The effects of interval and continuous swimming on Atlantic salmon growth and feed intake

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1. Background

In the growing aquaculture industry, the health and quality of Atlantic Salmon (*Salmo salar*) are essential for sustainability and economic profit. Swimming exercise has been shown to have positive effects on the wellbeing and quality of salmon, by increasing resilience and growth, whilst reducing aggression and mortality[1].

In this study, we conducted an experiment to analyse the effects of continuous versus interval training on Atlantic salmon during the freshwater phase. In addition, we investigated whether feeding the fish before or after interval training had any impact.

Aims
- Analyse fish growth parameters by specific growth rate and condition factor
- Analyse hepatosomatic index as an indicator of energy storage
- Investigate trainings effect on feed intake

2. Experimental design
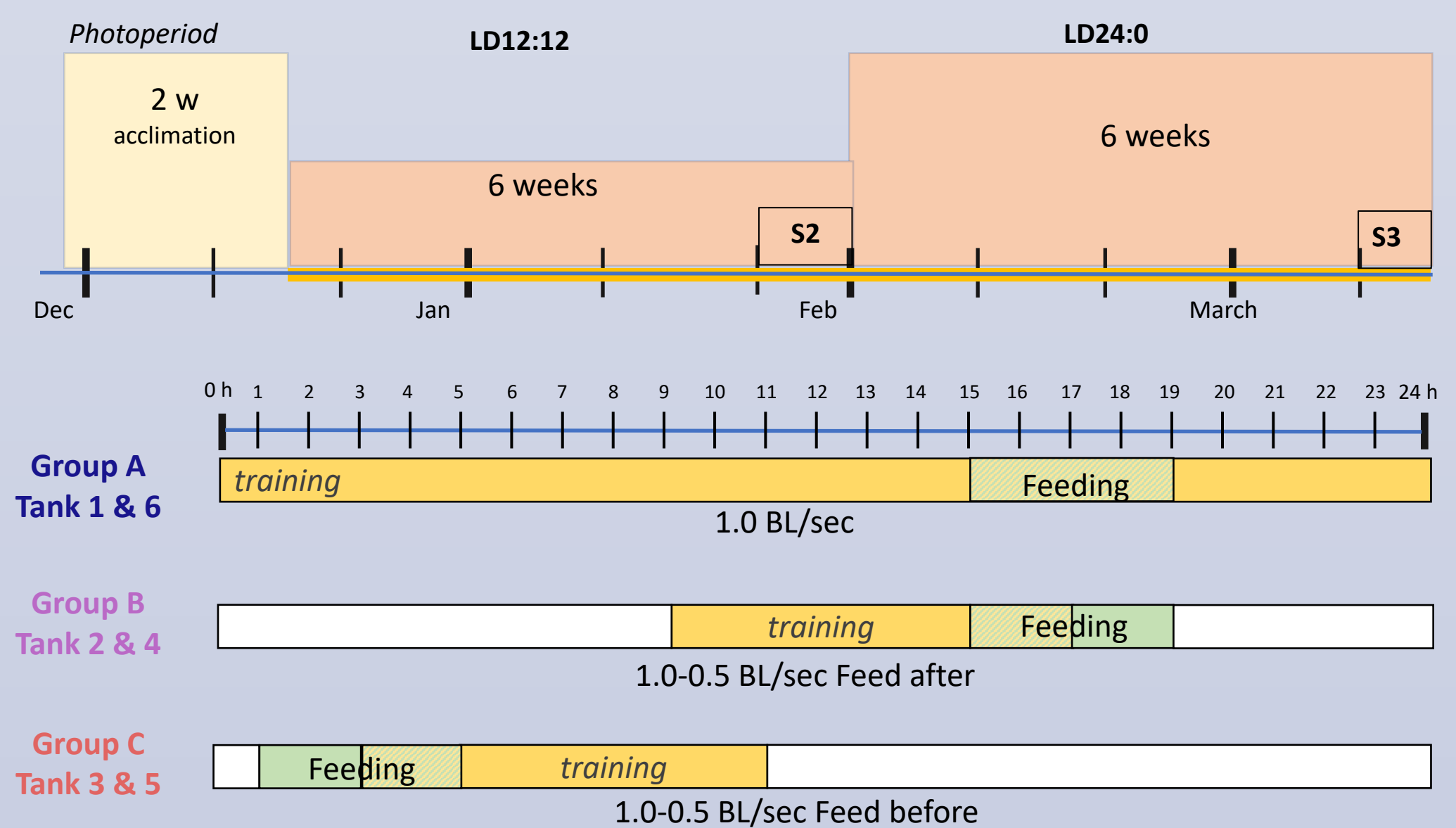
Experimental design: Top figure illustrates the experimental conditions (light regime) and timeline of experiment, with samplings S2 and S3 indicated. The lower figure depicts the Atlantic salmon experimental groups A, B, C, with corresponding tanks. Group A were continuously trained at 1.0 BL(body length)/sec. Group B and Group C underwent interval training, i.e., 1.0 BL/sec for 8 hours and 0.5 BL/sec for 16h. Group B were fed after training and Group C were feed before training. The feeding period for all fish lasted for 4 hours.
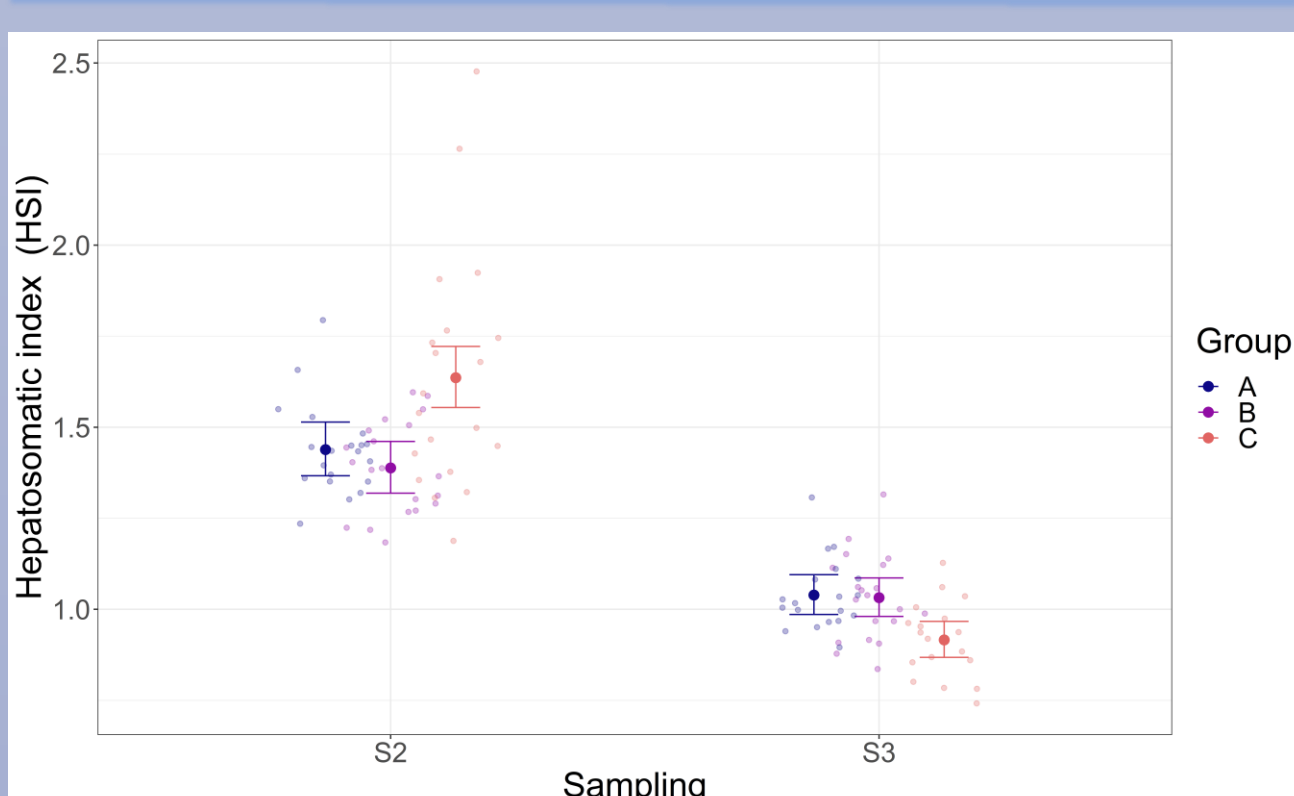
3. Results

