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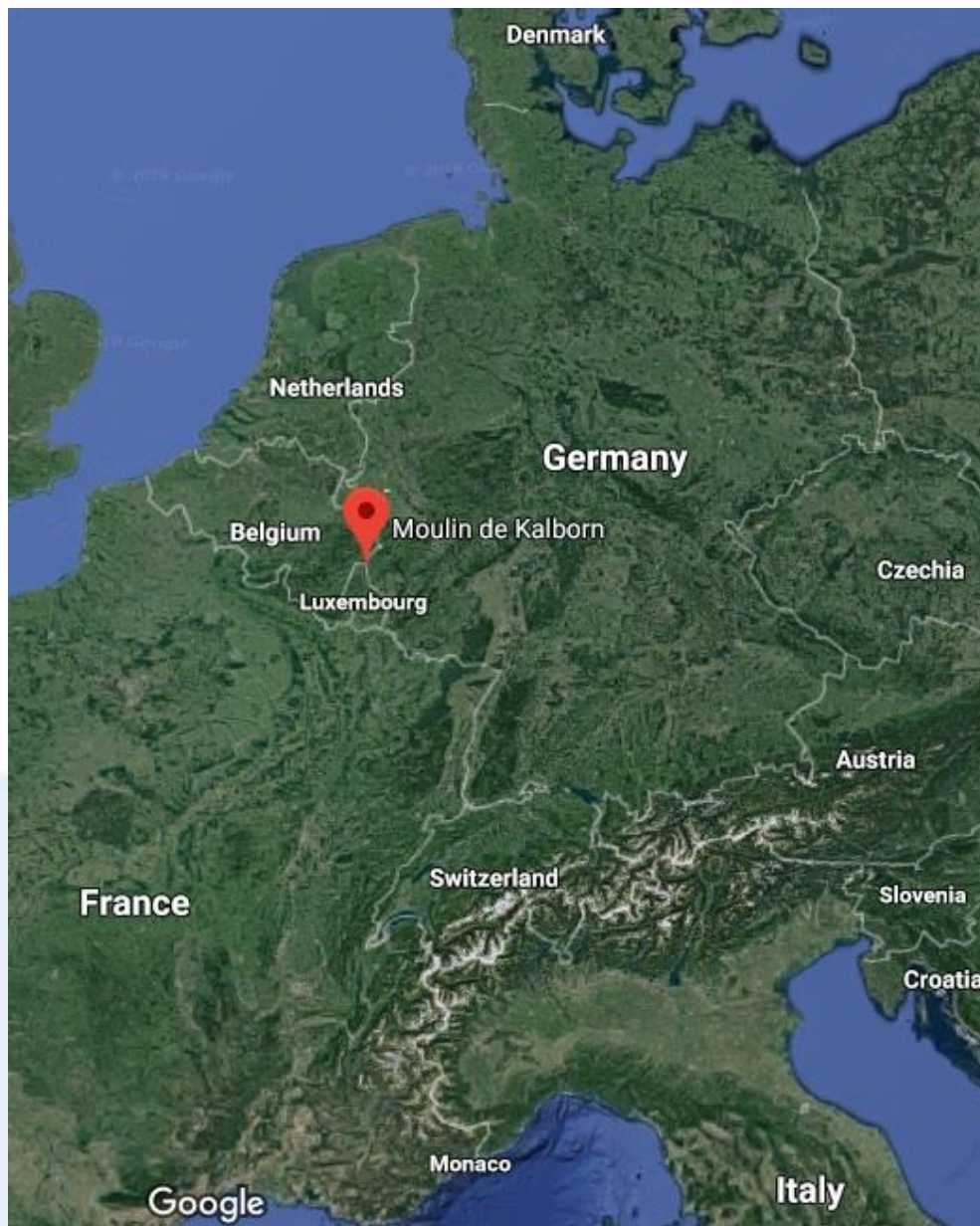
Propagation of freshwater mussels in Luxembourg

Searching for a more adapted diet

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Wanderscheid Anna, Thielen Frankie

The rearing facility

- The mill of Kalborn, situated in the north east of Luxembourg
- Operational since 2008
- Propagation of
 - freshwater pearl mussel (*Margaritifera margaritifera*)
 - thick shelled river mussel (*Unio crassus*)



Propagation methods

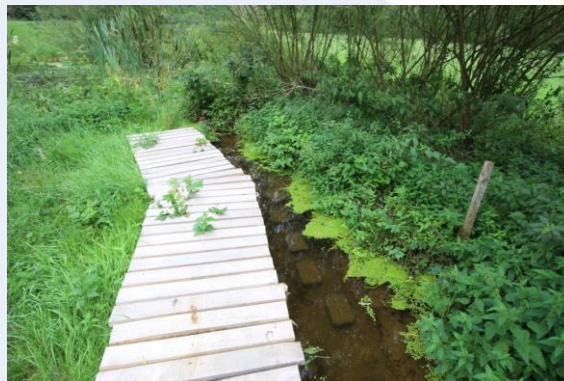
Detritus boxes



Sand aquaria

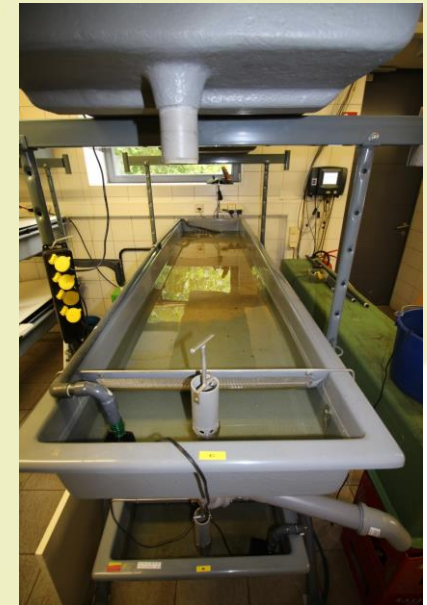


Outside rearing
channel



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Sand troughs



Feeding

- Feeding commercial algae
- Density of $1,5 - 2,0 \mu\text{m}^3/\text{ml}$



Why

- Survival rate for the first year with +/- 30 % OK
- Frequent high losses after 1,5 years in the station
- Very high survival for *U.c.* in outside rearing channel



