Associating sea bream, oyster, clam and shrimp in an earthern-pond loop: toward an environmentaly friendly system

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ASSOCIATING SEA BREAM, OYSTER, CLAM AND SHRIMP IN AN EARTHEN-POND LOOP: TOWARD AN ENVIRONMENTALY FRIENDLY SYSTEM

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INTRODUCTION

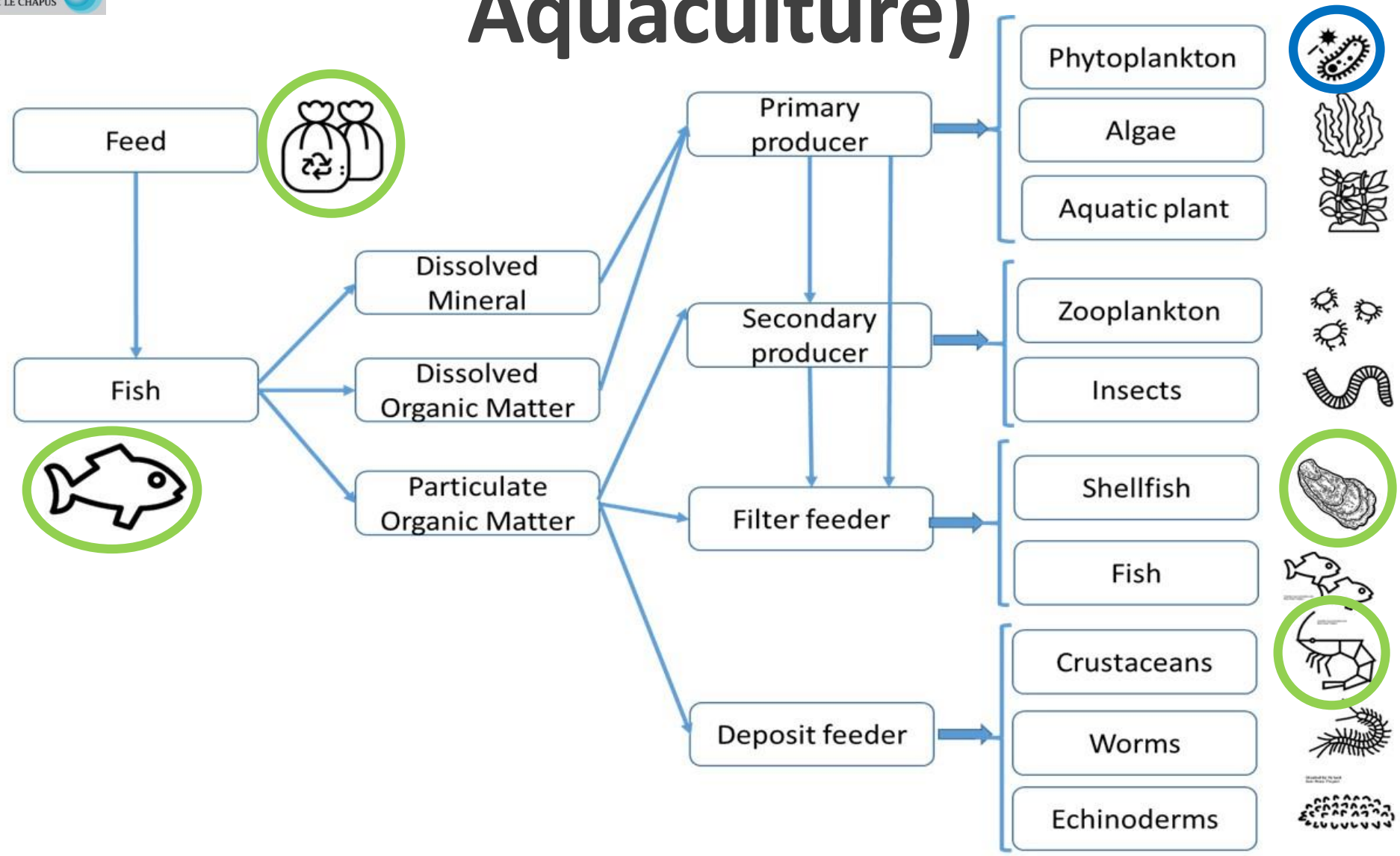
- SIMTAP project:
  - ❖PRIMA grant
  - ❖Based on IMTA approach
  - ❖To reduce the waste emissions
  - ❖To reduce the use of resources (energy, water, fishmeal, fish oil, soybean)
- System designed in ponds to meet the purposes of the project
- Assessed on:

→ water quality results

→ growth performances

→ nutrients use efficiency

IMTA (Integrated MultiTrophic Aquaculture)



Description of the system

Formulated feed: only composed of vegetal raw materials (without fish meal, fish oil, soybean), delivered 5 days/week

Mussels out of calibration, delivered 1 day/week, isoenergetic to formulated feed