Growth parameters
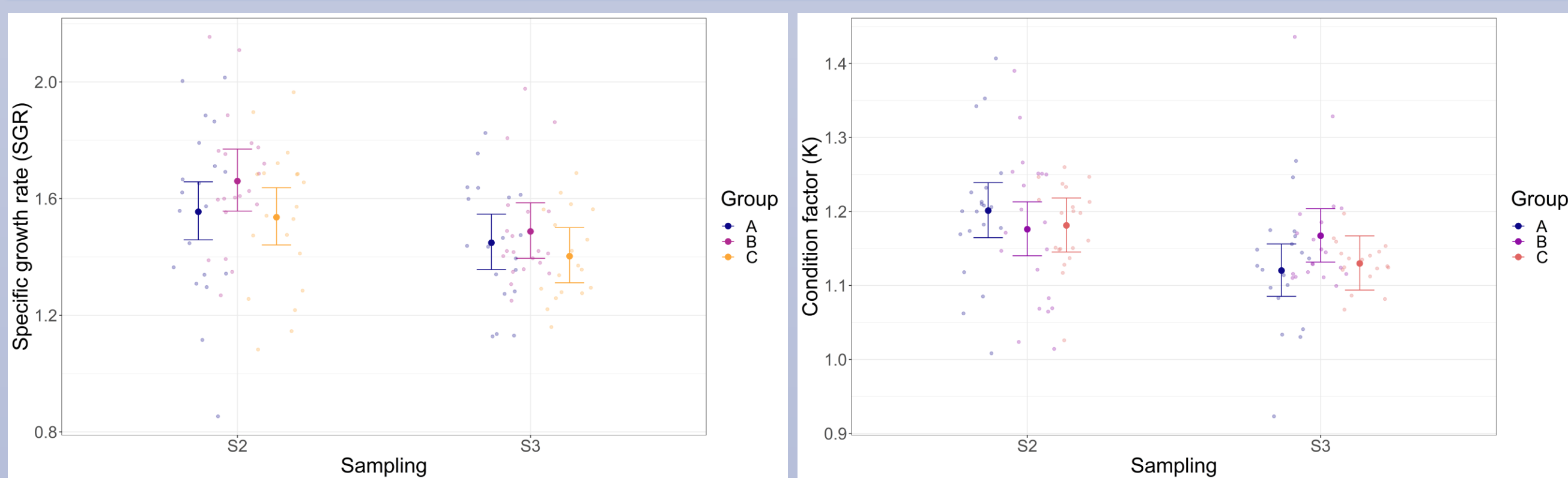
Specific growth rate (SGR) of Atlantic salmon under continuous swimming (group A) and interval swimming feeding after (group B) or before (group C) exercise at sampling S2 and S3.
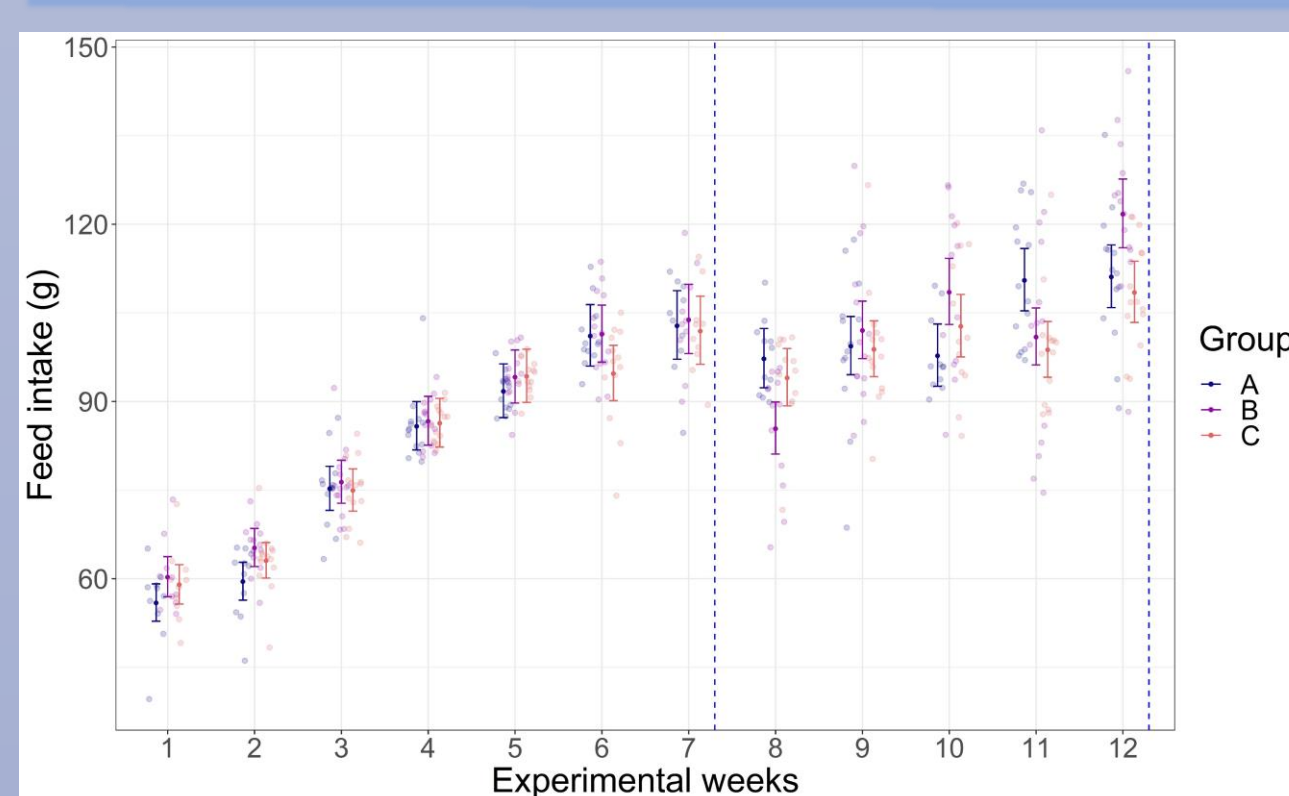

