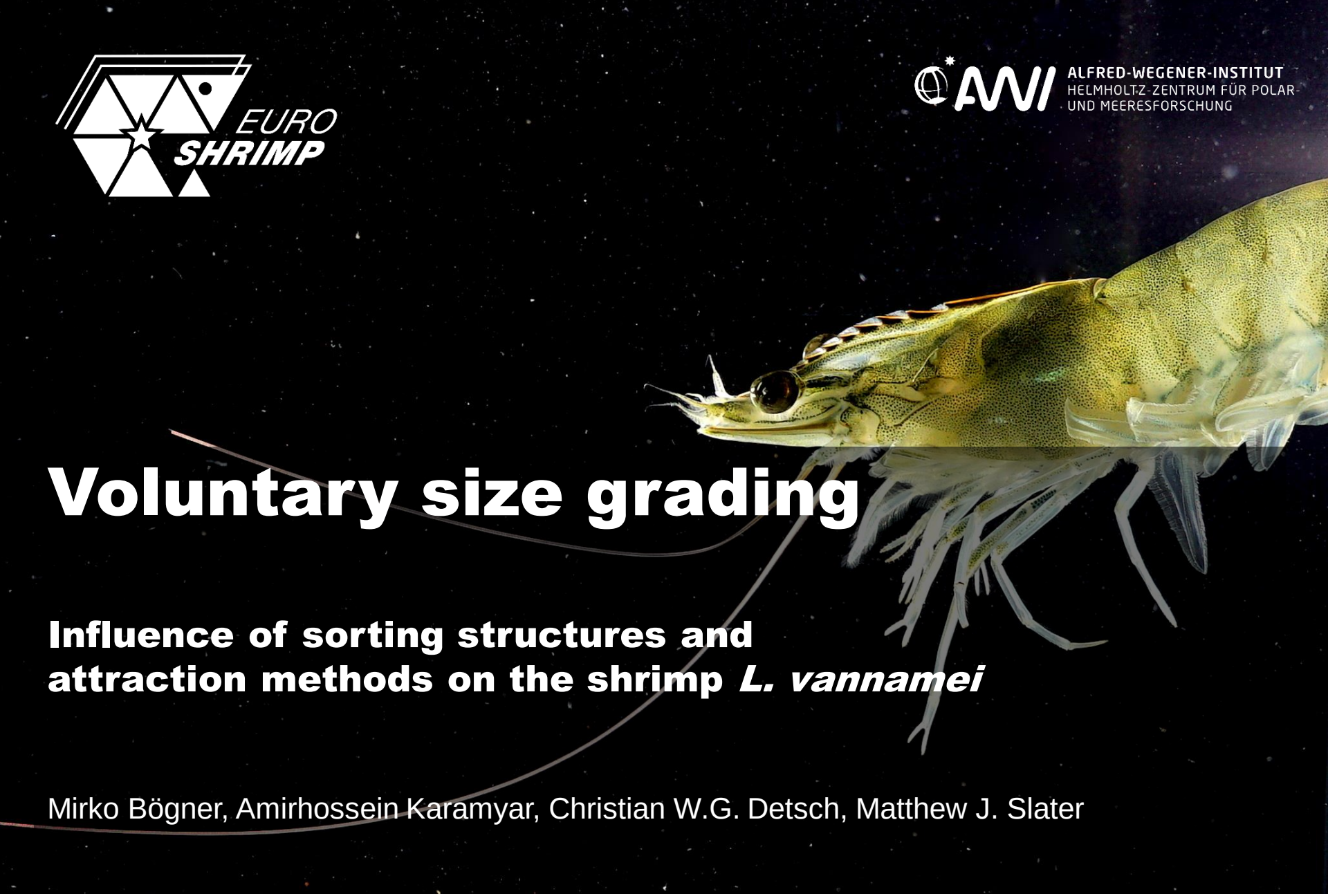

Voluntary size grading

Influence of sorting structures and attraction methods on the shrimp *L. vannamei*

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WHY SIZE- GRADING?

Uneven growth lead to

- Cannibalism
- Uneven feed distribution
- Variable product size

Disadvantages of current grading methods

- Herd up the animals
- Physical treatment
- Stressfull and harmfull

Solution: voluntary size grading

Advantages of self- grading:

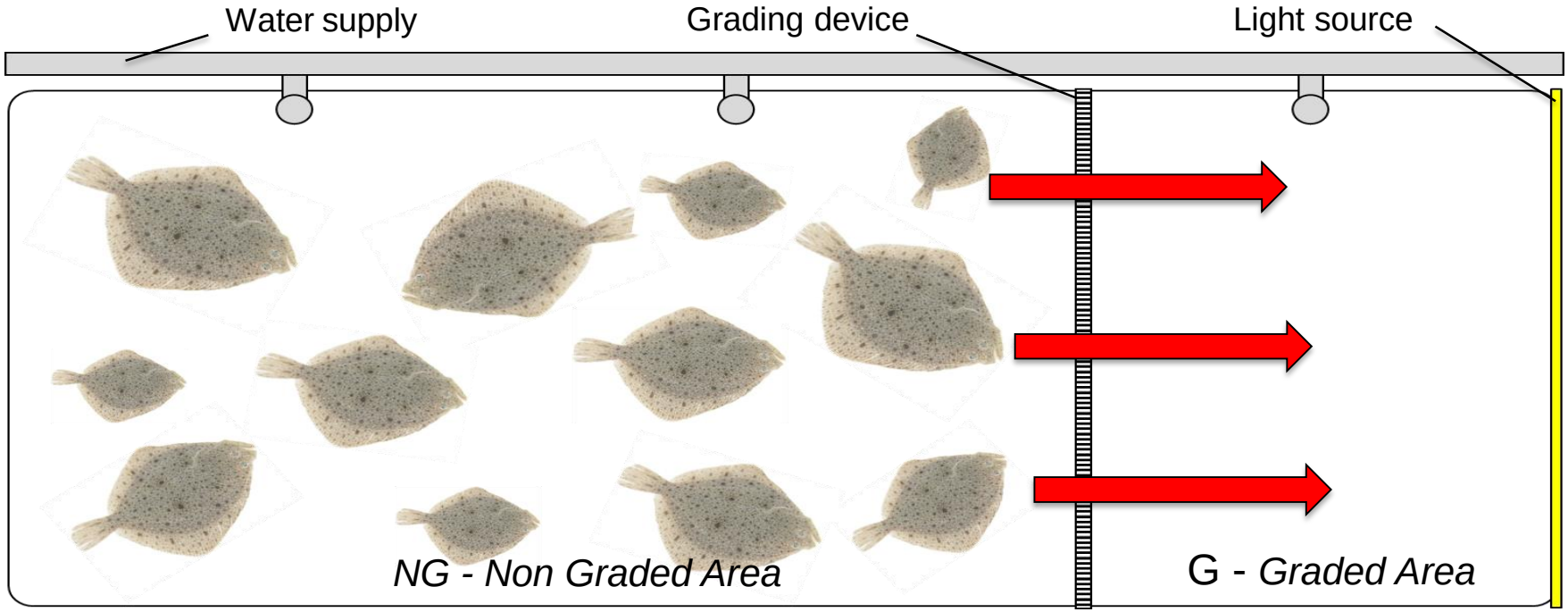
- Animal remain in the water
- No stress by force
- No mechanical damage
- Minimal personnel cost