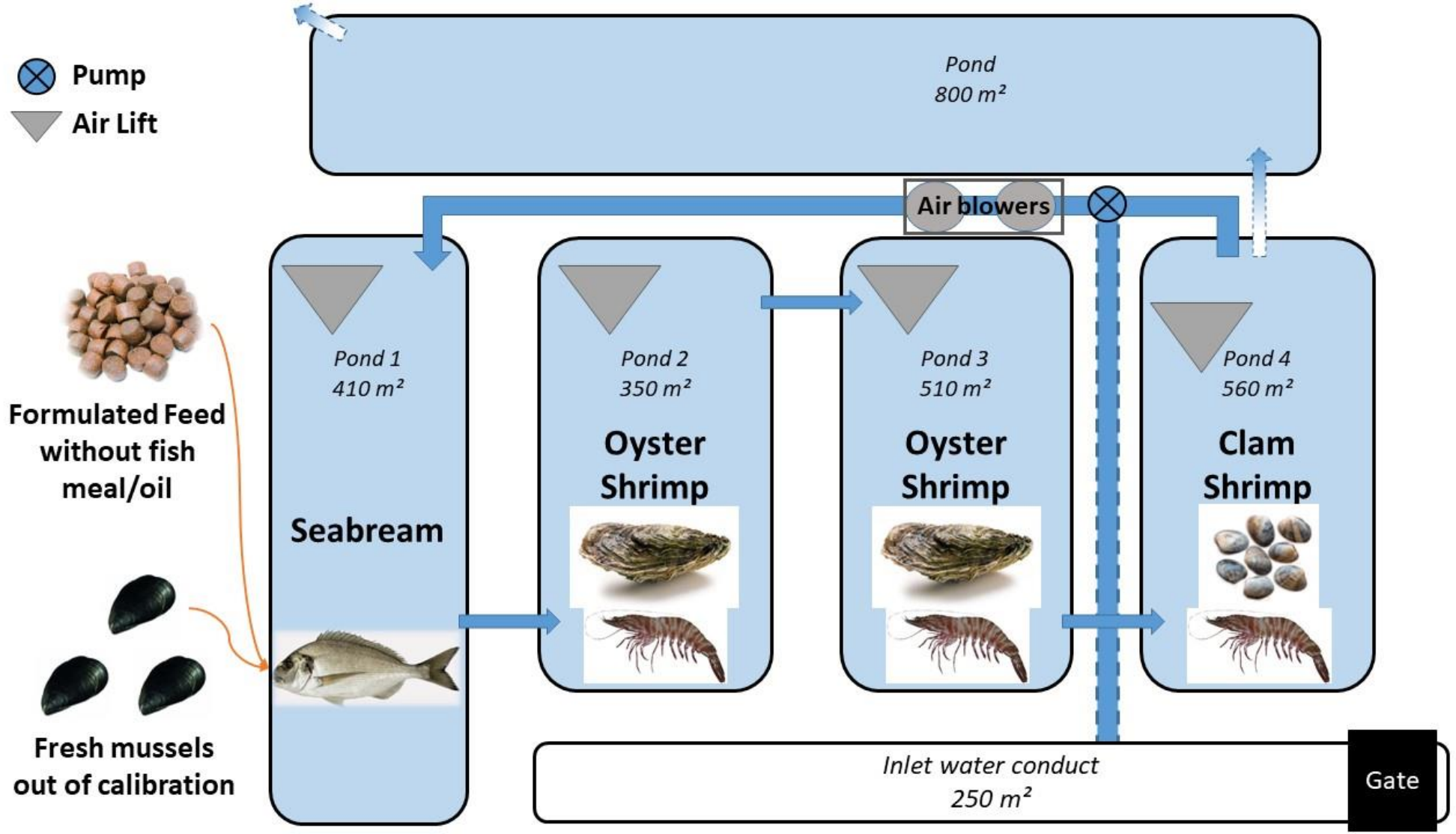
Gilthead Seabream (*Sparus aurata*): from RAS, 1 387 pre-grown (stocked at 0.720 kg/m²), ability to eat mussels

Shrimp (*Penaeus japonicus*): 2.5 post-larva/m²

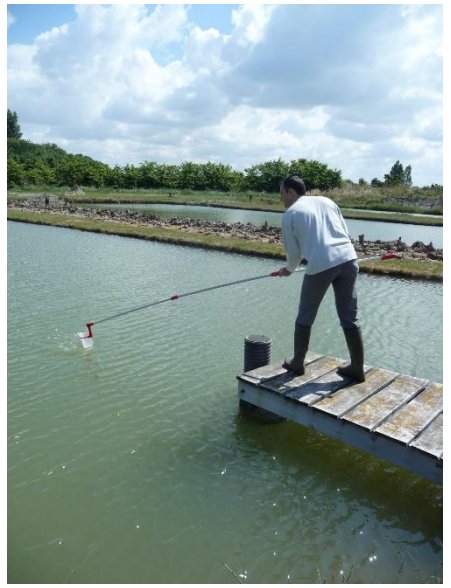
Oyster (*Crassostrea gigas*): 2.5 individuals/m²

