



HAL
open science

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

Christophe Jaeger, Vincent Gayet, Joël Aubin

► To cite this version:

Christophe Jaeger, Vincent Gayet, Joël Aubin. Associating sea bream, oyster, clam and shrimp in an earthen-pond loop: toward an environmentally friendly system. Aquaculture Europe, European Aquaculture Society, Oct 2021, Madeira, Portugal. hal-03885431

HAL Id: hal-03885431

<https://hal.inrae.fr/hal-03885431v1>

Submitted on 5 Dec 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

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

Christophe Jaeger, Vincent Gayet, Joël Aubin

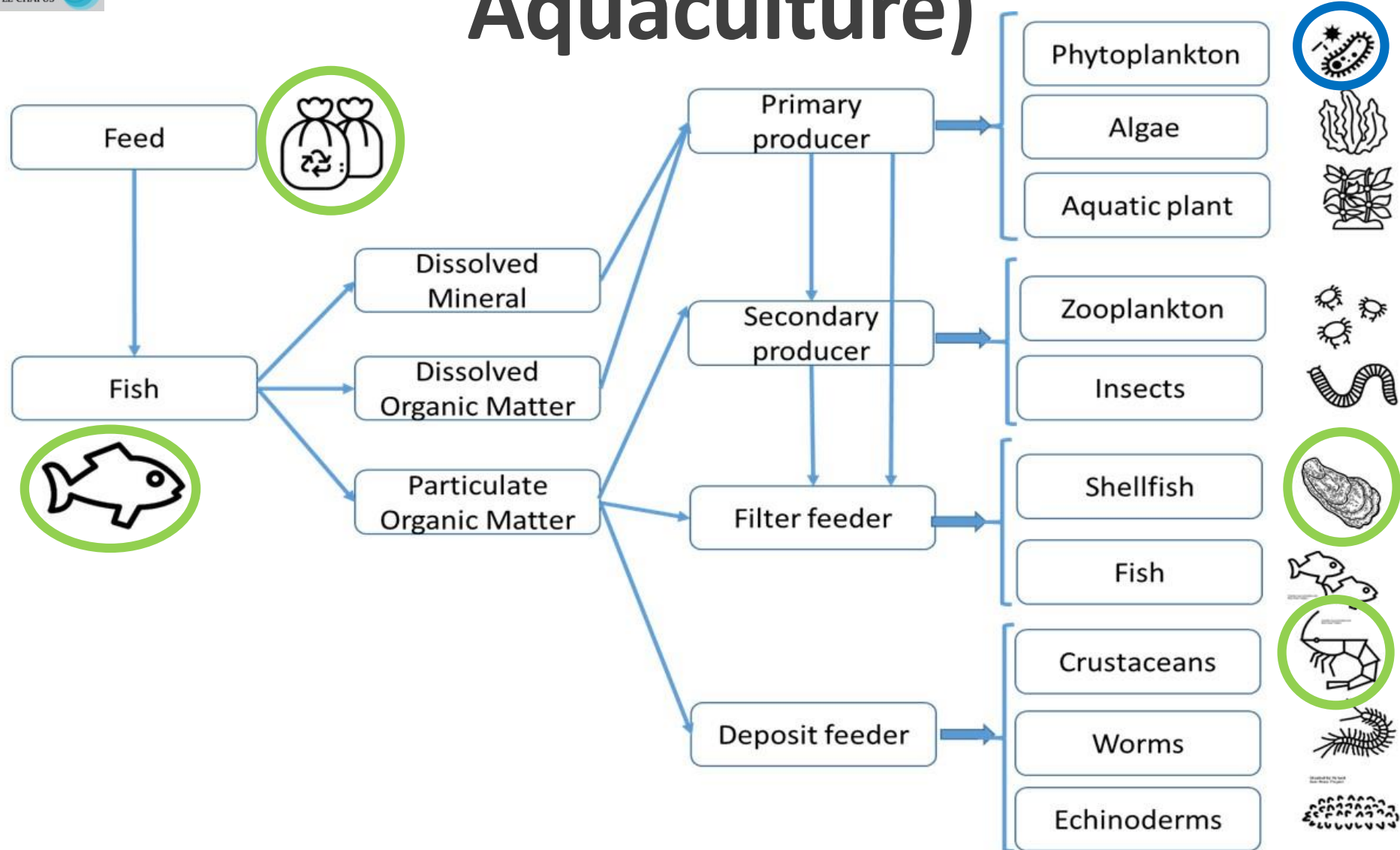
The PRIMA programme is supported under Horizon
2020, the European Union's Framework Programme
for Research and Innovation

