Diversify EU Barcelona January 17th

C-FEED AS

- Established in April 2014
- Located in Trondheim Area, Norway
- Based on more than 10 years research at SINTEF Fishery and Aquaculture
- Built the worlds first commercial scale production site for copepods in feb. 2016
- Producing Copepod eggs and adults for sale on daly base

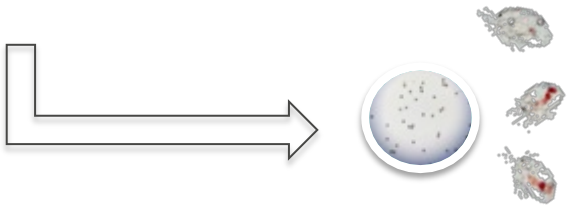
SEAFOOD FARMING

ON SHORE PRODUCTION

OFF SHORE

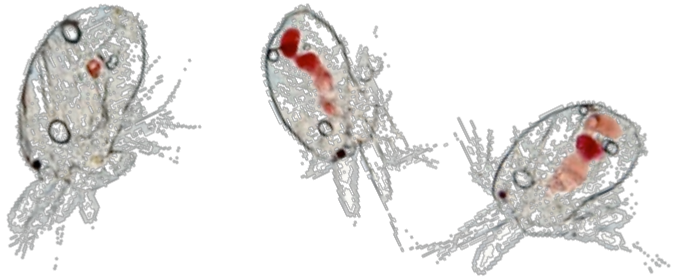
HATCHERY	STARTUP FEED	ONGROWING	FISH FOR MARKET
	Problem		

- HIGH MORTALITY
- LOW QUALITY
- SLOW GROWTH



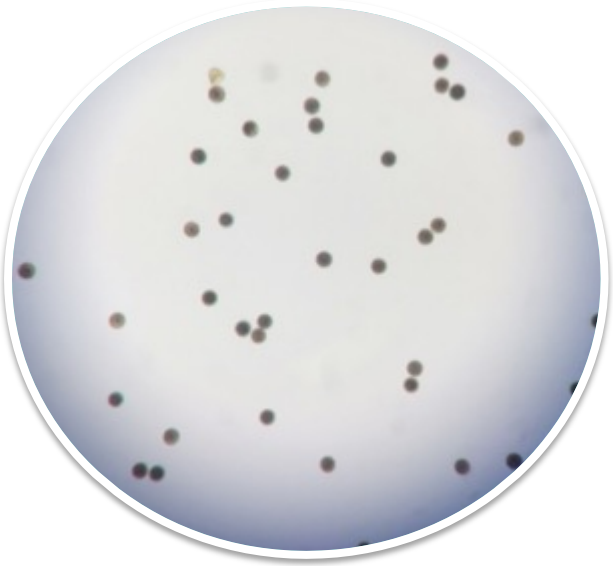
COPEPODS SOLUTION

LIVE FEED



- The use of high quality start-feed is essential for the development, survival and growth of the fry.
- Traditional live feeds, such as rotifers and Artemia have some insufficient nutritional content and must be enriched, which also can results in unfavourable production environment.

Photos: Tora Bardal

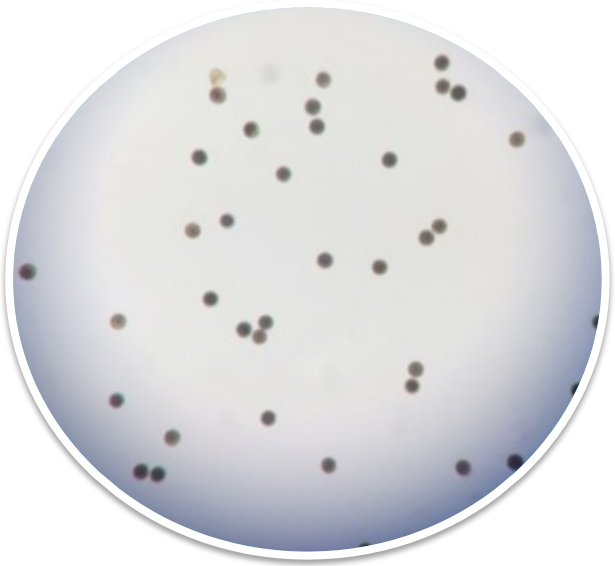


COPEPODS

- Optimal nutritional quality - rich in DHA & EPA, amino a vitamins
- Increases fish survival rates, growth and quality
- Improves fry-production environment