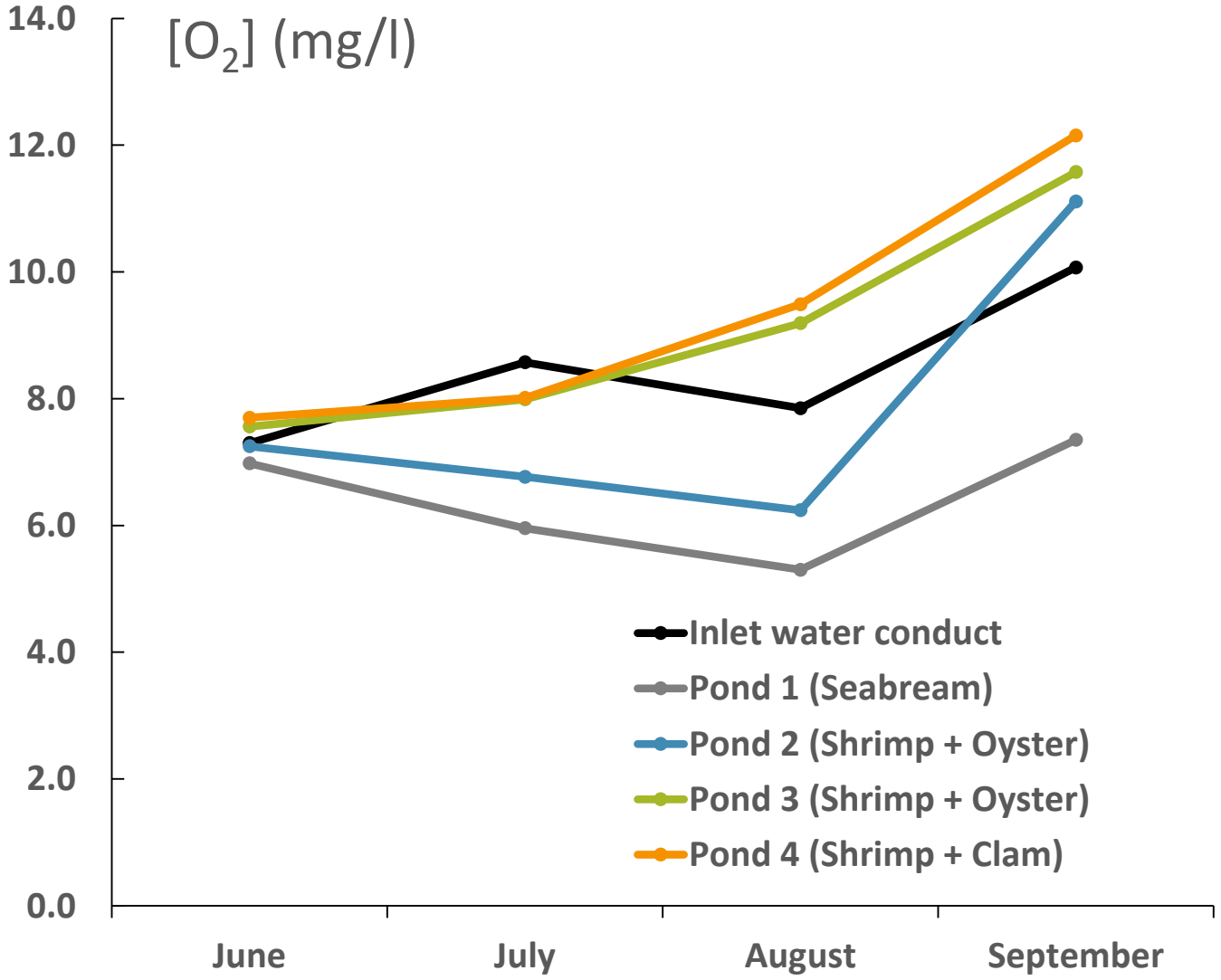
Clam (*Ruditapes decussatus / philippinarum*): 21 individuals/m²