Assumption

- Unadapted diet ?
 - ➔ feeding a freshwater organism with marine algae
- Maybe something is missing or accumulating over time
- Diet based on freshwater algae should be more adapted



Setup of algae culture

- Main goal: low effort + low costs !
- 2 tanks of 45 l
- Starter culture 2 x 0,5 l
Chlorella vulgaris
- River water
- Room temperature
- 24 h illumination
- No fertilisation



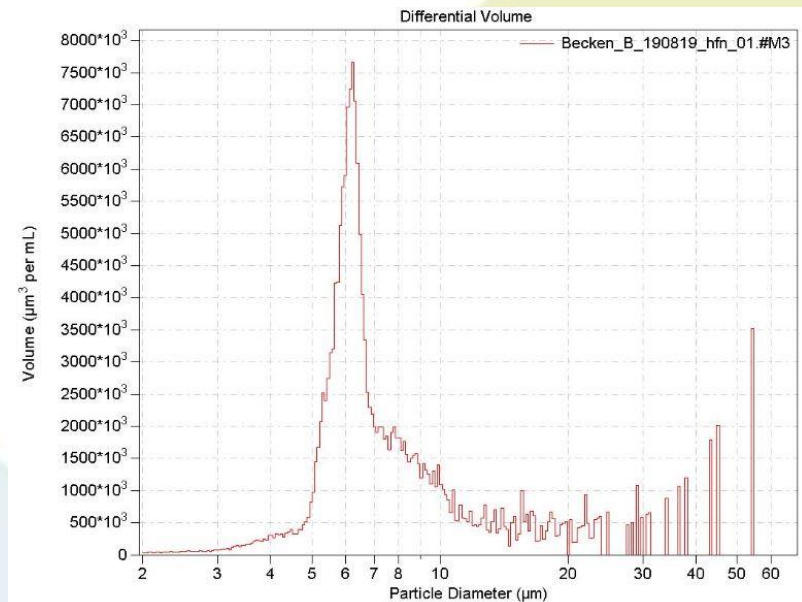
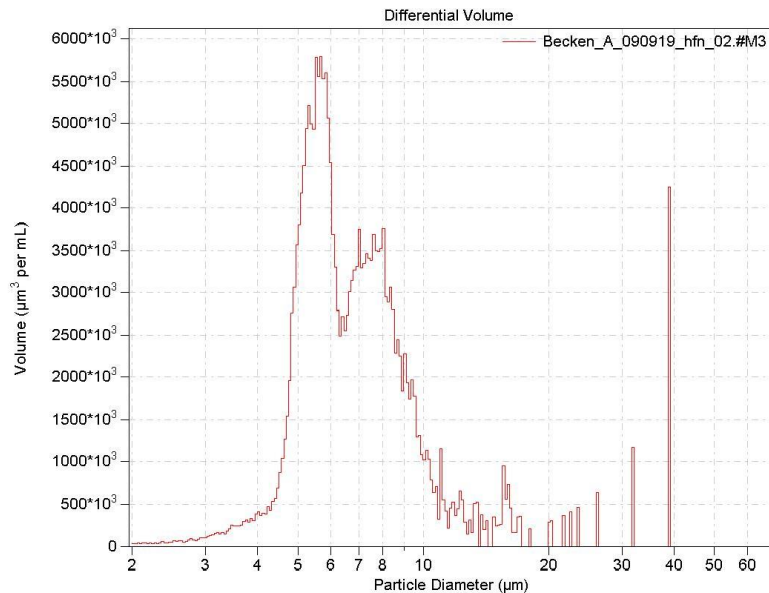
Setup of algae culture

- Good reproduction, high density after +/- 4 weeks
- Spontaneous occurrence of different algae and microbiological biomass



Setup of algae culture

- Size peak between 5 – 10 μm
- Tanks in weekly change harvest / reproduction



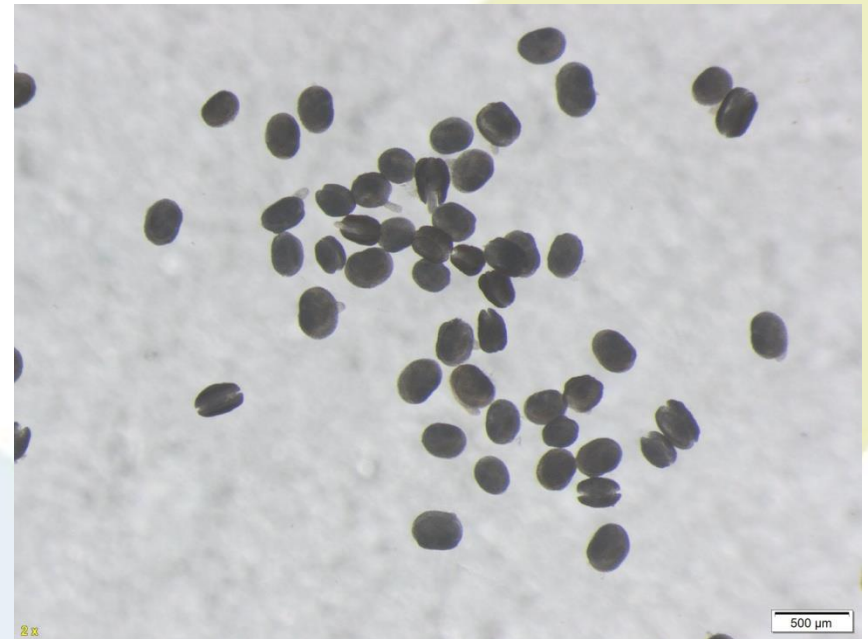
Conclusion I

- Success
- Culturing natural algae with very low input (1-2 hours weekly) is possible

