



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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