

# ImprovAFish

## Improving aquaculture sustainability by modulating the feed-microbiome-host axis in fish

### About the project

As the human population surges towards 10 billion, the production and consumption of aquaculture products such as fish is expanding. Efficient and environmentally sustainable practices are therefore required to ensure long-term food security. To solve these challenges, attractive solutions include developing new feed ingredients and better broodstock genetics to improve fish production and welfare.

Intriguingly, it has been shown that both feed and host genetics can modulate the microbiome of animals and thus influence its integral connection to host phenotype. The ambitious aim of ImprovAFish is to decipher the intimate functional coupling along the feed-microbiome-host axis in an applied context, with the emphasis on a promising 'next generation' functional feed ingredient (beta-mannan) that is known to promote beneficial microbiota in production animals, including promising preliminary data in fish.

Our approach is to jointly analyze how diet affects the metabolic function of the host and its microbiome as a single unit of action, using a novel and powerful framework called "holo-omics". This entails monitoring how changes in enzymes and metabolites produced by microbiota, correlates with uptake and metabolism of nutrients in the gut and liver of the fish. By doing this across life stages, different feeds and with recordings of key performance indices, we aim to identify exploitable interactions between specific feed components and microbiome functions that can be used to improve fish phenotype. In addition, associations between broodstock genetic variation, microbiome composition and diet will be determined, which will facilitate selection for fish with preferred gut microbiota. Ultimately ImprovAFish will facilitate optimization of improved and sustainable feeding strategies that are specifically tailored to host genetics (or vice versa), with an emphasis on socially responsible outcomes facilitated by a dedicated Responsible Research and Innovation process.



### Project Overview

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#### Priority Area:

Exploring improvements in fisheries and aquaculture

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