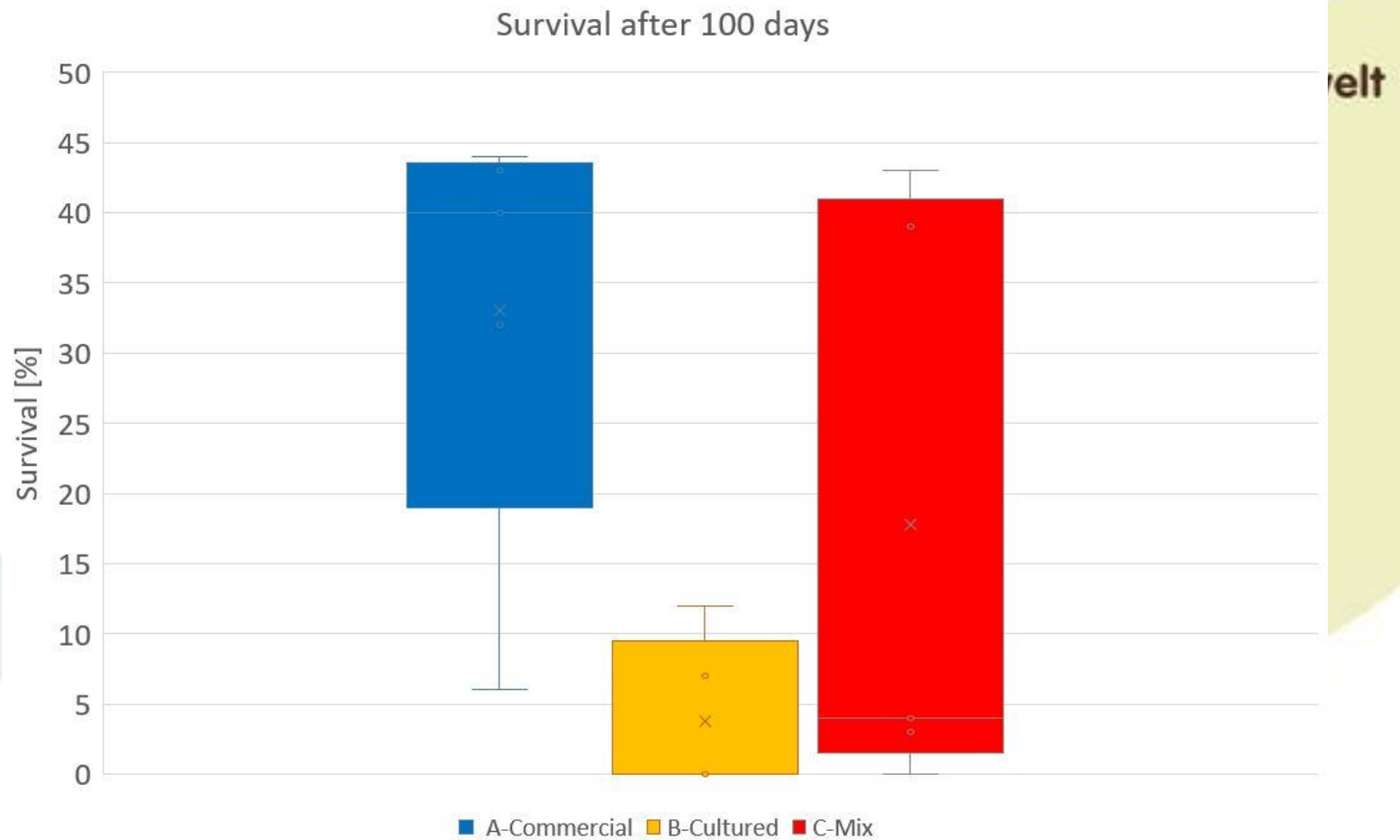


Feeding trial I

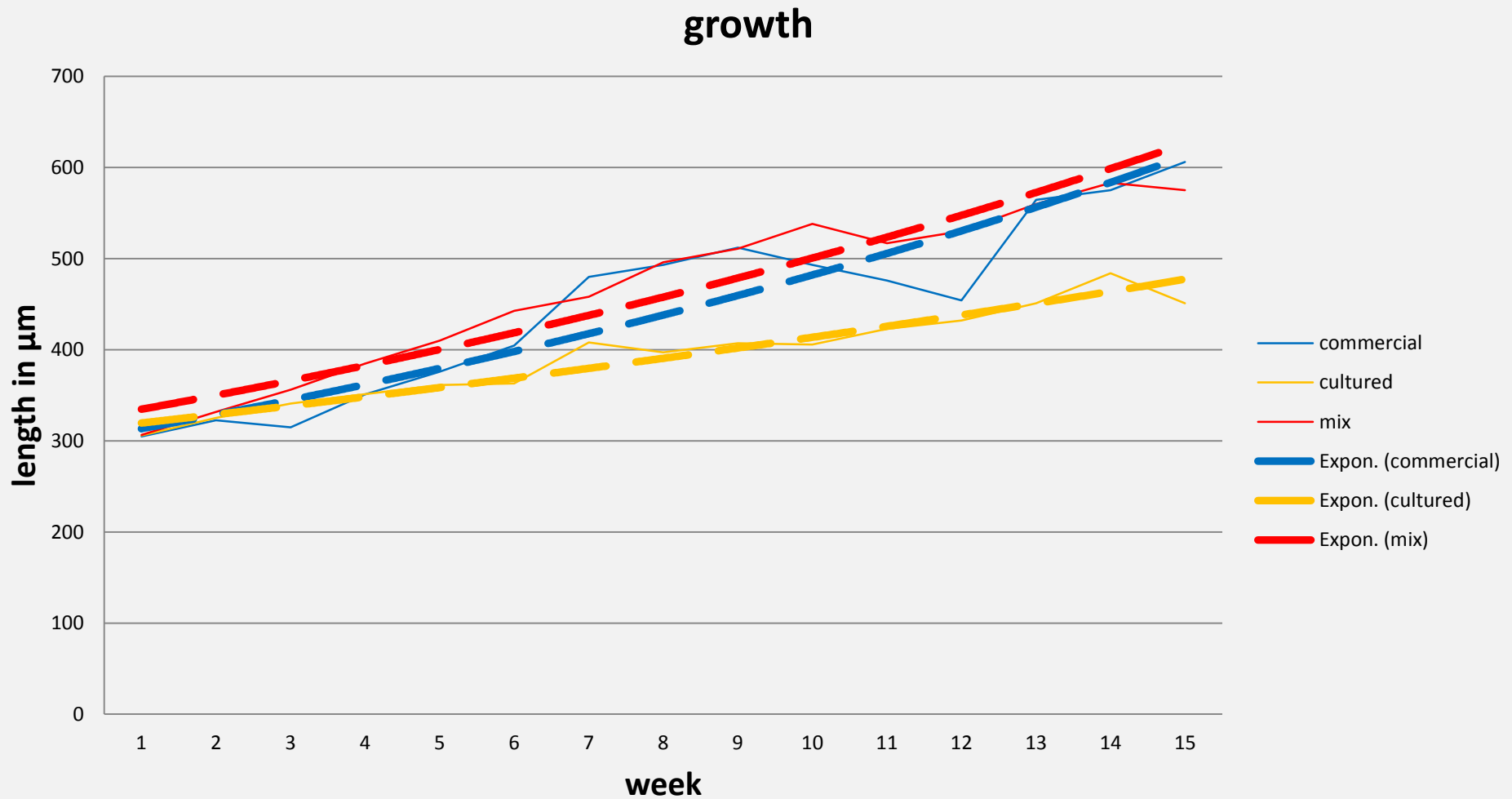
- Detritus boxes with *M.m.*
 - 3 sets of 5 boxes with 200 juvenile *M.m.*
 - Set A: commercial
 - Set B: cultured algae
 - Set C: mix 1:1