Pilot design



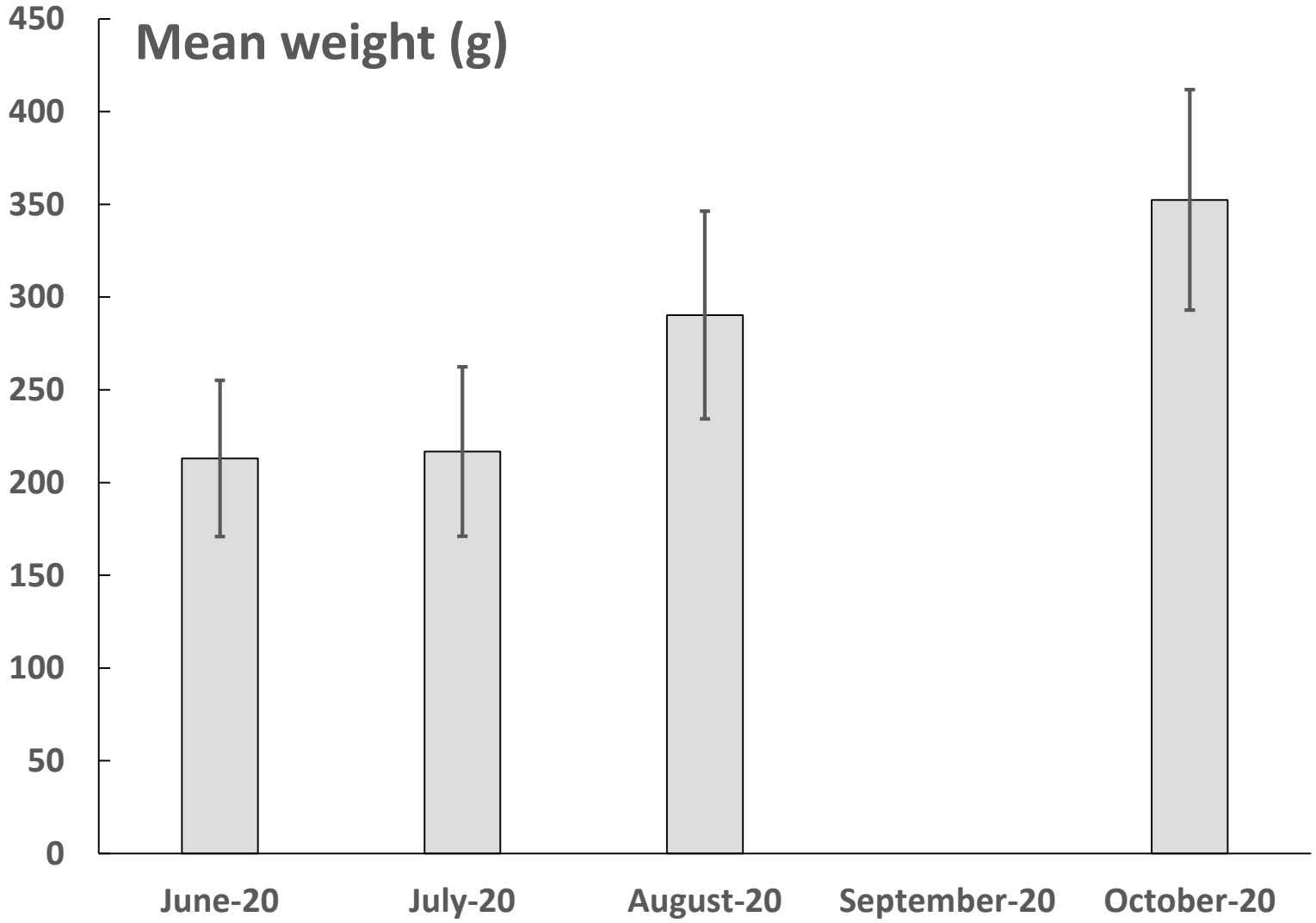
Water quality





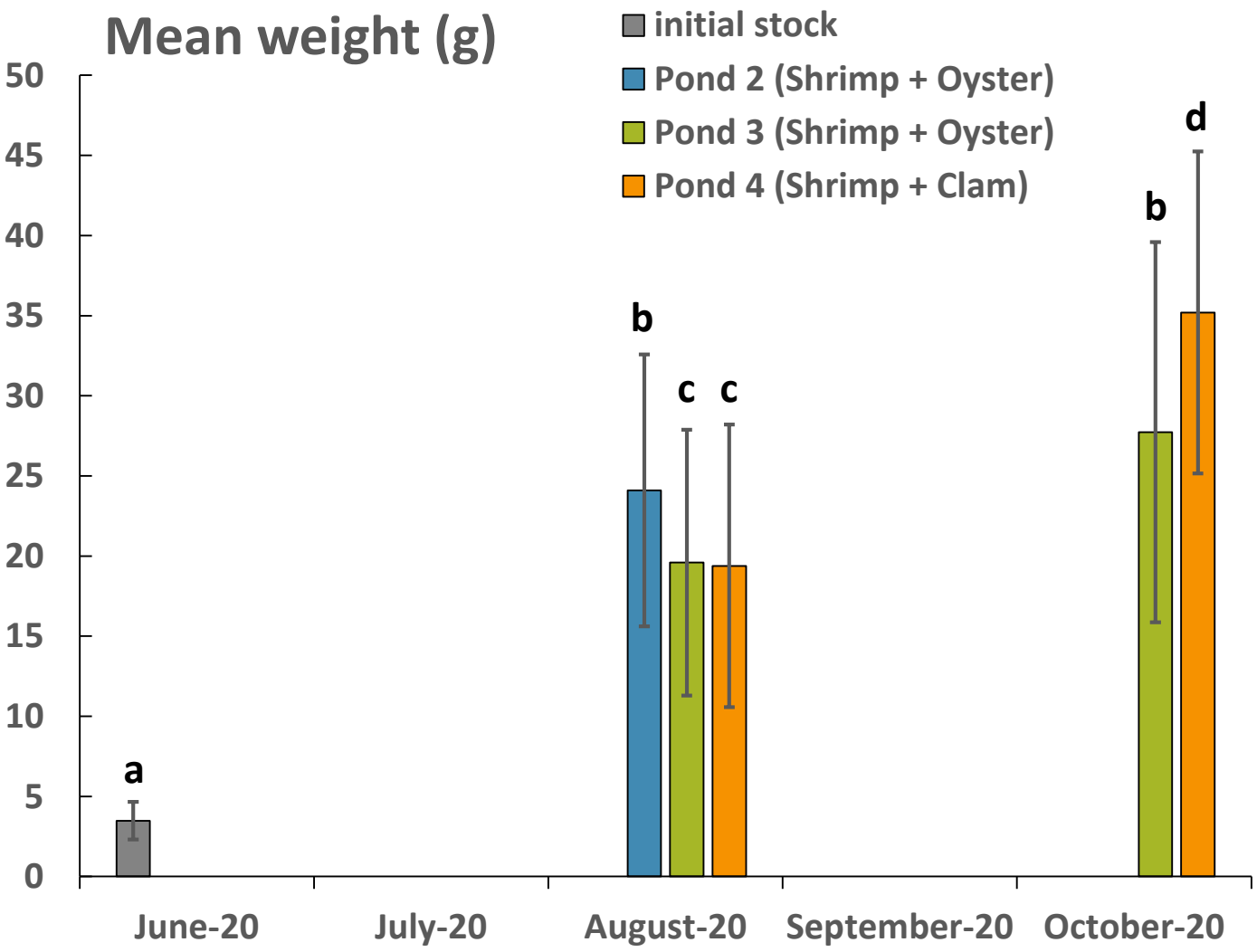
- No significant differences observed between ponds for [TN], [NH_4], [NO_2], [NO_3], [TP] and [PO_4] ($p<0.05$)
- [O_2] pond 1 < ponds 3 and 4 ($p<0.05$)
- Strong variations between night and day
- ↗ [Total chloro] (2.5 → 61 µg/l) in the ponds, not in the conduct (5-11 µg/l)