CFeed products

- COPEPOD EGGS



- LIVE COPEPODS

PRODUCT SUPPLY

Transport

- Air or land based freight
- Secures proper conditions
- Handles regulatory issues

Storage

Live copepods:

- Up to 1 week storage at 2 degrees without any feeding
- Several months, if fed with microalgaes

Eggs:

- Several months storage at 2 degrees

Hatching and ongrowing

Live copepods:

- C-feed takes care of all hatching and ongrowing

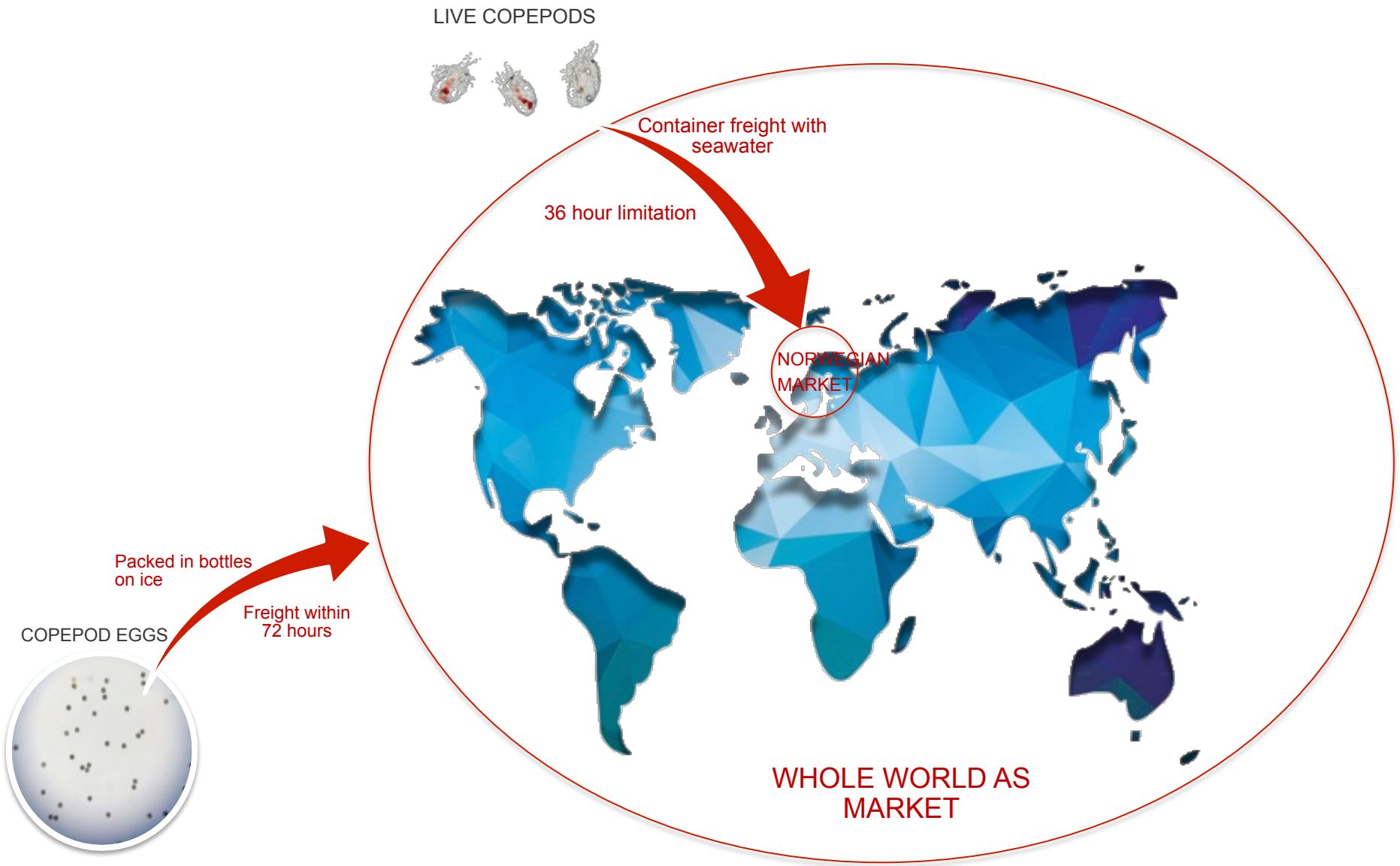
Eggs:

- Eggs hatch within 24 hours when placed in temperate sea water
- Feed with algae for until 12 days, to reach the right size
- Algaes can be bought from C-Feed

Use as feed

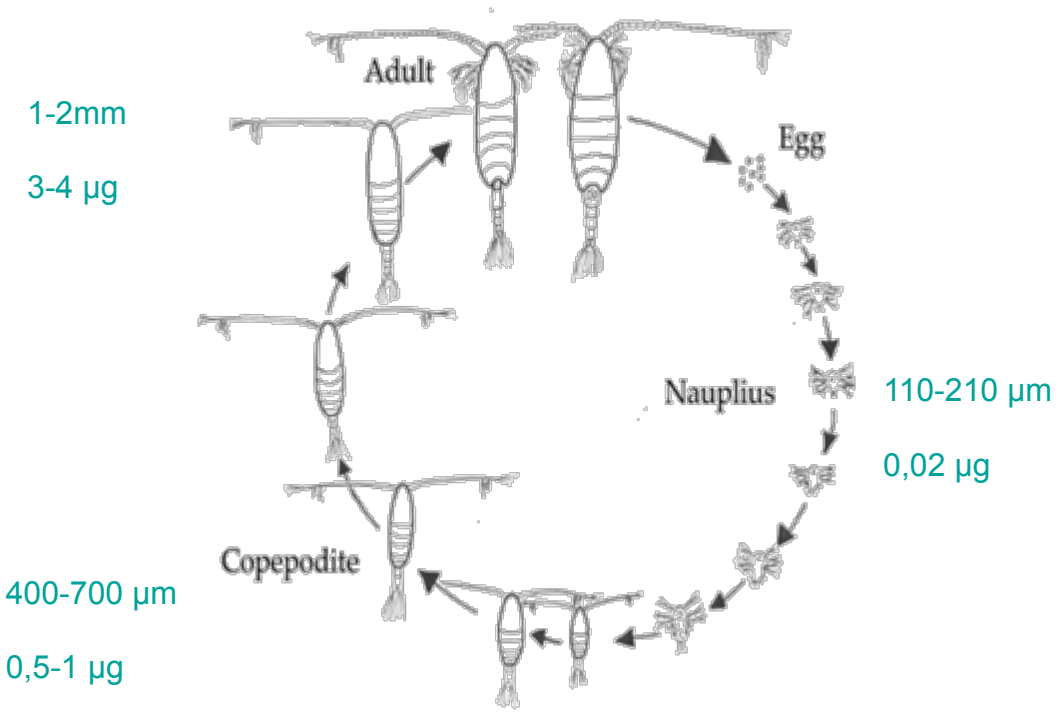
- Add properly sized copepods to fry tanks, following the proper feeding protocol

PRODUCT SUPPLY



LIFE CYCLE OF COPEPODS

- Hatch mutch like Artemia
- Different copeode size to different species at different stage
- Tested on several species to document effects



CASE STUDIES

The beneficial effects of copepod diet are well proven

CASE STUDY: Quality

14 days old Atlantic bluefin tuna larvae fed rotifers (A) and copepods (B)

