, from <https://www.championingscience.com/2019/03/15/everything-should-be-made-as-simple-as-possible-but-no-simpler/#:~:text=%E2%80%9CEverything%20should%20be%20made%20as,of%20how%20to%20conduct%20science>.

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