Gilthead seabream



- Good growth except during the first month due to the adaptation of fish
- FCR : 1.9 (in eq. form. feed)
- Survival rate : 90%

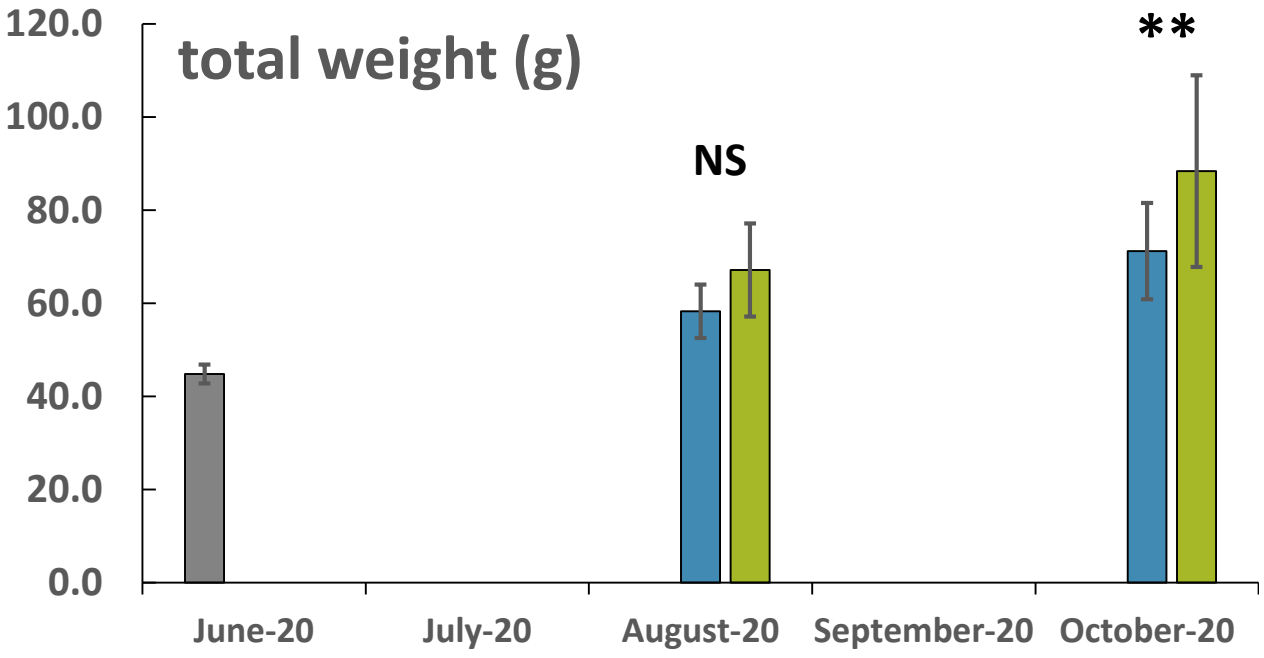
Shrimp

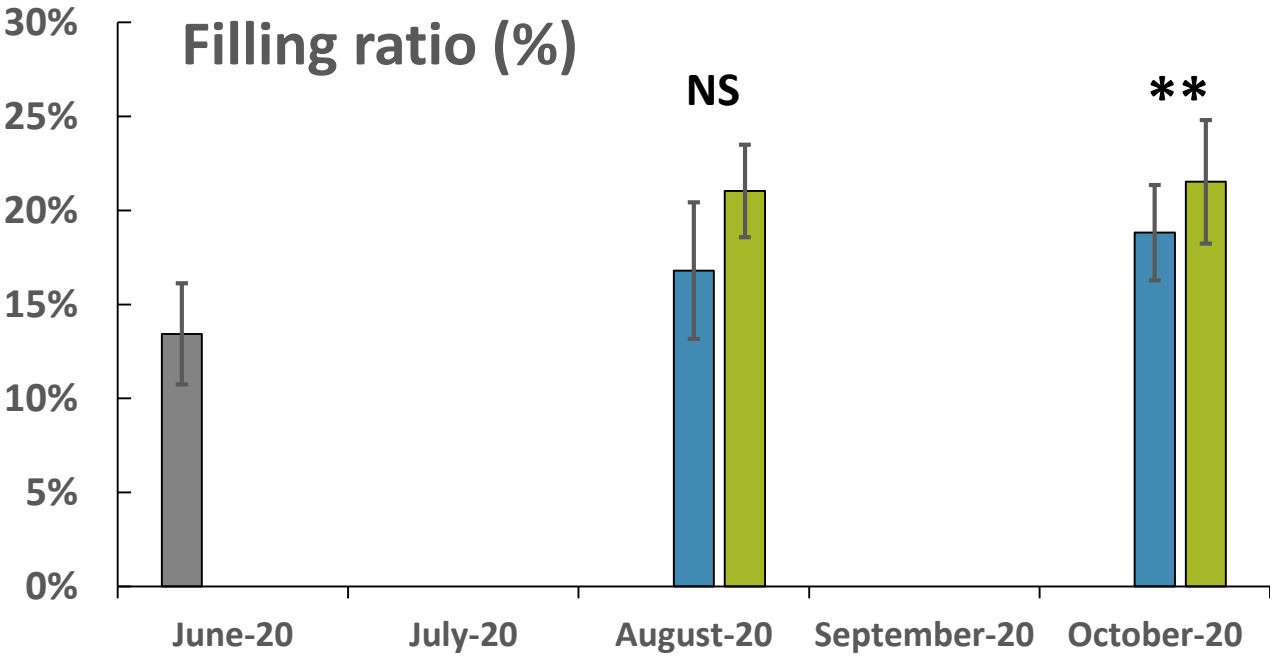


- Mean weight increased 9-fold
- Final weight similar to fed shrimps