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

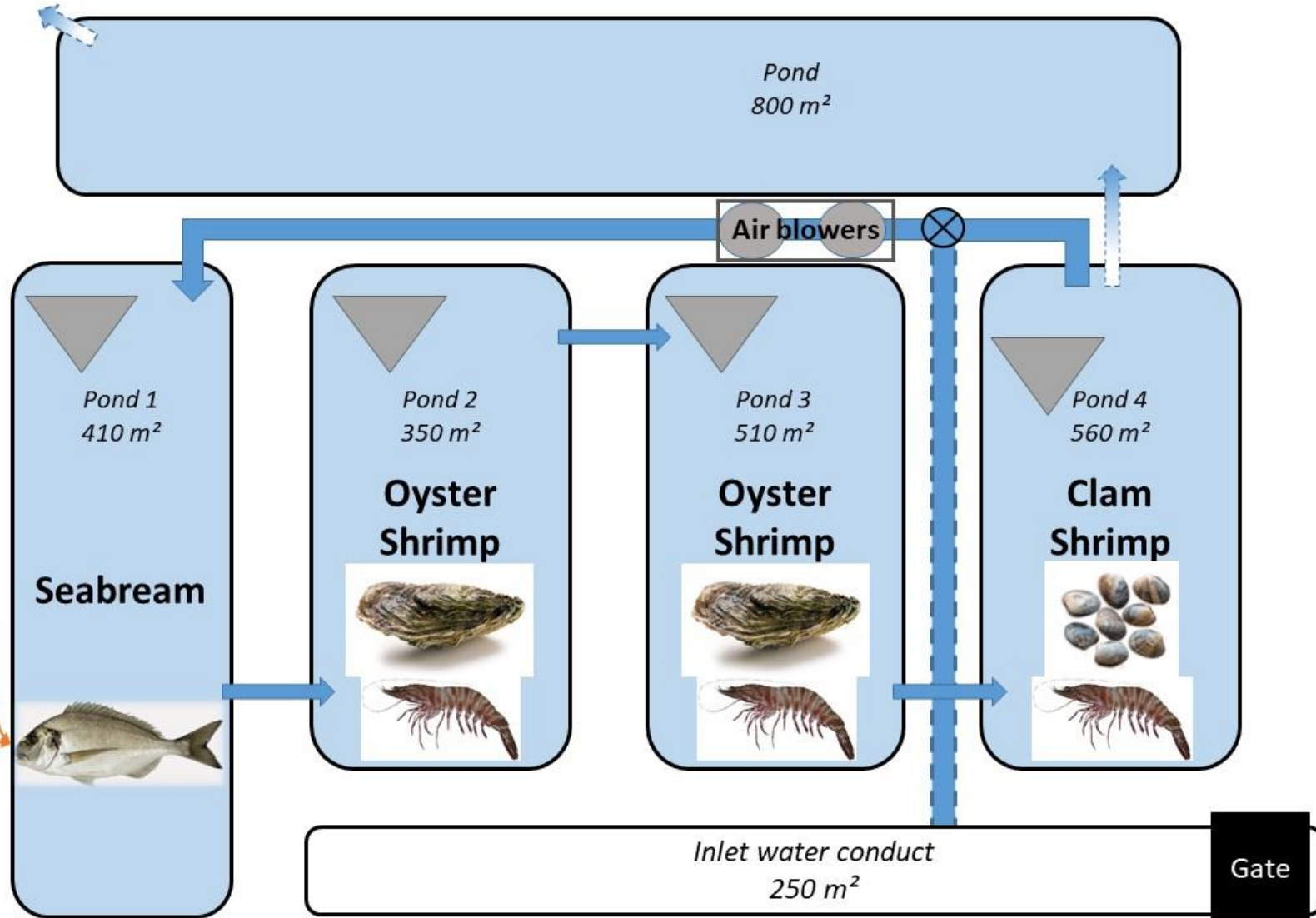


Oyster (*Crassostrea gigas*): 2.5 individuals/m²