Results trial I



Results trial I

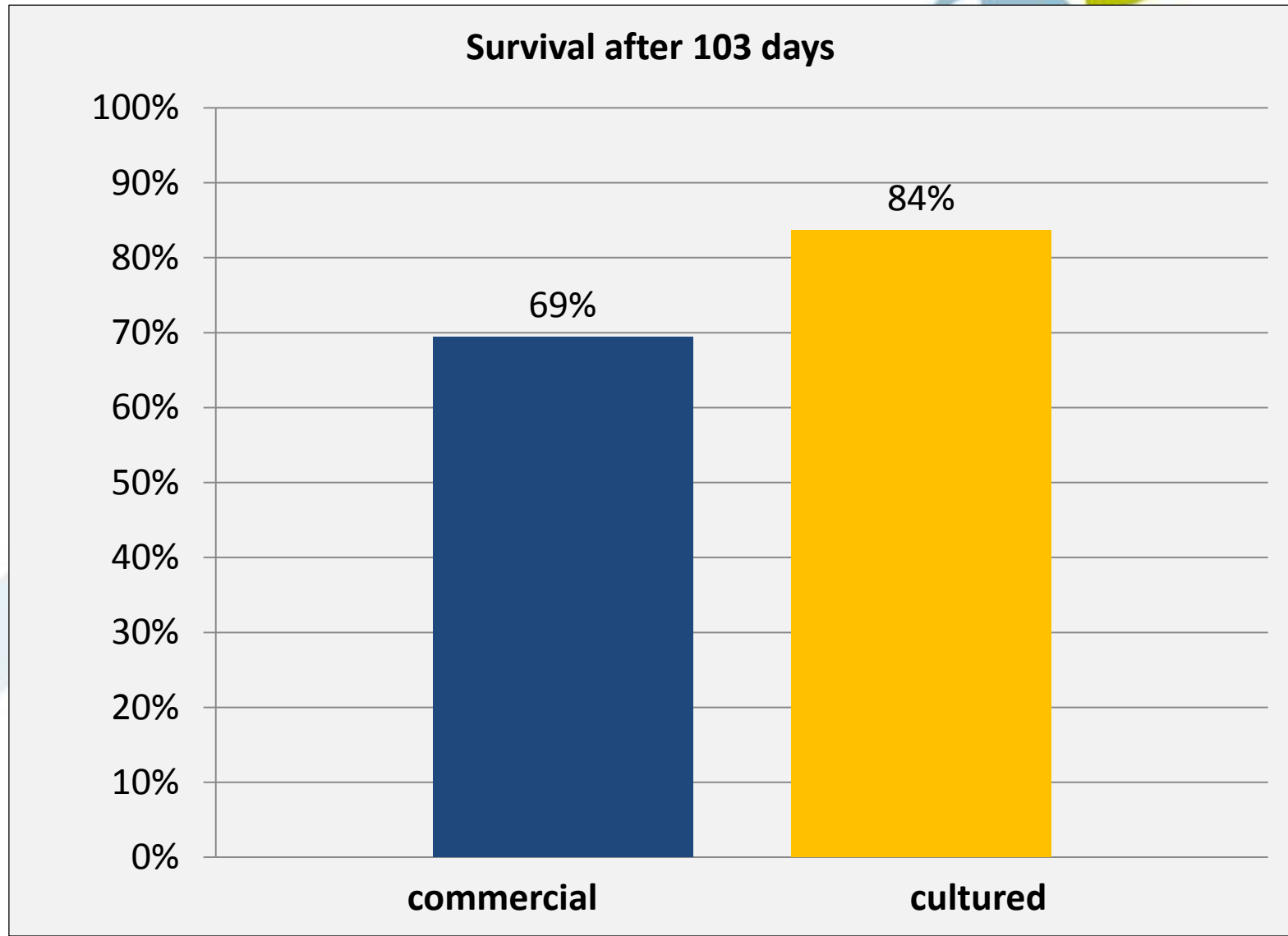


Feeding trial II

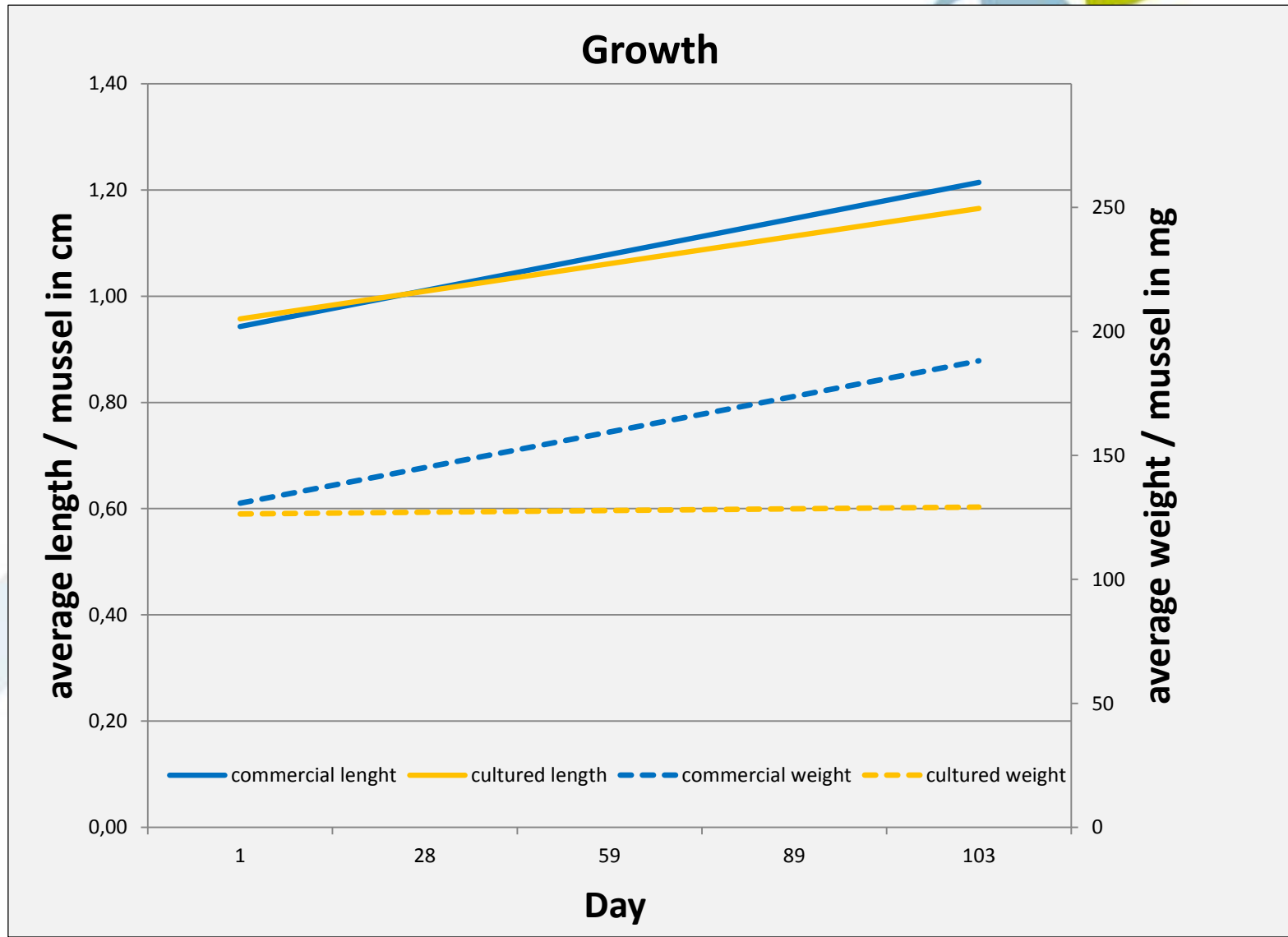
- Aquaria with *U.c.*
 - Set of 18 month old *U.c.* divided in 2 sets
 - Set A: commercial
 - Set B: cultured algae