- High variability due to sexual dimorphism
- All shrimps from the pond 2 died, just a few days before harvesting.
- survival rate : 38% pond 3, 58% pond 4 (predation by eels ?)

Oyster

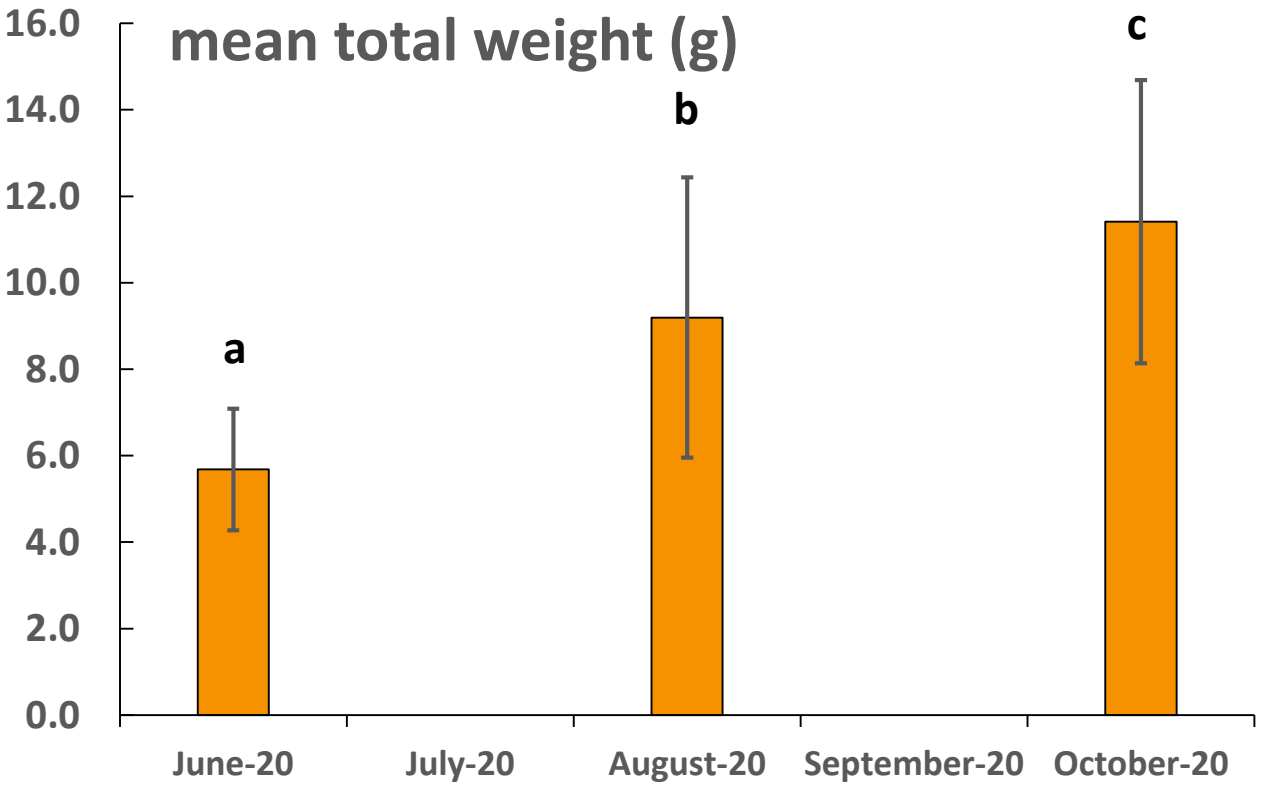
- Increase of the mean total weight (shell + flesh)
- Filling ratio over the standard quality (12%-15%)
- Survival rate = 90%

