

# SalmoSim: An in vitro simulator of the Atlantic salmon GI tract and microbiome

Raminta Kazlauskaite

Bachar Cheaib

Chloe Heys

Umer Zeeshan Ijaz

Stephanie Connelly

William Sloan

Julie Russell

Laura Rubio

John Sweetman

Alex Kitts

Philip McGinnity

Philip Lyons

Martin Llewellyn

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## Video Byte

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# Abstract

Aquaculture is a critical industry for human food production, and strategies to improve fish nutrition while protecting the environment can help maximize aquaculture output and sustainability. However, the roles of the gut microbiome in fish nutrition are not well understood. To support further research, scientists recently developed SalmoSim, an in vitro model of the Atlantic salmon gut and microbiome. The researchers linked three bioreactors seeded with gut material from adult farmed salmon to simulate the stomach (S), pyloric caecum (PC), and midgut (MG). When a fishmeal “diet” (FMD) was supplied, SalmoSim’s microbial community stabilized in approximately 20 days and was ecologically indistinguishable from the real fish microbiome used to inoculate the system. Switching from the FMD to a fishmeal-free diet (FMF) for 20 days did not affect most microbes (operational taxonomic units, OTUs) in either SalmoSim or real salmon. In addition, food switching did not significantly change the volatile fatty acids in SalmoSim, supporting the low microbial impact of the novel feed. Although it cannot currently simulate digestion, SalmoSim is a useful tool for food supplement pre-screening and salmon microbiome research, and it can be used as a prototype to develop models that simulate the guts of other fish species.