BACKGROUND

Grading of flatfish

- Development of a grading device for flatfish
- Testing of different attraction / repellent methods

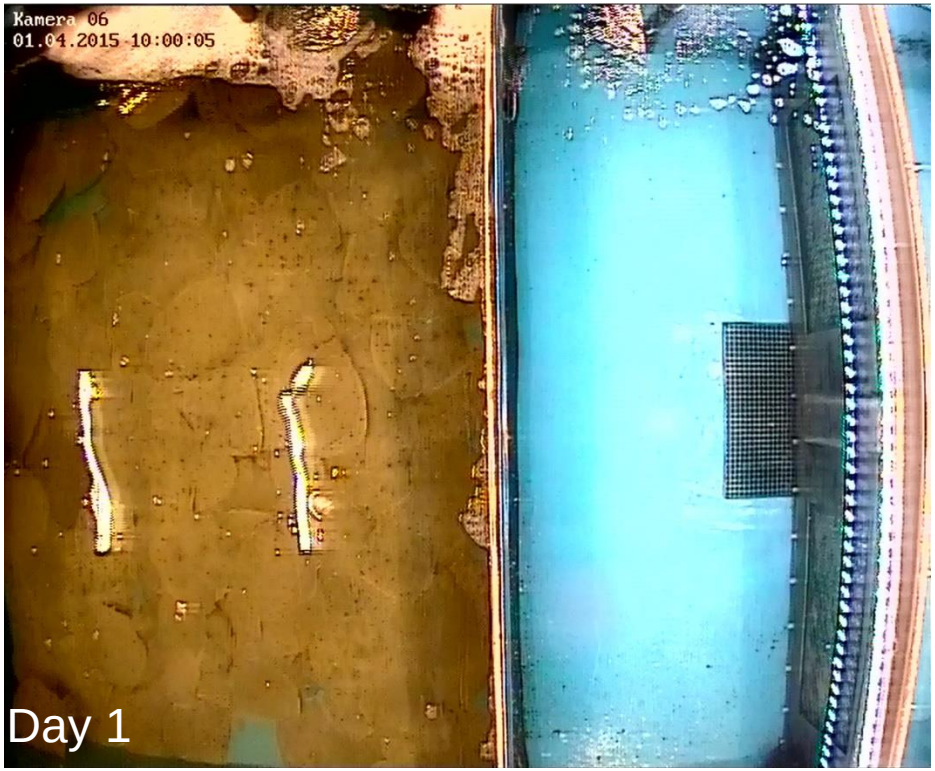
Turbot *(Scophthalmus maximus)*

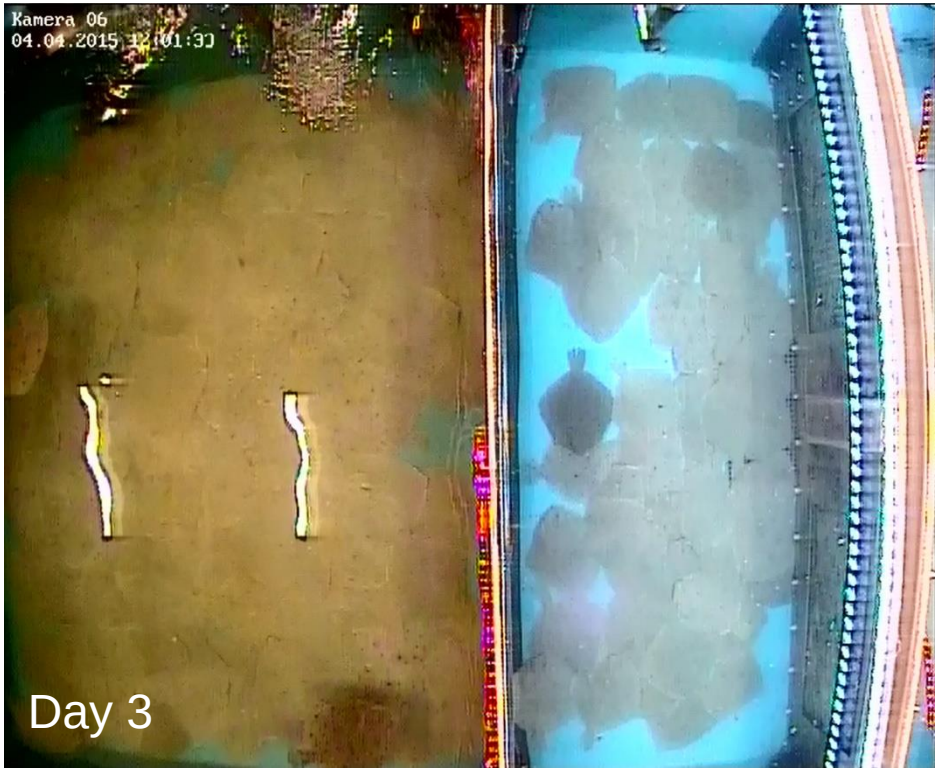


BACKGROUND

Conclusions

- Self- grading takes time, but minimal personnel
- 100 % grading success was not achieved (94 %)
- Self- grading of turbot is highly effective, with the right stimuli!!!