Results trial II



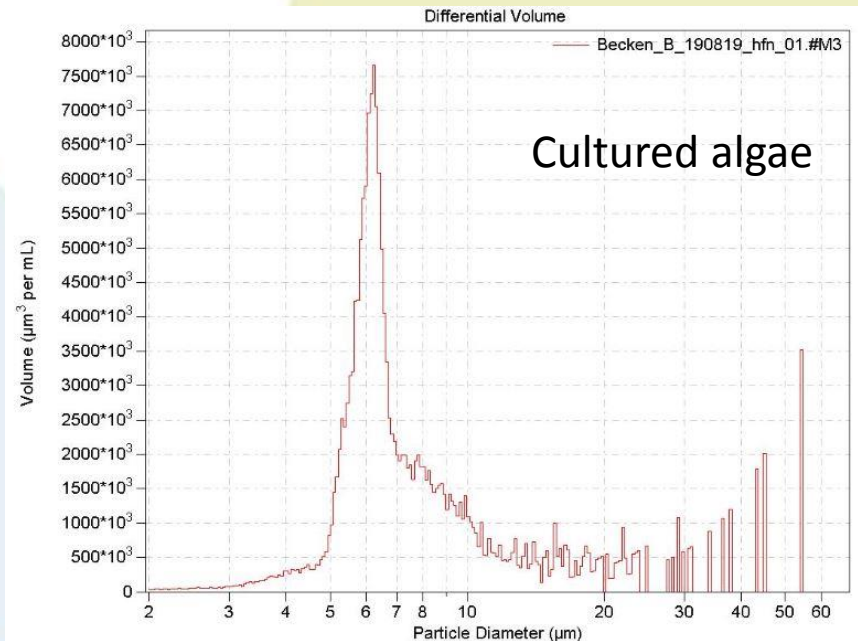
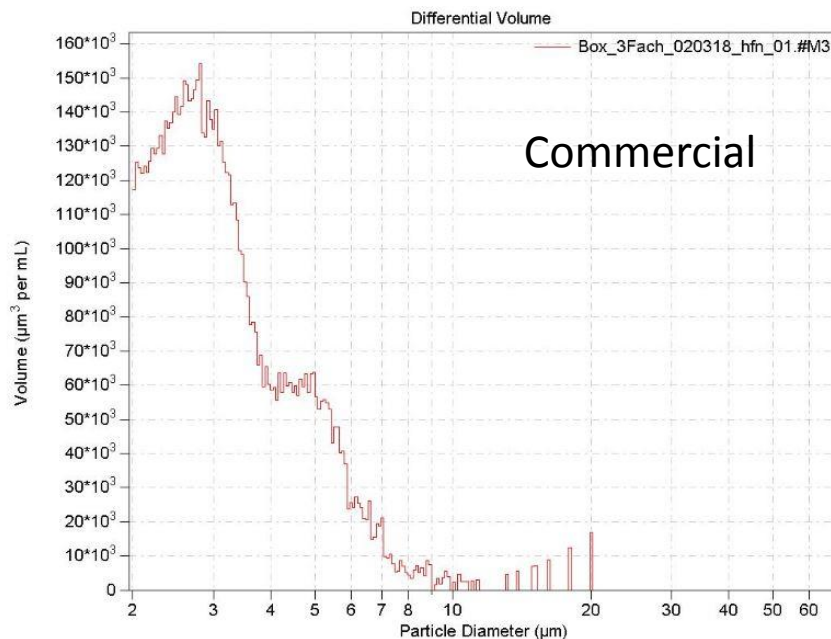
Results trial II



Conclusion II



- Diet based exclusively on cultured algae seems not adapted for juvenile *M.m.*
 - Size range slightly different



Conclusion II



- Higher survival for older *U.c.* fed with cultured algae
- Less growth with cultured algae
- Nutritional value of commercial algae must be higher
 - Higher concentration of cultured algae could lead to better results
- A mixed diet of commercial and cultured algae is promising

Feeding trial III



- Further trial started in June 2019
 - 3 sets of 3 aquaria with 150 juvenile *U.c.* / aquarium
 - Higher concentration
 - Set A: commercial; 3 times higher
 - Set B: commercial; as usual (control group)
 - Set C: mix; commercial as usual + 500 ml cultured
 - Special attention on water quality; observed once weekly

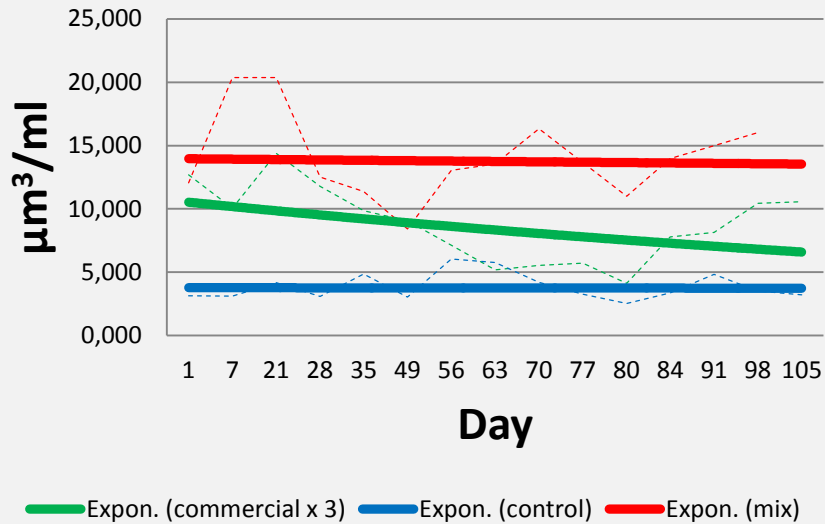
Assumption



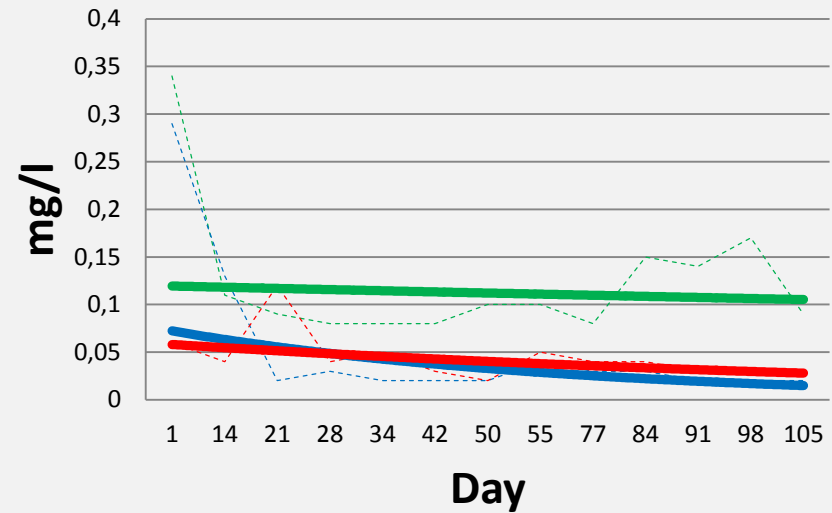
- Higher concentration could raise the survival rate and growth, regardless of the diet
- But
 - high concentration of commercial algae could degrade water quality
 - cultured algae could improve water quality

