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Abstract

through (9.4 L h^{-1}) at 10–12 °C to keep their growth slow and fed with commercial feed (Biomar Inicio Plus, 0.5 mm) [6].

Experimental design

Our aim was to explore how the change in the nutritional quality of prey impacts the somatic growth of fish fry and its biomolecule content. Our special interest was to compare fish fry growth with DHA-rich diet to DHA-poor diets and when EPA content is also altered. This simulated zooplankton community change from copepod-dominated to Cladocera-dominated zooplankton and green algae and cyanobacteria dominance in lakes (lack of DHA and EPA; diets 35) or change in the macroinvertebrate community from DHA-rich to DHA-poor species and when benthic cyanobacteria have increased. Rainbow trout fry growth and biomolecule content were additionally compared to an artificial diet that represented possibility for the maximal growth [7].

More specifically, the following five fish diets were used 1. Artificial diet (Fish feed, Biomar Inicio Plus; 1.0% and 0.5% of ω-3 PUFA and DHA) was used as an optimal diet to achieve maximum growth rate for rainbow trout, 2. Marine zooplankton diet of krill and Mysis (Krill Pacifica and Mysis, Ocean Nutrition; feeding ratio of krill and Mysis: 50% and 50%; Krill/Mysis; 1.5% and 0.6% of ω-3 PUFA and DHA) to simulate DHA-rich diets in lakes and streams, [8]. *Daphnia* fed on poor nutritional quality methylotrophic bacteria (grown on methane) and intermediate quality green algae (*Daphnia* 1; bacteria + green algae; 0.5% of ω-3 PUFA of DW), 4. *Daphnia* fed on the intermediate quality diet (*Daphnia* 2; green algae; *Acutodesmus* sp.; 1% of ω-3 PUFA of DW), 5. *Daphnia* fed on a mixture of high quality (*Cryptomonas, Mallomonas, Synura, Peridinium, Diatoma*, *Stephanodiscus*, and *Nitzschia*) and intermediate quality algae (*Daphnia* 3: feeding ratio 80% high quality and 20% of green algae; 2% of ω-3 PUFA of DW and 0.2% of EPA of DW). Diets 3–5 represented DHA-deficient diets (cladoceran and most macroinvertebrates in freshwaters). Moreover, *Daphnia*-dominated diets differed in their EPA-content and thus presented poor, intermediate, and high (rich in EPA) nutritional quality. This simulated situation when the dietary availability of EPA for daphnids and macroinvertebrates is limited [9-10].

Conclusion

We compared how DHA-rich and DHA-deficient prey impact the development and biochemical content of rainbow trout (*O. mykiss*) fry by altering the dietary availability of macromolecules (lipids, carbohydrates, proteins) and essential amino acids and fatty acids. The fast somatic growth of trout fry when feeding on a DHA-rich diet compared to DHA-poor diets demonstrates that change in zooplankton or macro invertebrate communities to DHA-deficient species may reduce the growth of salmonid fish fry. This is especially likely when fish fry cannot efficiently biosynthesize EPA, DHA, or ARA from their precursors and thus cannot overcome suppressed availability of these physiologically essential biomolecules by endogenous biosynthesis.

References

1. DiRusso CC, Li H, Darwis D, Berger J, Watkins PA, et al. (2005) Comparative biochemical studies of the murine fatty acid transport proteins expressed in yeast