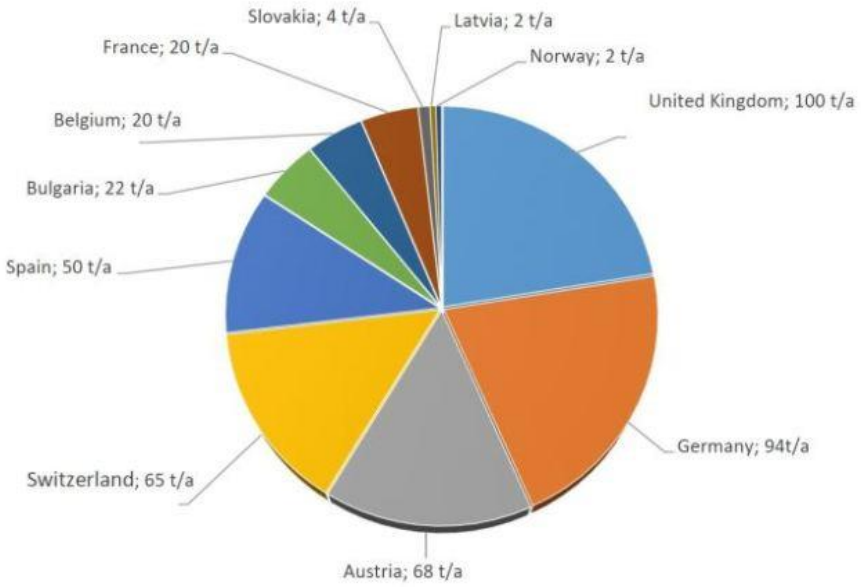


Bögner, M., S. Zwicker, D. Bögner and M. J. Slater (2017). Influence of feeding sequence, light and colour on the performance of a self-grading system designed for turbot (*Scophthalmus maximus*)." Aquacultural Engineering **77**: 1-8.

SHRIMPS IN EUROPE

- About 30 shrimps farms listed in Europe
- Closed production system (RAS, biofloc)
- small and medium size (3 t – 100 t)
- Approx. 450 t annual production

Whiteleg shrimp *(Litopenaeus vannamei)*



Source: https://www.euroshrimp.net/14-european-shrimp-production-in-2020/

NEXT STEP: SHRIMP- GRADING

New project:

- **Grade Aid** – Development of a device and methods for voluntary size grading of shrimp

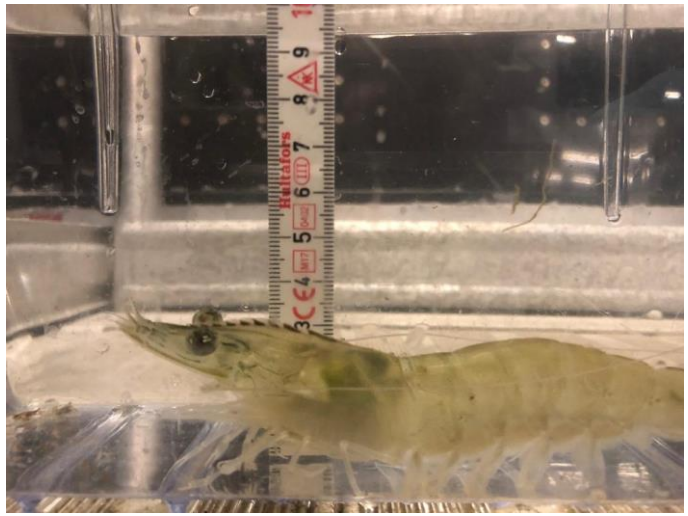
Project goals:

1. Development of **grading device** and **functional structures**
2. Testing of **preference methods** to increase self- grading success

SHRIMP SELF- GRADING

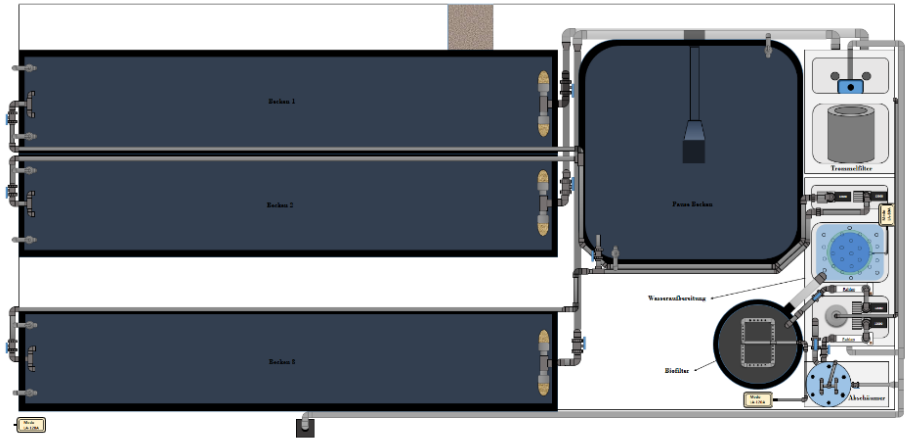
Grading device:

- Adapted to different animal sizes
- Modular construction possible
- Easy to integrate into AQ- tanks