Rotifers

- 83% deformities
- 1% survival

Copepods

- 8% deformities
- 10 % survival

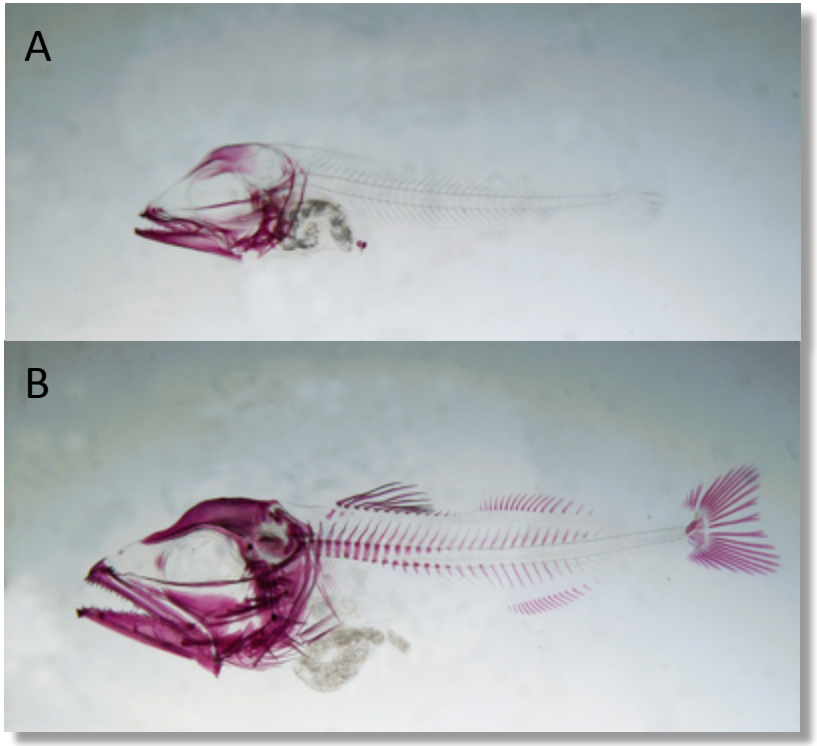
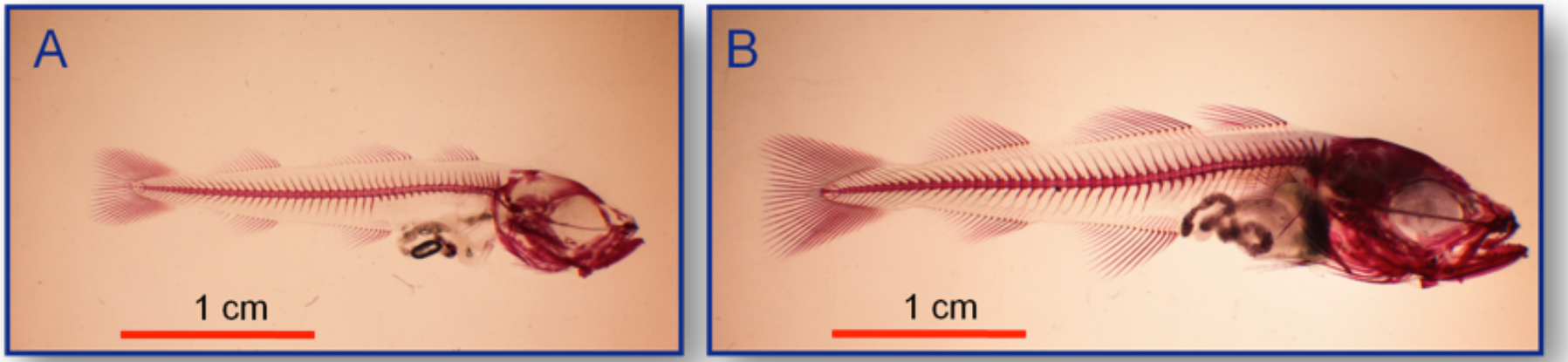


