

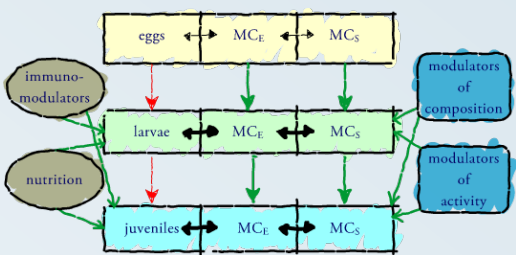


PROMICROBE

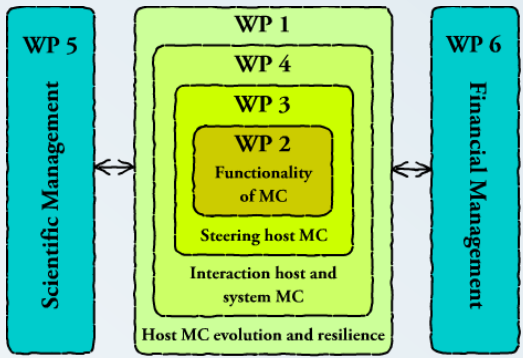
Microbes as positive actors for more sustainable aquaculture

improving knowledge on host microbial interactions in aquaculture systems

The PROMICROBE concept starts from the idea that in the aquaculture environment, the host microbial community (MC) is influenced by the host itself and by the microbial community of the system in which the host is living.



It is anticipated that there is a reciprocal interaction between the different compartments of the system in every stage of the life cycle.



*Sponsored by the EC Seventh Framework Programme
Theme 2: Food, Agriculture and Fisheries, and Biotechnology*

WORK PACKAGE 1

establishment, stability & resilience of gut microbial communities

The specific objectives are to:

Characterize the gastrointestinal microbial community of various fish species as a function of developmental stage using culture independent methods.

Evaluate the effect of the holding regime (feed, cultivation regime etc) on the composition of gastrointestinal microbial community.

Evaluate to what extent the composition of the gastrointestinal microbial community affects performance/viability (growth, survival) of the fish.

Evaluate to what extent fish within and between species has one or several healthy stable states of gastrointestinal microbial community composition.

Characterize the time course stability of gut microbial communities in individuals.

Test the resilience of the intestinal microbial community after perturbations with antibiotics.

Compare the composition of the autochthonous microbial community versus the microbial community in faeces of single individuals.

Work Package Coordinator

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Norwegian University of
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NTNU

other partners involved

Ghent University

INRA - Ifremer

Wageningen University

Sintef - Fisheries & Aquaculture

WORK PACKAGE 2

the functionality of microbial communities at the host level

The main focus here is to develop an experimental system that allows for the study of the effects of micro-organisms on the host in an unambiguous way contributing to an increased knowledge on the effect of micro-organisms on the host metabolism.

This goal set, one can develop an axenic larval growth protocol using compound diet instead of live feed and a gnotobiotic challenge test for larvae using *Listonella anguillarum*. These tools allow to investigate the effect of feed components on the outcome of such a *L. anguillarum* challenge and to determine the relationship between diversity of the microbial community and prevention of invasion by a pathogen.

In a further stage, cDNA-AFLP technology is used to look into different MC - host interactions such as feed degradation and fermentation, the effect of immunostimulants on host metabolism...

Also the extent the MC composition in later phases is determined by the early exposure (imprinting) is looked into.

Work Package Coordinator

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other partners involved

INRA - Ifremer

Wageningen University

Norwegian University of Science and Technology

Sintef - Materials & Chemistry

Sintef - Fisheries & Aquaculture

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WORK PACKAGE 3

the steering of gut microbial communities

Steering of the microbial community can be done in two different ways: (1) by adding live microbes through water or feed (probiotics), and (2) by selecting microbes in the gut and/or in the rearing system with particular substrates (prebiotics or other selective compounds). Prebiotics are non-digestible compounds present in the feed in small quantities - normally oligosaccharides and polysaccharides - for selecting beneficial bacteria. Such substrates may be considered to steer MC inside the fish. They can be used as purified feed additives, or introduced with plant-based protein sources, in the context of the urgent need for replacing fish meal by alternative sources of protein in aquafeeds. Nitrogenous compounds are other important substrates for bacteria, and their dietary supply, especially in readily usable forms like protein hydrolysates, may act upon MC and the host. In a more holistic approach, the C:N ratio in feeds will affect microbiota inside the fish, and in the rearing system after excretion and defecation.

Work Package Coordinator

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other partners involved

Ghent University
Wageningen University
Norwegian University of Science and Technology
Sintef - Materials & Chemistry
Sintef - Fisheries & Aquaculture

WORK PACKAGE 4

the functionality of gut and system microbial communities

In this work package, there will be looked into the comparison of the microbial communities in the water in the different Recirculating Aquaculture System (RAS) components, including the fish and the feed in RAS.

Secondly, there will be an evaluation of the impact of waterborne microbial communities (MC) on the intestinal (gut) microbial flora in these RAS setups.

The impact of algae on the water microbial community and its cascading effects on the gut flora is evaluated, together with the nutritional qualities of microbial flocs grown aerobically, anoxically or anaerobically in RAS.

Finally, the limits and options to integrate microbial processes in RAS are determined, while safeguarding gut MC integrity and hence well-being of cultured organisms.

Work Package Coordinator

Marc **Verdegem**

Wageningen University



other partners involved

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Sintef - Fisheries & Aquaculture

PROJECT MANAGEMENT

PROMICROBE has a Scientific Steering Committee (SSC), composed of the Project Management Team, the WP leaders and at least one scientist of all the partners.

Apart from the scientists that are involved on a daily basis in the project, the SSC will be supplemented with Patrick Sorgeloos (UGent), Sachi Kaushik (INRA - Ifremer) and Johan Verreth (WUR), operating as advisers to the scientific management of the project.

The Project Management Team (PMT) consists of the Scientific Coordinator, Peter Bossier (UGent), the Scientific Assistant Coordinator, Yngvar Olsen (NTNU) and of Kristof Dierckens, who is the Financial Manager (UGent).



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