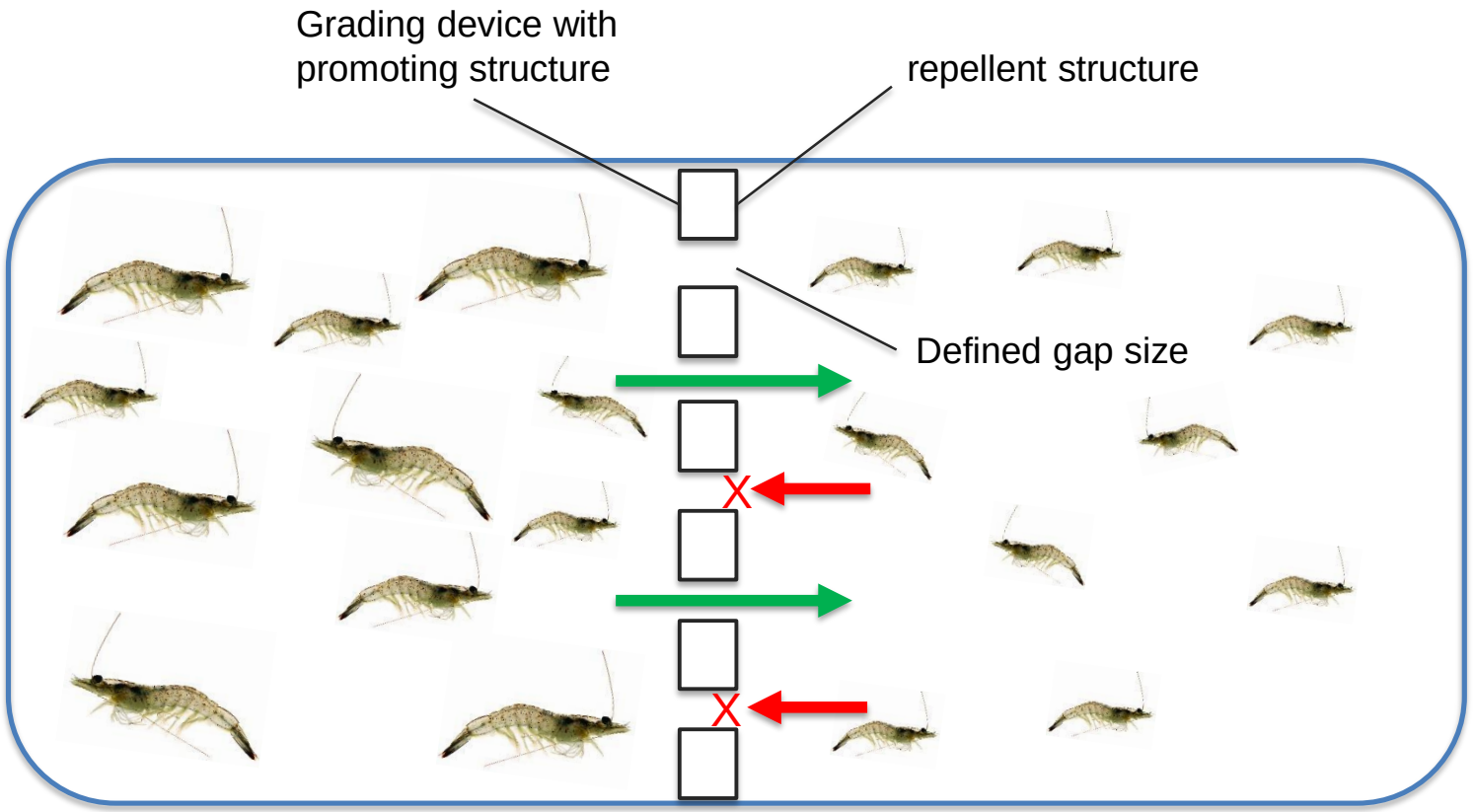
Self- grading structures:

- Use of animal behaviour
- Support or prevent crossing the device
- Testing self- grading success



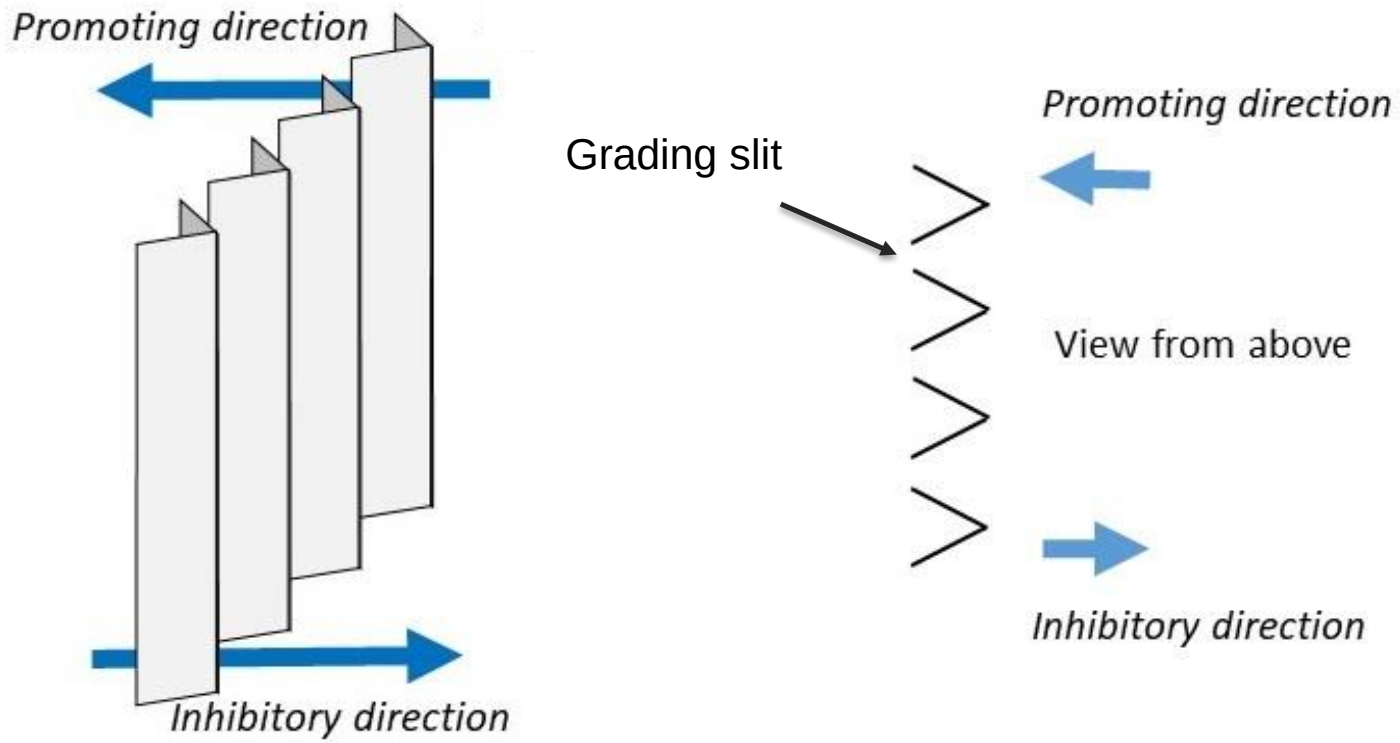
SHRIMP SELF- GRADING

Functional principle of the self grading device:



FUNCTIONAL STRUCTURES

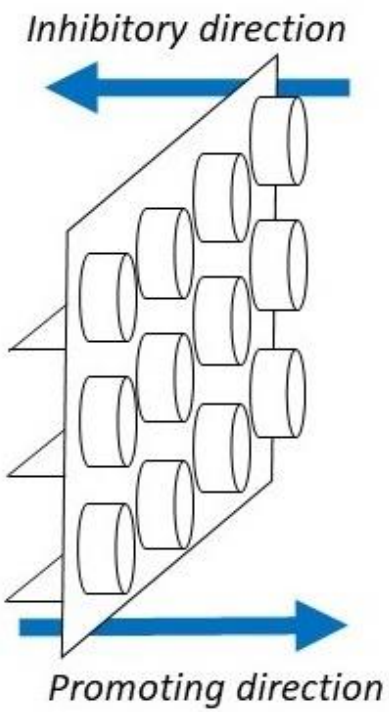
Version 1



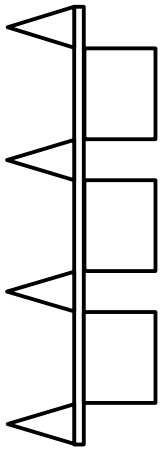
FUNCTIONAL STRUCTURES

Version 2

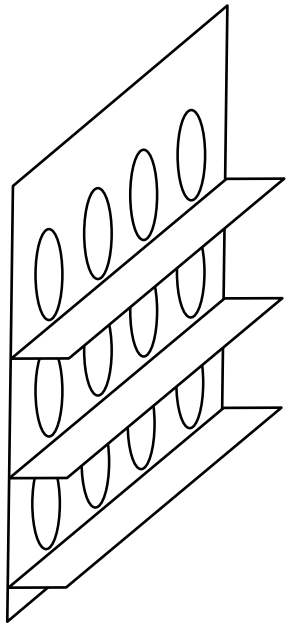
Repellent side



Side view



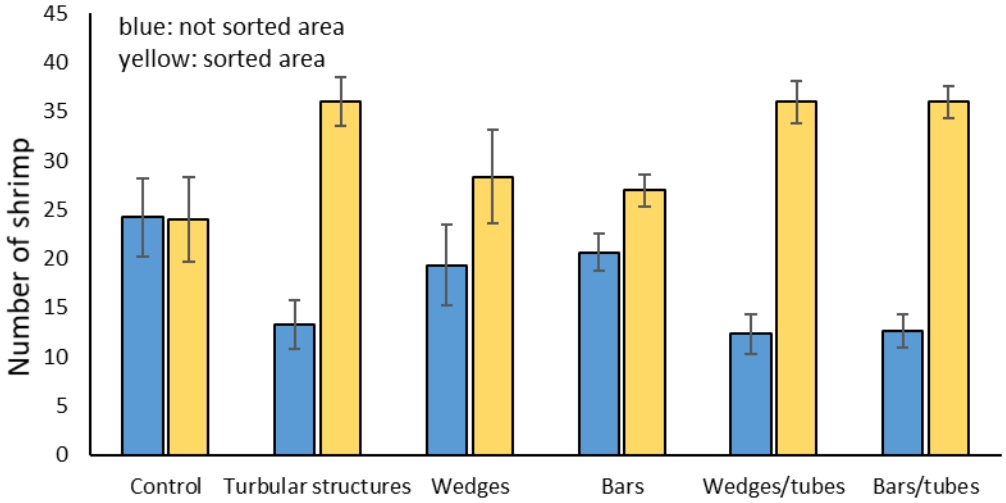
Promoting side



FUNCTIONAL STRUCTURES

Experiments grading structures:

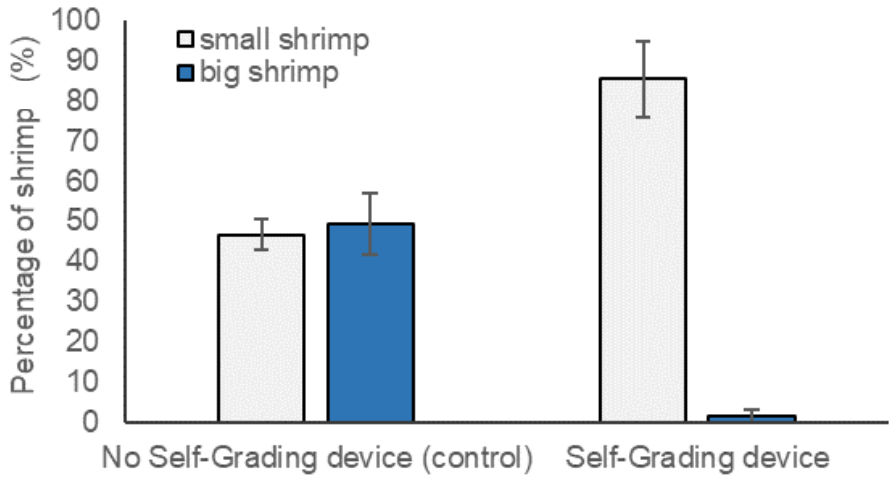
- 25 shrimp in each compartment 18.4 g
- Self- Grading time: 36 h

