



# Enchytraeids

## as Live Feed for Aquaculture

– Development of Mass Production and Cryopreservation



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### PROBLEMS

Today, fish fry production is based almost exclusively on rotifers and *Artemia*, which both need to be enriched with fish oils or algae before use. This procedure is **expensive and time-consuming** and the nutritional quality of these types of live feed is not optimal. Due to the small size of rotifers and *Artemia*, the weaning to pelleted fish feed happens at a relative early life stage where the juvenile fish cannot optimally digest dry feed.

The result of these constraints is **high mortality, sub-optimal growth rates and high occurrence of deformities**.

Further, both availability and prices of *Artemia* are unstable and the European Aquaculture sector is limited by supply and quality of sufficient live feed.

One very important **unmet need** is therefore **an adequate supply of** new types of nutritious and health-improving **live feed** organisms.

### SOLUTION – HOW CAN WE SOLVE THESE PROBLEMS?

We aim to develop nutritious, palatable, size-specific and immune-stimulating live feed organisms for larval and juvenile stages of farmed fish. The **live feed should showcase three features** when fed to the fish:

- Improve fish growth and development
- Minimize fish mortality
- High nutritional quality without enrichment

To enable global distribution and safe storage of live feed organisms we will develop an industrial method to cryopreserve live Enchytraeids by **utilizing their natural ability of freeze tolerance**.

In addition, future research will investigate the possible use of Enchytraeids as live vectors for early probiotic introduction and vaccination of early life stages of fish.



### POTENTIAL

Cryopreserved Enchytraeids as live feed has the potential to revolutionize aquaculture as we know it, by **ensuring growth potential and survival** of currently cultivated fish species in aquaculture, but also **enabling rearing of new fish species** in aquaculture.

By using Enchytraeid worms as live feed the fish farmer can **postpone weaning** onto dry feed until the fish is large enough to eat and utilize dry feed optimally and **increase his yearly yield by 35 million DKK**.

### CHALLENGES

- 1 Enchytraeid worms are produced on a semi-industrial scale, but methods need to be improved for optimal **industrial mass production**.
- 2 Currently, no long-term transport and safe storage options are available. **Cryo-preservation** of live enchytraeids has been performed in the lab, but a method for industrial use has yet to be developed.
- 3 **Proof-of-concept** needs to be established by testing the cryopreserved products together with the industrial aquaculture partners.



### SPIN-OUT COMPANY: DELIFEED

Project partners will create a spin-out company that will produce and deliver various kinds of live feed, **including Enchytraeids**, to the global aquaculture sector.

- Expected DELIFEED revenue in 2028 is 27.5 million DKK based on our current European network.
- Global live feed Share of Market (SOM) is 315 million DKK
- Added value creation in the EU aquaculture sector is >350 million DKK.

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