# Quality and quantity of enrichments influence well-being of aquaculture fishes

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The research demonstrates that stone enrichments that have been previously conditioned in lake water significantly improve survival of aquaculture fish compared to clean stones. Credit: Pekka Hyvärinen/Luke

Collaborative research of the University of Jyvaskyla and Natural Research Institute Finland presents new evidence of the effects of

enriched rearing on well-being of aquaculture fishes. The research demonstrates that stone enrichments that have been previously conditioned in lake water significantly improve survival of fish compared to clean stones. Also a higher number of stones has a similar positive effect. The results have practical implications for prevention of aquaculture diseases. The study was published in *Antibiotics* in March 2021.

The volume of aquaculture is continuously increasing. Parasitic diseases represent a significant threat to farmed fishes and ecological solutions to minimize use of medication are being sought.

Enriched rearing, where rearing tanks are equipped with different types of structures, has been shown to reduce the impact of diseases. However, the mechanisms underlying these effects are unknown.

"This study investigates the effect of quality and quantity of enrichments on survival of young brown trout and landlocked Atlantic salmon from a common disease of aquaculture fishes, the flavobacterial infection. Enriched tanks with just a handful of stones previously conditioned in lake water had a higher fish survival compared to tanks with clean stones or those without stones. In addition, a higher number of stones has a similar positive effect," says Senior Lecturer Anssi Karvonen from the University of Jyväskyla.

"The results suggest that the conditioning forms a beneficial microbial community on the stones, which is capable in preventing harmful bacteria. We are currently conducting further investigations on the structure of the microbial communities," says Karvonen.

## Disease prevention might be possible with precision use of enrichments

The recently published research provides information on the dynamics between enrichments and diseases. When and how the enrichments are being applied can influence the outbreak and harmfulness of a disease.

The results have significance for the health of aquaculture fishes, as well as costs associated with the rearing.

"The results suggest that the use of certain type of enrichments just before the anticipated disease outbreak can reduce the impact of a disease and possibly minimize the need for medication. This type of precision enrichment could also decrease the workload and costs associated with the cleaning of the tanks. Enrichments are already being applied in production-scale rearing of salmonid fishes intended for stocking in collaboration with aquaculture companies. For example, tests of new and more user-friendly structures of enrichments for young Atlantic salmon are currently being run in facilities of Voimalohi Ltd," says principal scientist Pekka Hyvärinen from the Natural Resources Institute Finland.

**More information:** Anssi Karvonen et al, Quantity and Quality of Aquaculture Enrichments Influence Disease Epidemics and Provide Ecological Alternatives to Antibiotics, *Antibiotics* (2021). DOI: 10.3390/antibiotics10030335

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