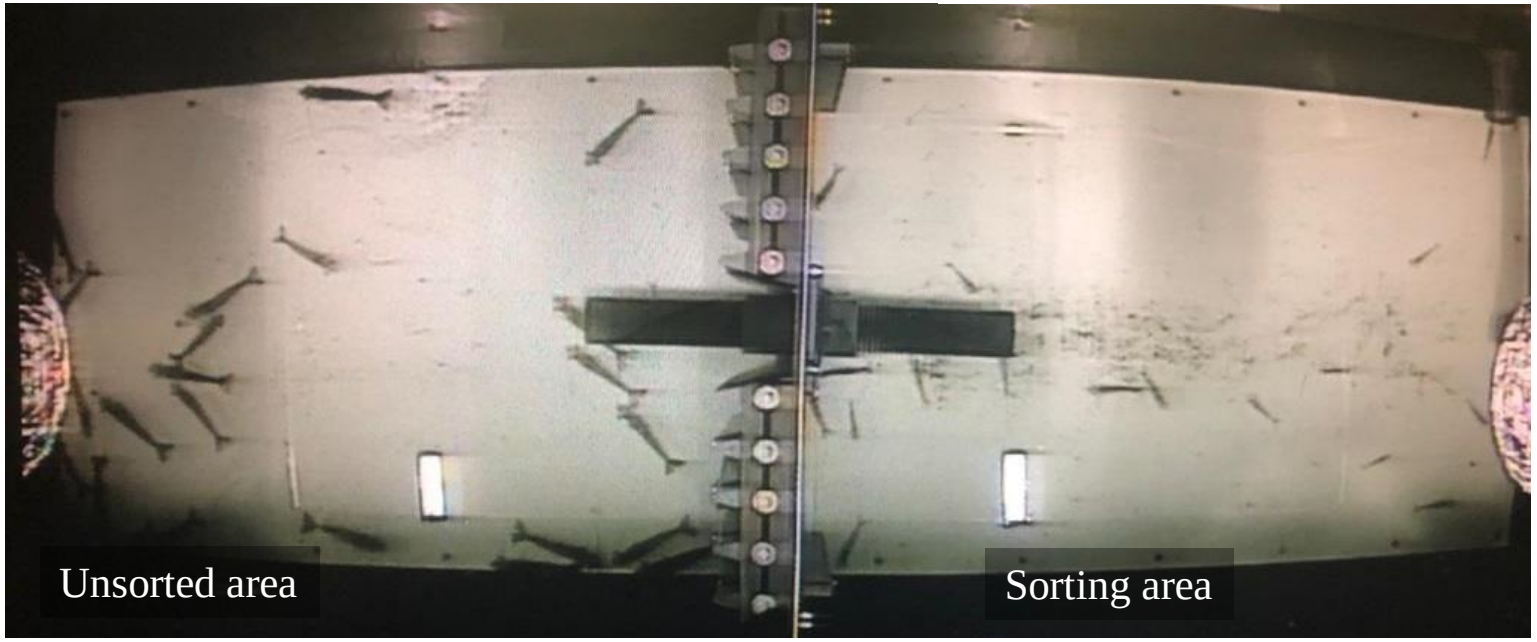


FUNCTIONAL STRUCTURES

Self Grading experiment with mixed group:

- 25 shrimp a 2.6 g, 25 shrimp a 14.6 g inserted into the unsorted area
- Self- grading time: 72 h





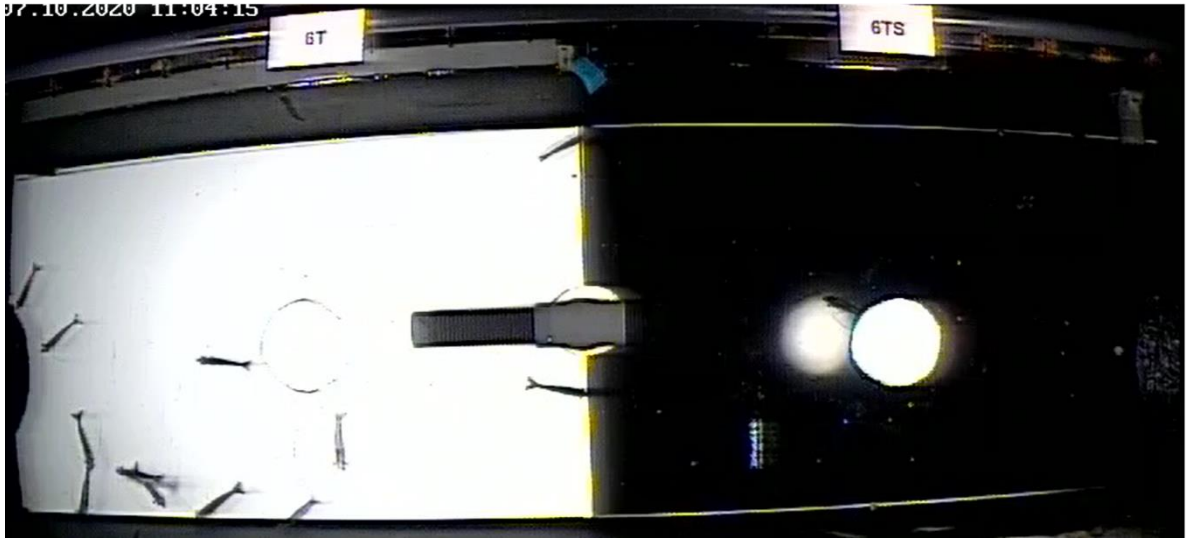
SHRIMP PREFERENCES

Influence of attractant and repellent on shrimp

Main idea: Relocalisation of shrimp without force and technic

Test setup:

- Tank devided in 2 different zones
- 50 shrimp were place into the tank (10 – 18 g)
- Observation for 36 h