Condition factor (K) of Atlantic salmon under continuous swimming (group A) and interval swimming feeding after (group B) or before (group C) exercise at sampling S2 and S3.

Hepatosomatic index

Hepatosomatic index (HSI). of Atlantic salmon under continuous swimming (group A) and interval swimming feeding after (group B) or before (group C) exercise at sampling S2 and S3.

Feed intake

Feed intake in grams of Atlantic salmon under continuous swimming (group A) and interval swimming feeding after (group B) or before (group C) exercise during experiment. Blue stapled lines represent samplings.

4. Summary

- The study found no statistically significant differences in terms of growth parameters between the three treatment groups, however:

  - SGR in Group B tended to be higher than in Group A and C, which were similar.

  - The condition factor of fish in Group A (p < 0.01) and C (p < 0.05) significantly decreased from sampling S2 to S3.

- The hepatosomatic index (HSI) of fish in group C was significantly higher than A and B during sampling S1 (p < 0.05), but the opposite was observed during S2 (p < 0.01).

- Feed intake showed a steady rise but fell after sampling S2. Group C had the highest feed intake.

5. Conclusion

Our preliminary data indicates that interval training (1.0 - 0.5 BL/sec) and feeding after training may be beneficial for health and quality for salmon.

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References:
1. Castro, V., Grisdale-Helland, B., Jørgensen, S. M., Helgerud, J., Claireaux, G., Farrell, A. P., Krasnov, A., Helland, S. J., & Takle, H. (2013). Disease resistance is related to inherent swimming performance in Atlantic salmon. *BMC Physiology*, *13*(1), https://doi.org/10.1186/1472-6793-13-1