Photo: Fortuna Mare

CASE STUDY: Growth

60 days old cod juveniles



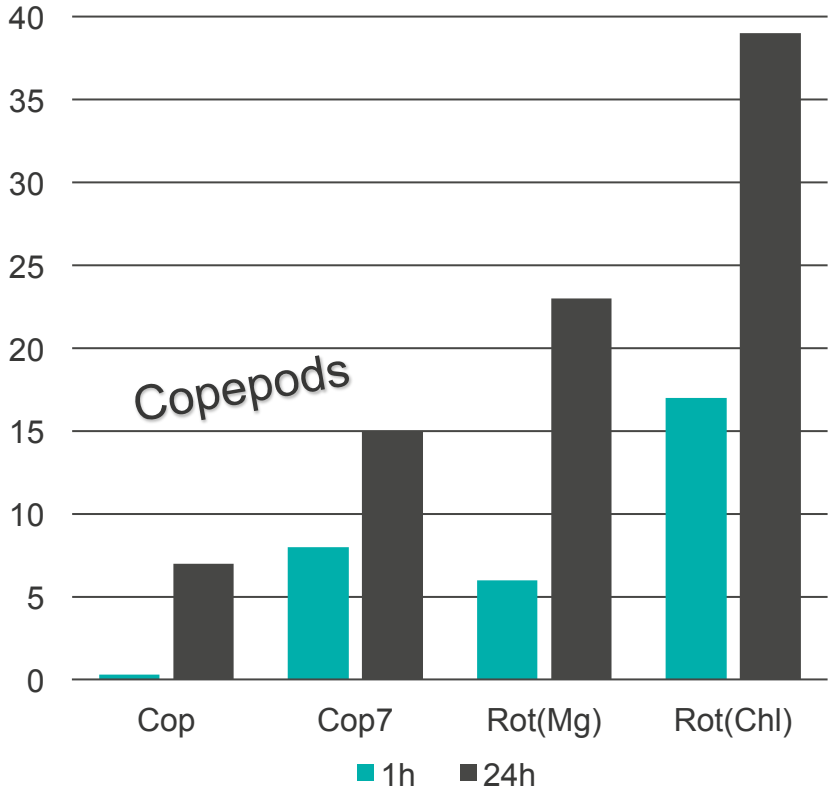
Photos: Tora Bardal

Rotifer diet

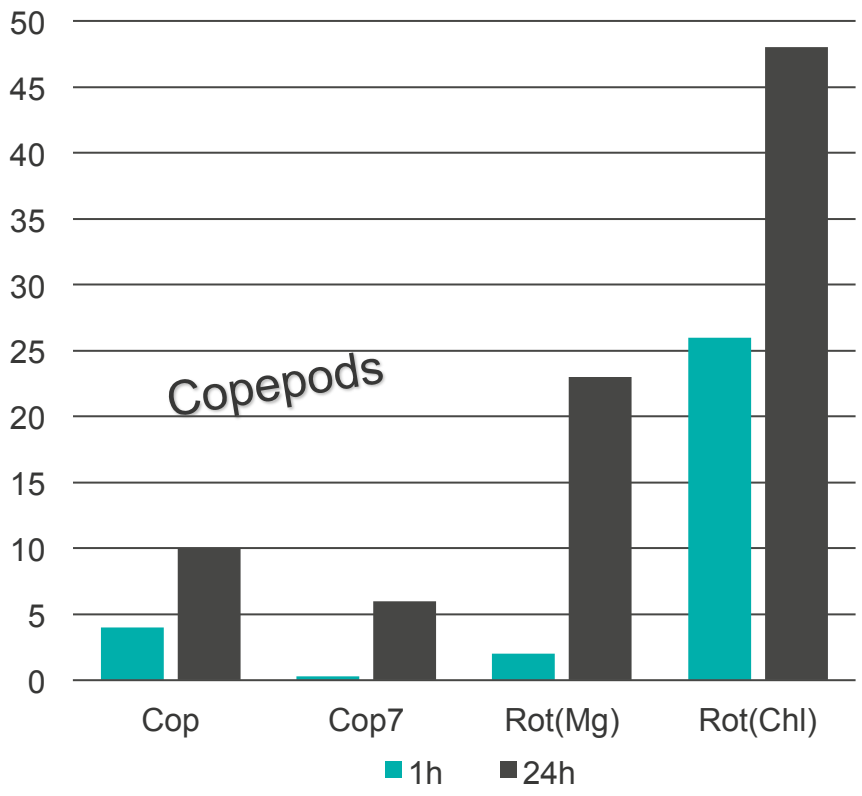
Copepod diet

CASE STUDY: Stress resistance

Cod fed with copepods/rotifers exposed to air for 1h/24h

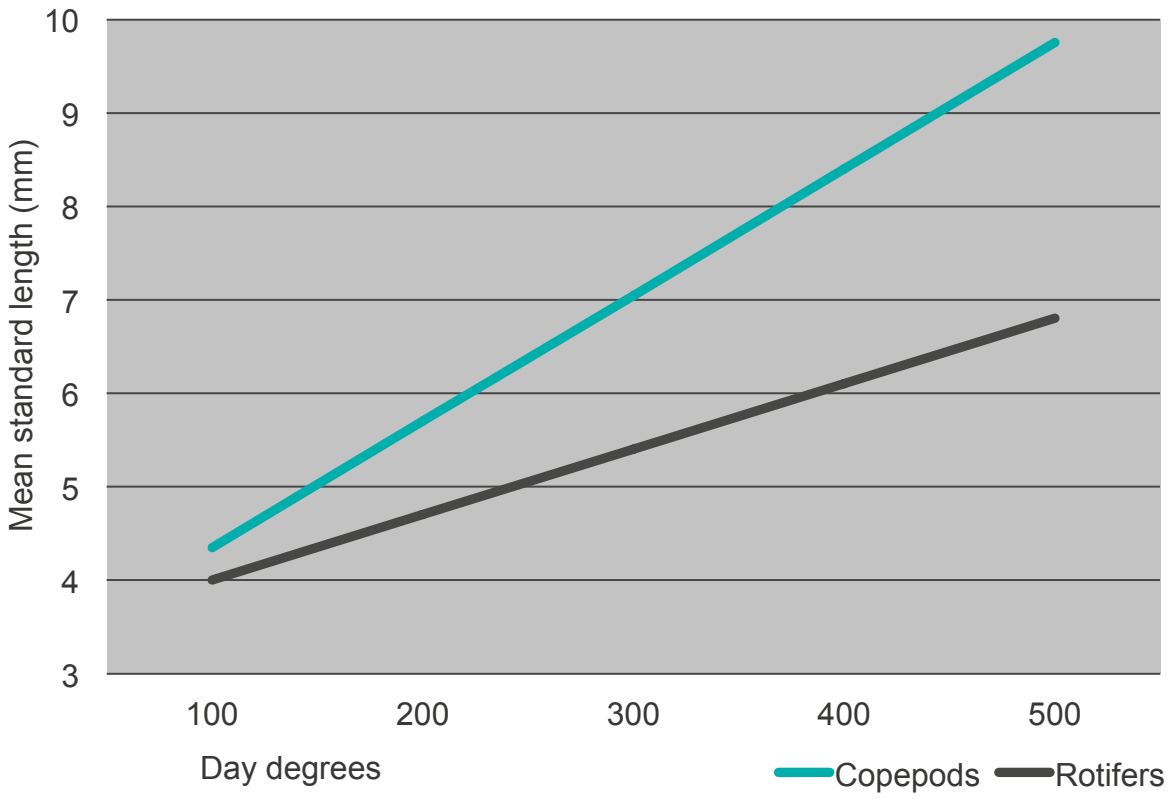


Mortality(%) after 45 sec air exposure test



Mortality(%) after 2x60 sec air exposure

CASE STUDY: Growth (Ballan Wrasse)



- 900 000 fish
- Copepod diet for 9 days
- 30% increased growth with COP
- Better Survival, stress tollerance, less deformities

2017 activities

- 1 Larger test in Turbot (last week)
- 2 Larger test in Sea Bream (February)
- 2 Larger tests in Ballan Wrasse (March)

WHAT ABOUT THE DIVERSIFY SPECIES?

HALIBUT

- Using right size copepods (stage 6-7)
- Using right density (5-15 cop/ml)
- Make the copepod visible (red colour)

⇒ Significant improvement

- Fast growth (metamorphosis and dwelling at bottom after 35 days)
- Close to 100 % natural pigmetation
- Well developed eye- migration
- Improved stress tolerance
- Good weaning to dry feed

=> Halibut already commercial (Cfeed solution)

WHAT ABOUT THE DIVERSIFY SPECIES?

GREATER AMBER JACK

- Not much scientific results published
- Some results in use of Copepods from ponds shows good results

- Could expect results in direction of Tuna- results (fast growth, starts with planctons, cannibalism)

⇒ Very interesting species for Copepods
⇒ CFeed are eager to get into trials with Greater Amber Jack

WHAT ABOUT THE DIVERSIFY SPECIES?

WRECKFISH (polyprion americanus)

- Relatively new species for aquaculture
- Bottleneck; larval survival
- Some testes with mix copepods and rotifiers indicates higher survival

⇒ Needs to explore tests with Copepods
⇒ CFeed are eager to get into trials with Wreckfish

WHAT ABOUT THE DIVERSIFY SPECIES?