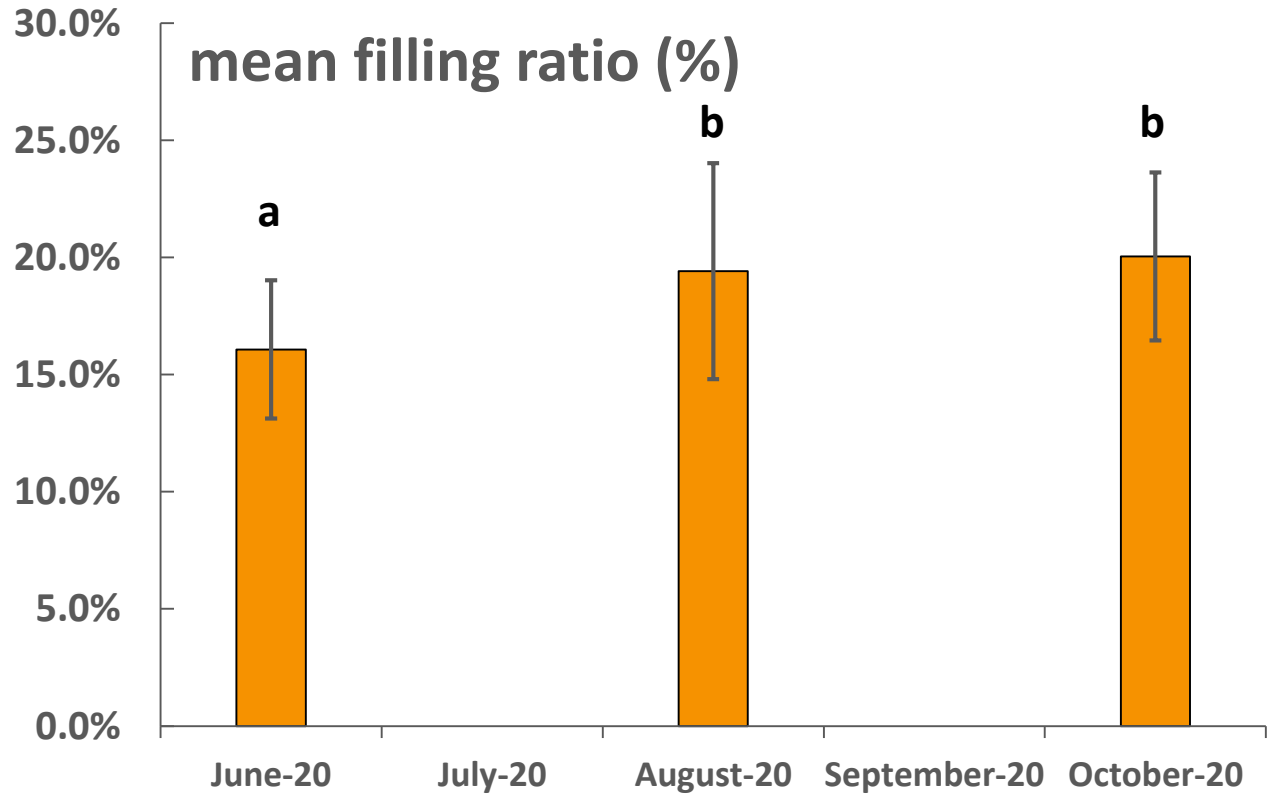




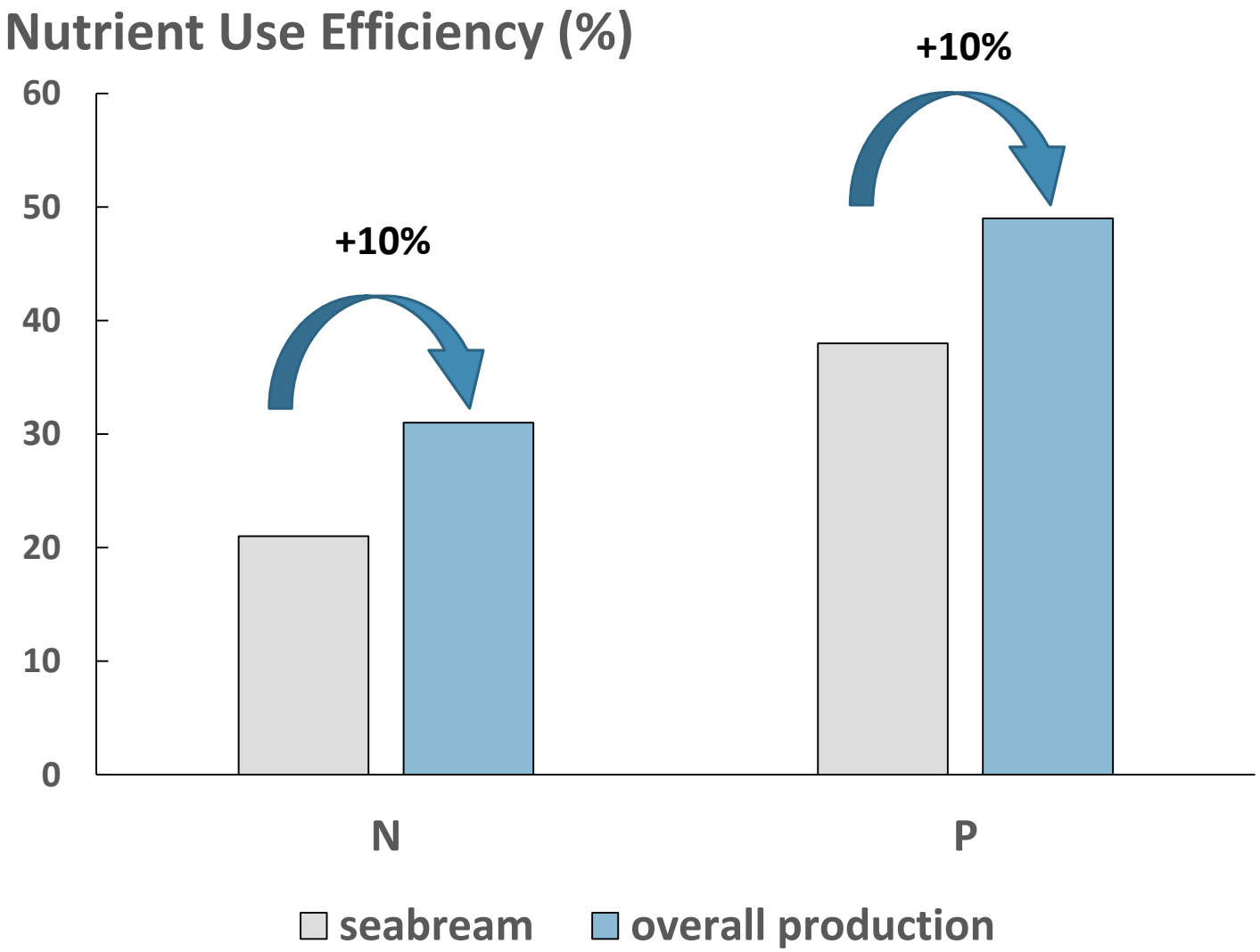
Clam

- **Mean total weight doubled until a marketable size**
- **Mean filling ratio 20% at harvest (*vs* 16% at stocking)**
- **Survival rate estimated around 70%**





Nutrient use efficiency



- Input = formulated feed + mussels
- Output = seabream + shrimp + oyster + clam
- Calculations based on body composition from literature
- Improvement of 10% of NUE and PUE

Conclusion