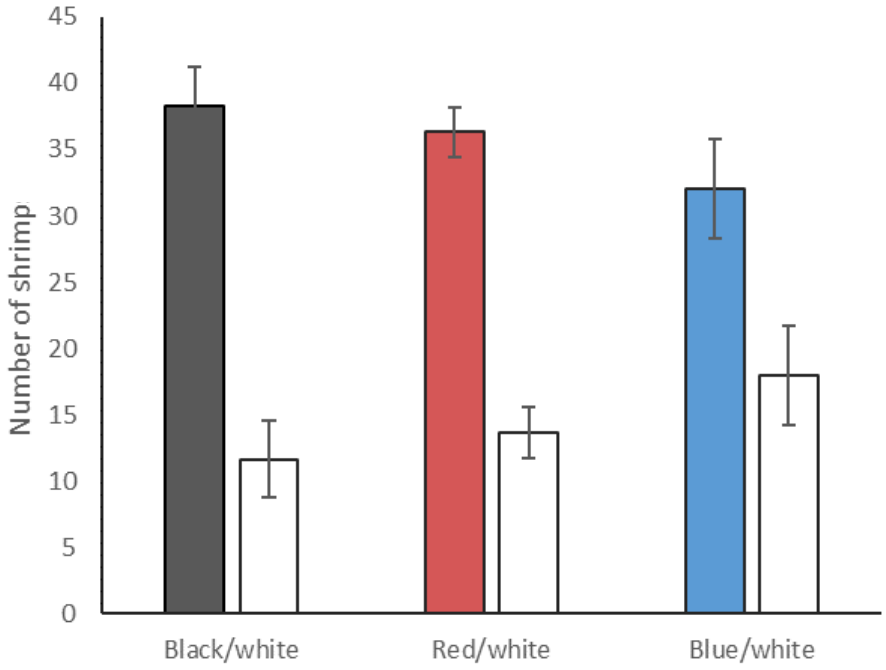
Tested methods

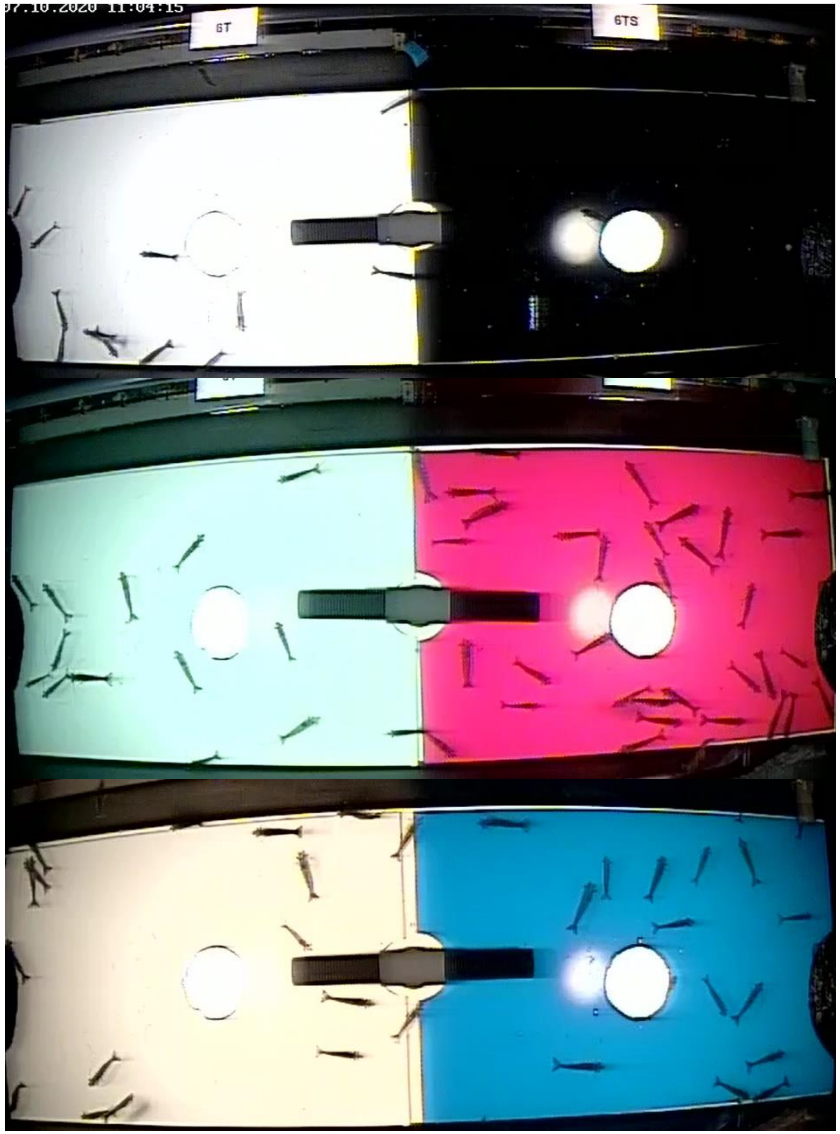
- bottom colour
- Light colour
- Water current
- Feeding rhythm

ATTRACTANT AND REPELLENT

Results bottom colour experiments:

- Strong effect with black bottom colour
- Shrimp prefer dark bottom



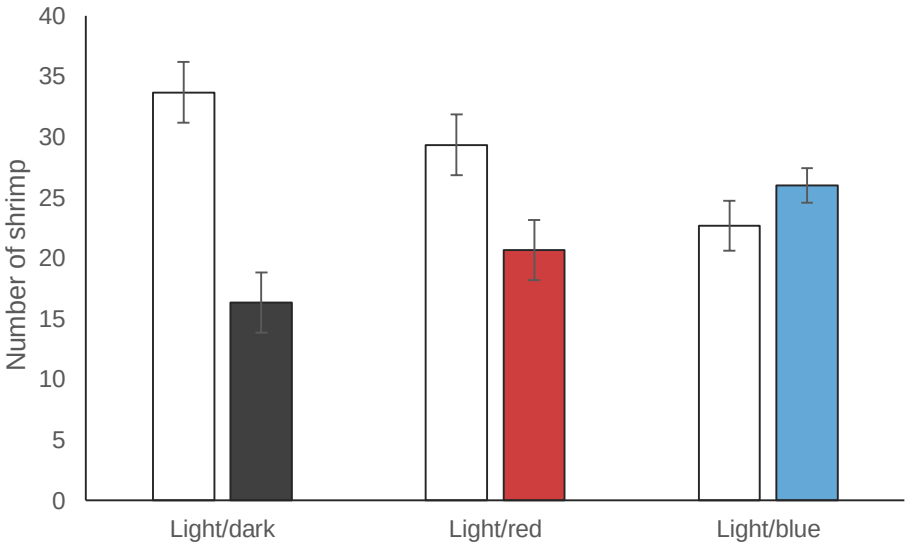


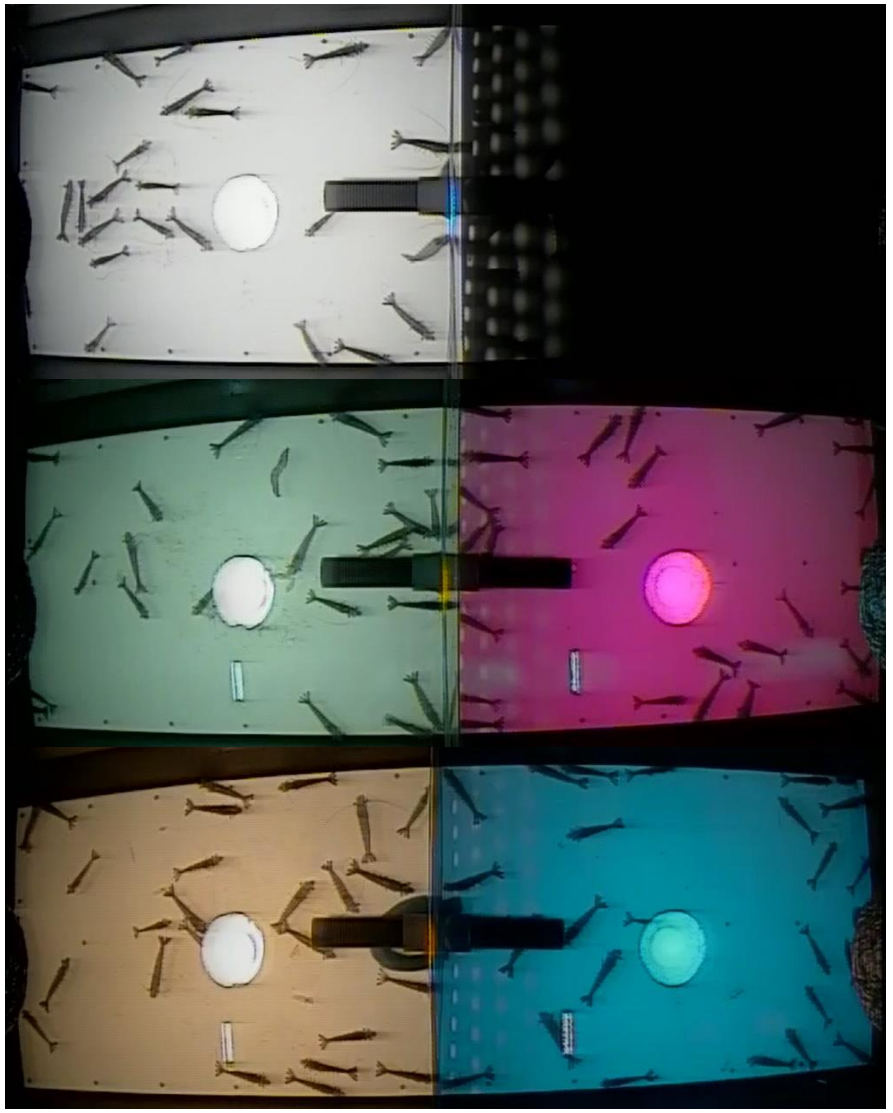
HELMHOLTZ

ATTRACTANT AND REPELLENT

Results light colour experiments:

- Strong effect with white light and no light
- Animals prefer to stay in the light area

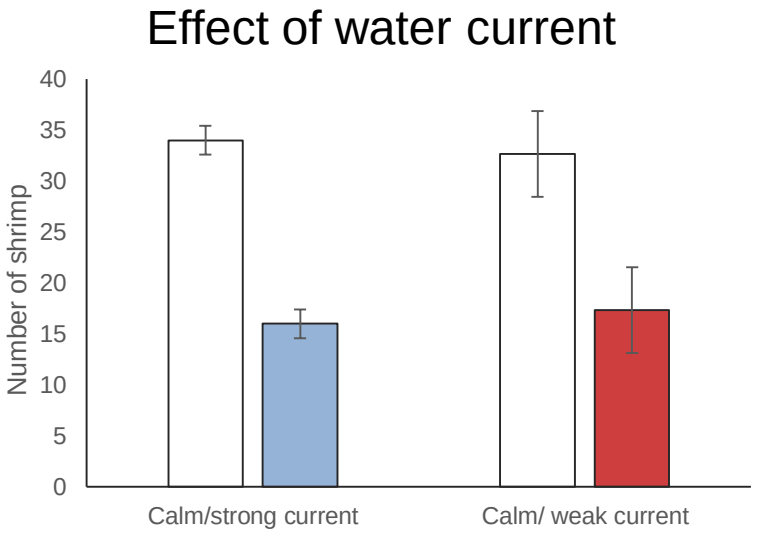


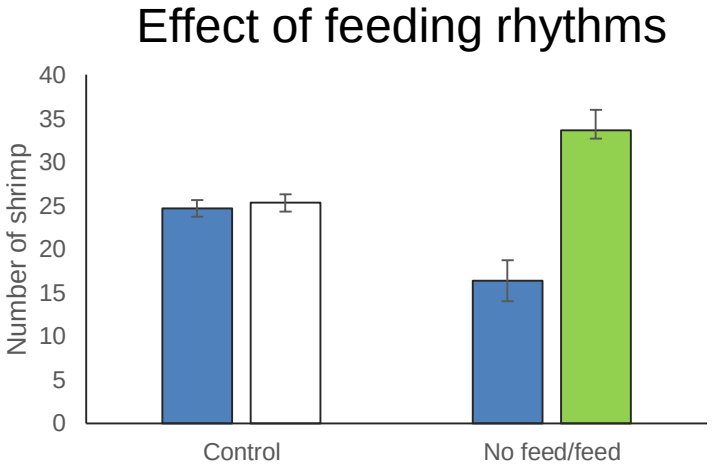


ATTRACTANT AND REPELLENT

Results water current and feeding rhythms:

- Shrimp avoid areas with water current
- Animals stay in the area with food in the meantime





CONCULSION

Self grading device:

- Voluntary size grading in shrimp works
- Tested self grading device in lab-scale
- 100 % sorting not possible
- Voluntary grading of shrimp needs time

Attractant/ Repellents:

- Changes in bottom or light colour have strong effects on preferred place
- Light, bottom colour and feeding have temporary effects
- Permanent relocalisation with water current

CONCULSION

Practical use:

- Self gradig device for uniform batch size
- „Open“ separation of different cohorts
- Stressless supporting methods for e.g. sorting, harvesting or cleaning work

Furter Steps:

- Testing of wider range of shrimp sizes
- Adaption of grading device to commercial plant
- Test run with commercial self- grading prototyp

Thank you for your Attention!

EUROSHRIMP

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HELMHOLTZ-ZENTRUM FÜR POLA
UND MEERESFORSCHUNG