GREY MULLET

- Adults are Herbivorous/Omnivorous
- Early stage eat planctons
- High mortality during early larvae development
- Seems to have specific nutritional demands (taurin, fatty acids etc.) and greenwater

⇒ Typical problems/needs where Copepods can be a good solution

⇒ CFeed are eager to get into trials with Grey Mullet

WHAT ABOUT THE DIVERSIFY SPECIES?

PIKEPERCH

- Sorry, no (you can’t winn ‘em all ☺).
- Fresh water species

CONCLUSION DIVERSIFY SPECIES

In 4 of 5 species we already know, or we expect:

- Improved survival
- Better growth
- Improved stress resistance
- Better weaning
- Improved juvenile quality

by using Copepods as starter feed

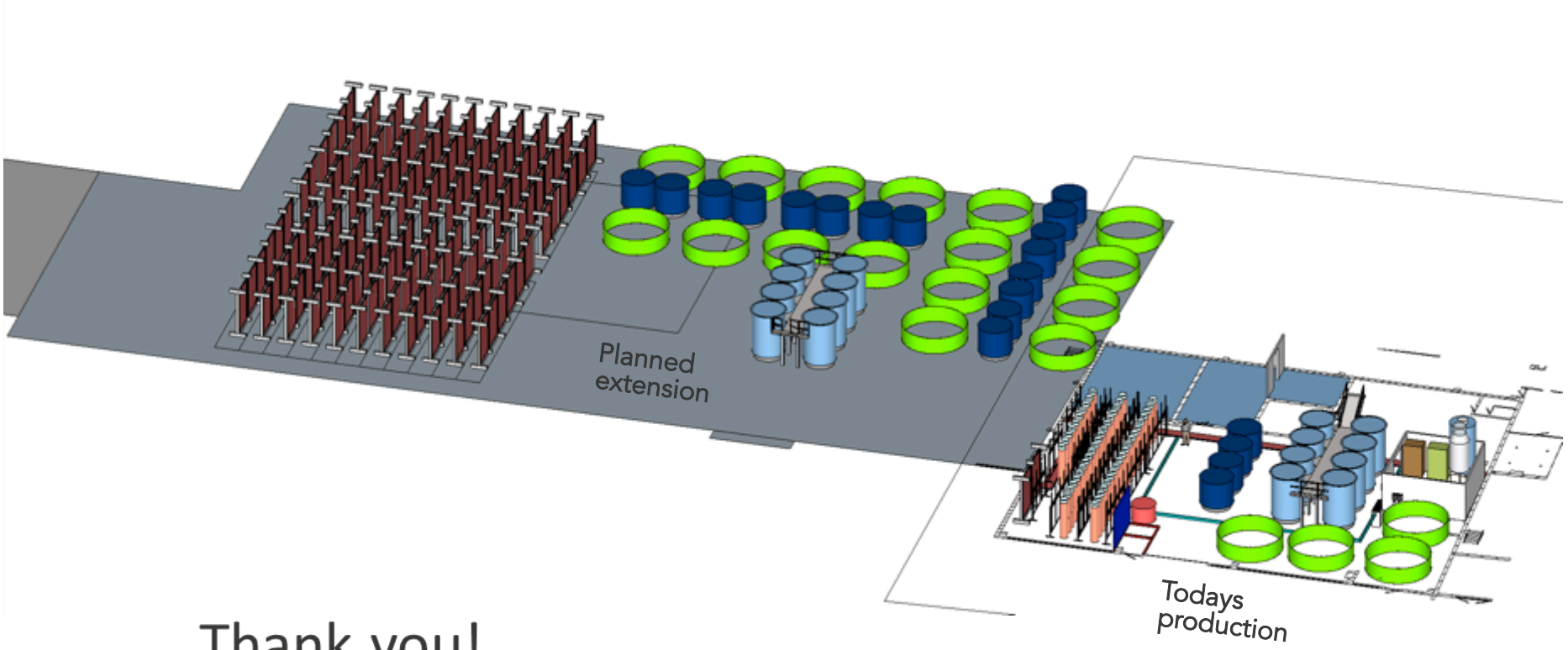
⇒ IMPROVED ECONOMY

CFeed targets

- Larger/Medium size projects in testing copepods at Diversify- species
- If possible with both national institutes & market companies
- Preferrably together with projects «about to get into industrial scale»
- All off interest

⇒ Please contact us if you are interested ☺

2018 extension plans



Thank you!