- The use of a plant based feed and local discarded mussels possible to growth seabream
- **Shrimps grew up without additional feed, but survival has to be improved**

⇒ Air supply is necessary to support production

- **Shellfish had good performances**

⇒ Possible to increase production of shellfish

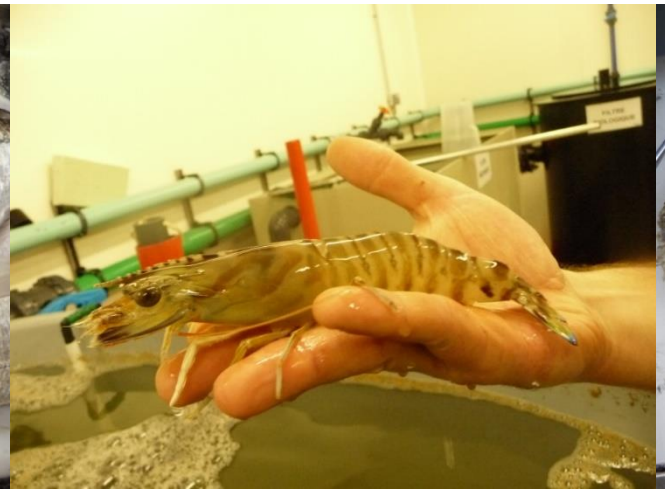
Conclusion

- **The overall system improves use efficiency of the feed delivered**

⇒ limit use of ressources (feed ingredients and water)

⇒ limit waste emissions

⇒ increase number of marine products


Thank you