Results trial III

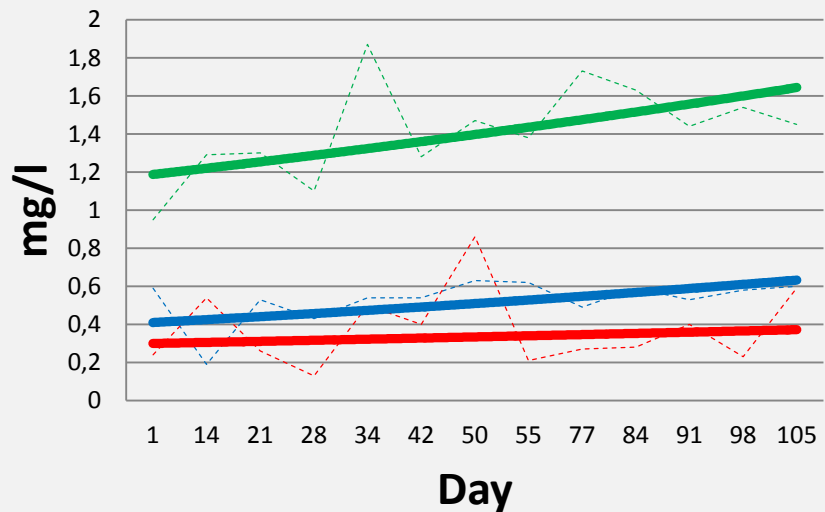
Density



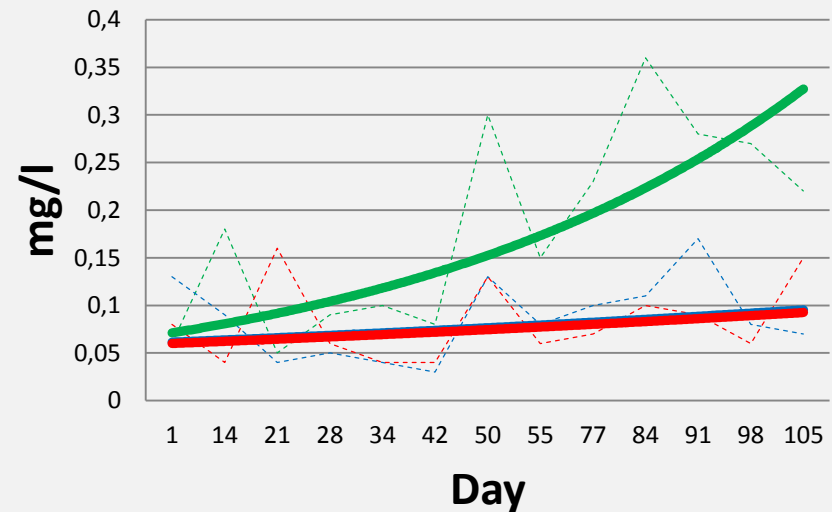
NO_2^-



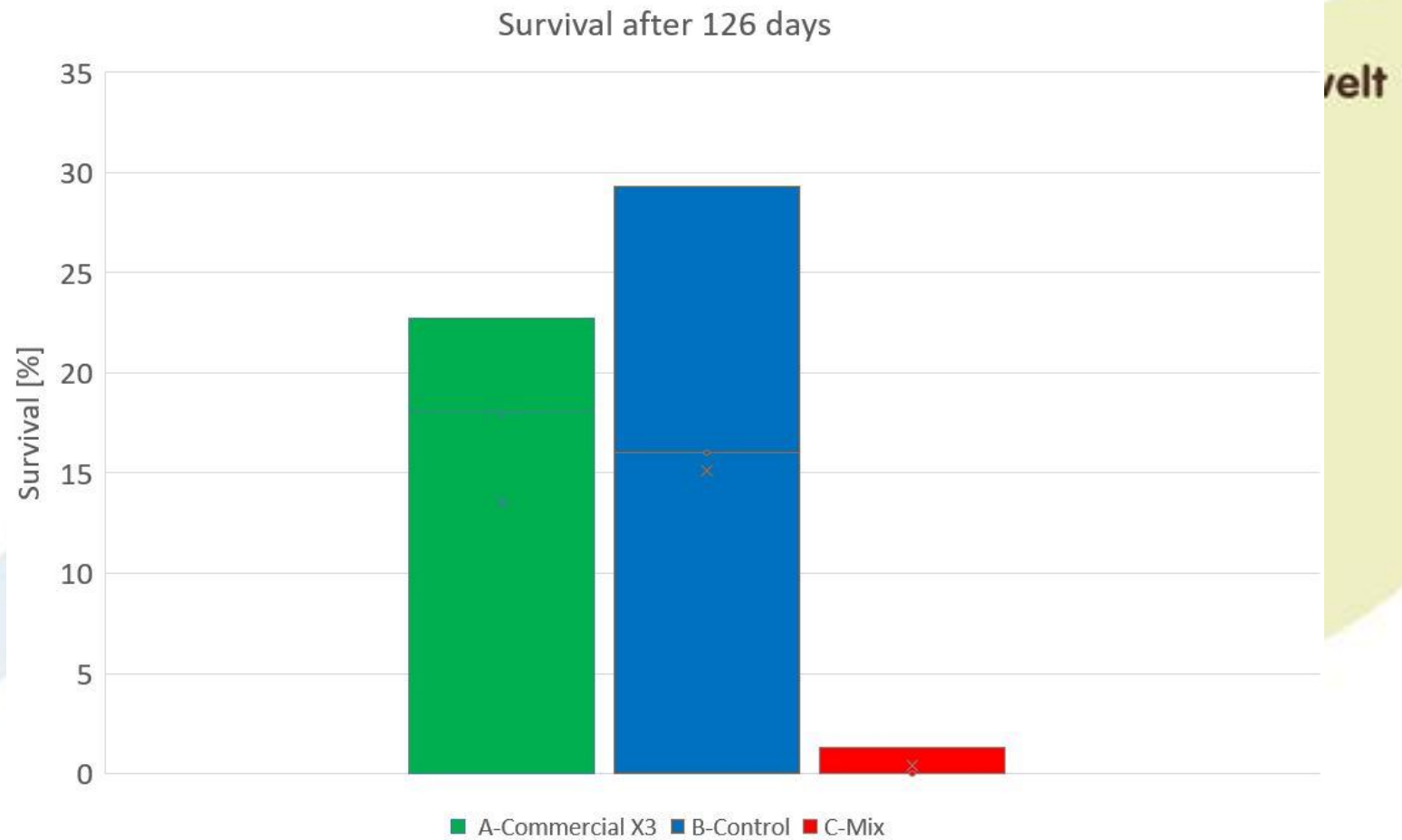
PO_4^{3-}



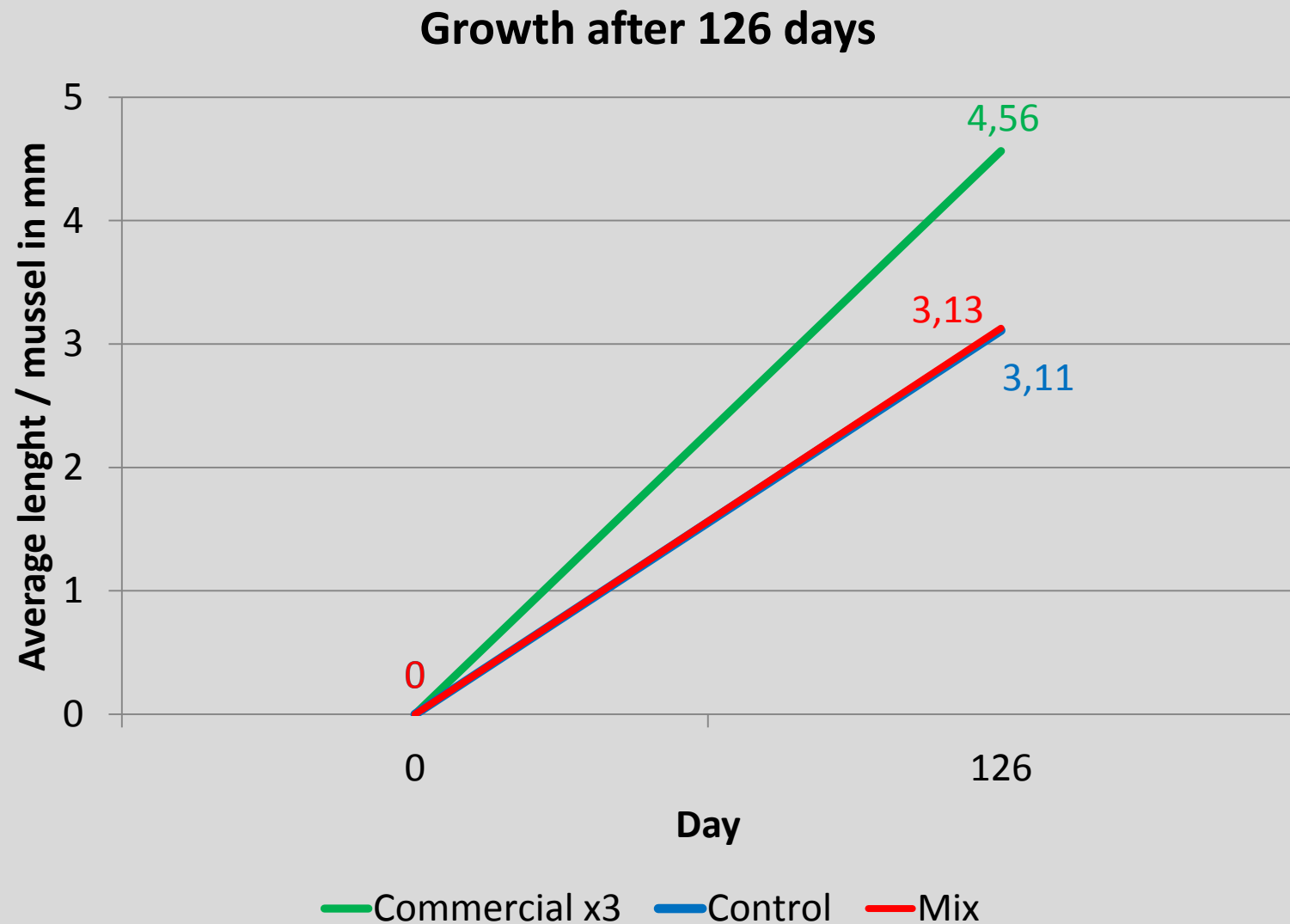
NH_4^+



Results trial III



Results trial III



Conclusion III

- Assumption only partly confirmed:
 - Higher concentraion of commercial algae degrades water quality
 - Higher concentration of cultured algae improves water quality
- But!
 - Very poor survival and growth for mixed diet
 - Water quality shows only light influence on survival for juvenile *U.c.*
 - Growth is much better with increased food density



Overall conclusion



- Cultering natural algae with very low effort is possible
- But it is not suitable for juvenile mussels
- It could be an alternative for older mussels that have to stay longer than 15 month in the station
- Further trials are in process

Acknowledgments

- The whole team



- Project Partners



LE GOUVERNEMENT
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et des Infrastructures

Département de l'environnement

A large, stylized leaf logo is positioned on the left side of the slide. The leaf is light blue and has a curved, organic shape. The background of the slide is dark brown. On the right side, there are several horizontal bars in yellow and dark blue, which serve as a backdrop for the text.

Thank you for listening

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