

The optimum water velocity for Atlantic salmon post-smolts in RAS is close to one body length per second.

HYPOTHESIS:

High water velocities provide an aerobic training environment for fish and result in higher growth rates but may impair fish health and welfare. This study was design to determine the optimal water velocity to balance growth rate and welfare for post-smolts.

DURATION: 2017-2019

FISH SIZE TESTED: 80 - 480 g

SALINITY TESTED: Brackish water (12 ppt)

HIGHLIGHTS:

- Four continuous water velocities, (0.5, 1.0, 1.8 and 2.5 body length per second (BL/s) were evaluated for Atlantic salmon post-smolts in RAS.
- During three months, the growth rates increased significantly with higher velocities. Relative mean differences in body weight between the lowest and highest velocity groups were 5.7%. The condition factors were also significantly lower in the lowest velocity group.
- We demonstrated by histological analyses that the increased growth rates were ascribable to increased muscle growth or in other words thicker muscle fibers.
- High velocities (≥ 1.8 BL/s) have been found to result in inflammation of muscle fibers and negatively affect mucosal health. Increased schooling behaviour may be an additional factor that leads to increased social interaction.
- The optimum velocity for a good welfare and a healthy growth was estimated as slightly above 1 BL/s.

- The commonly used large industrial tanks are a challenging environment to implement the recommended water velocities and dedicated technical adaptation would be necessary in most cases.

RECOMMENDATIONS:

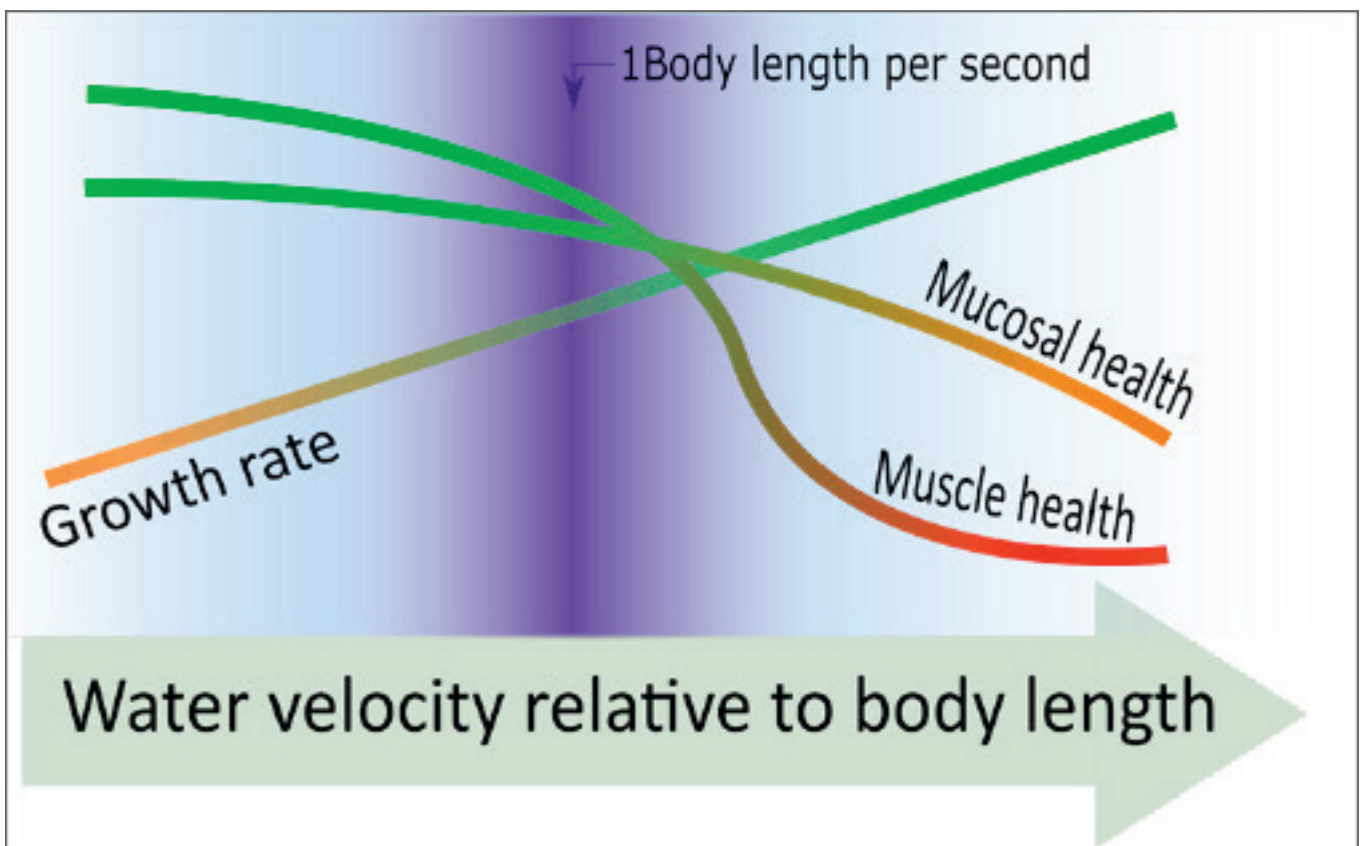
- Too low water velocities were linked to decreased condition factors and non-optimal growth rates. We determined “too low velocities” around 0.5 body length per second.
- Too high water velocities may optimize the growth rate but have negative implications as decreased mucosal health. We determined “too high velocities” as 1.8 body length per second and above.
- The results of the present study in combination with previous studies led to our conclusion that the optimum velocity for salmon post-smolts is slightly above 1 body length per second.



READ MORE:

G. Timmerhaus et al. 2021. The optimum velocity for Atlantic salmon post-smolts in RAS is a compromise between muscle growth and fish welfare. *Aquaculture* 532 (2021) 736076

The factsheet is ready for implementation, but with the note that the testing has not been done for all industrial relevant conditions.



Simplified overview of water velocity effects on post-smolts in RAS.