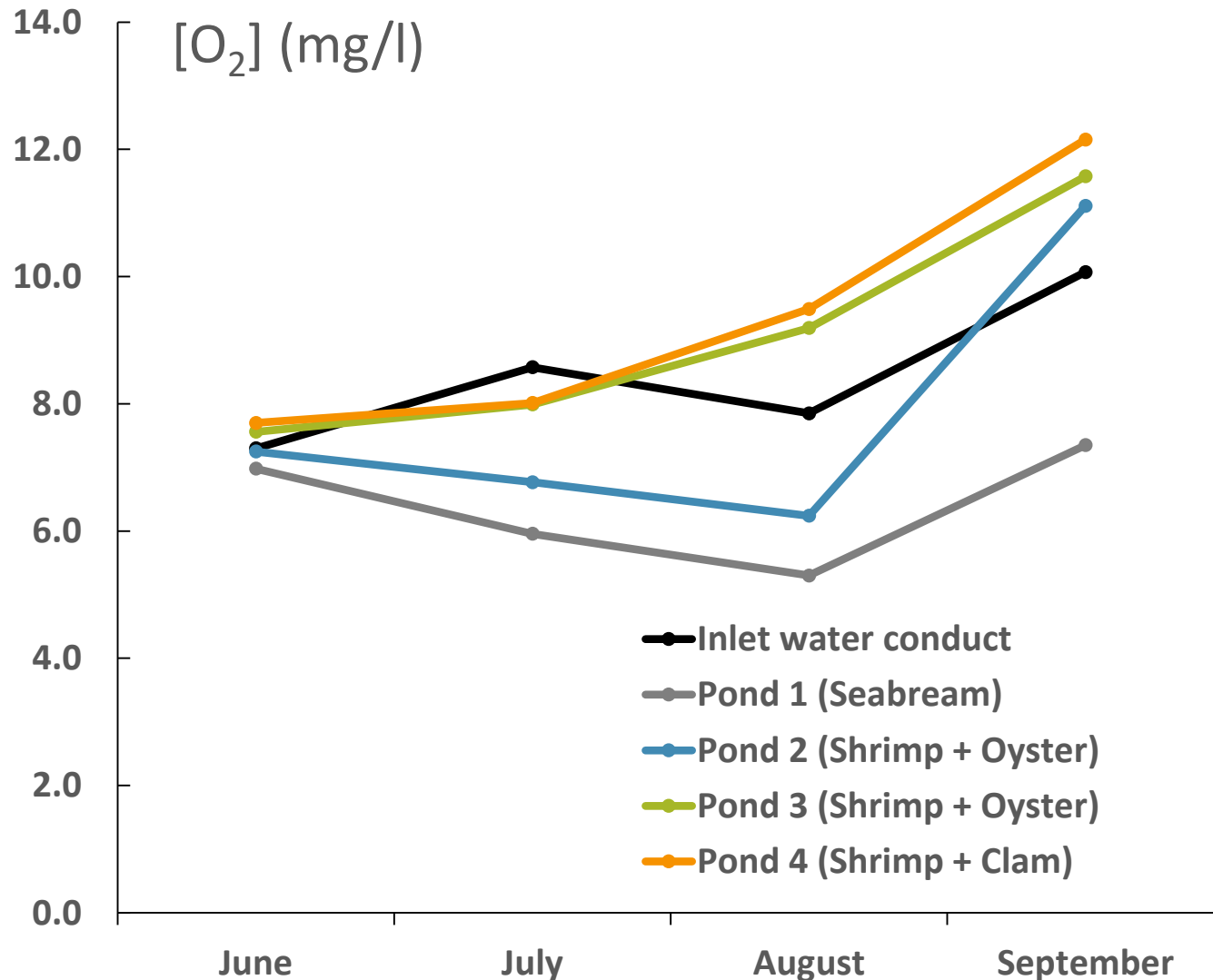


Clam (*Ruditapes decussatus / philippinarum*): 21 individuals/m²

Pilot design



Water quality



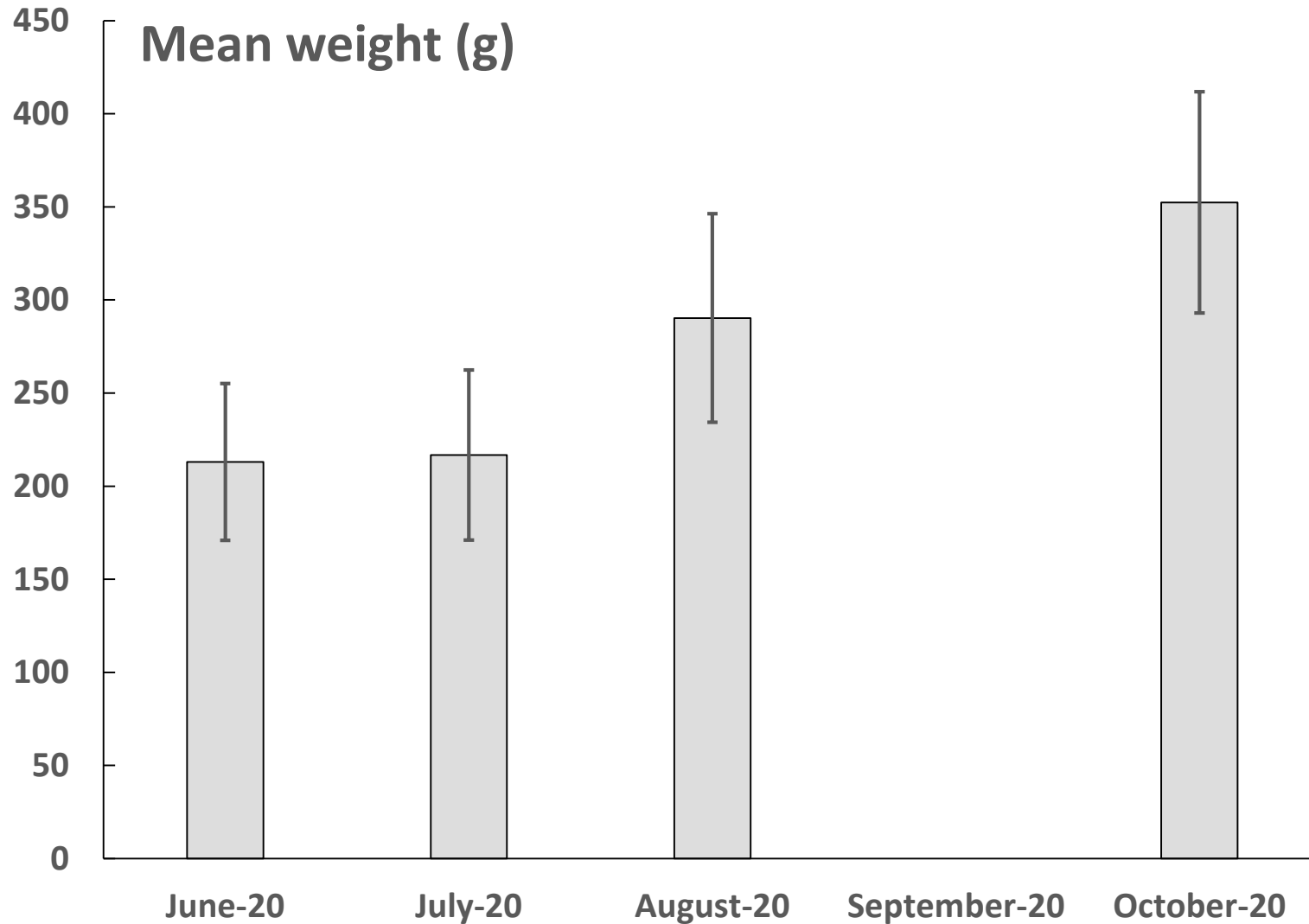
❖ No significant differences observed between ponds for [TN], [NH₄], [NO₂], [NO₃], [TP] and [PO₄] ($p < 0.05$)

❖ [O₂] 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)

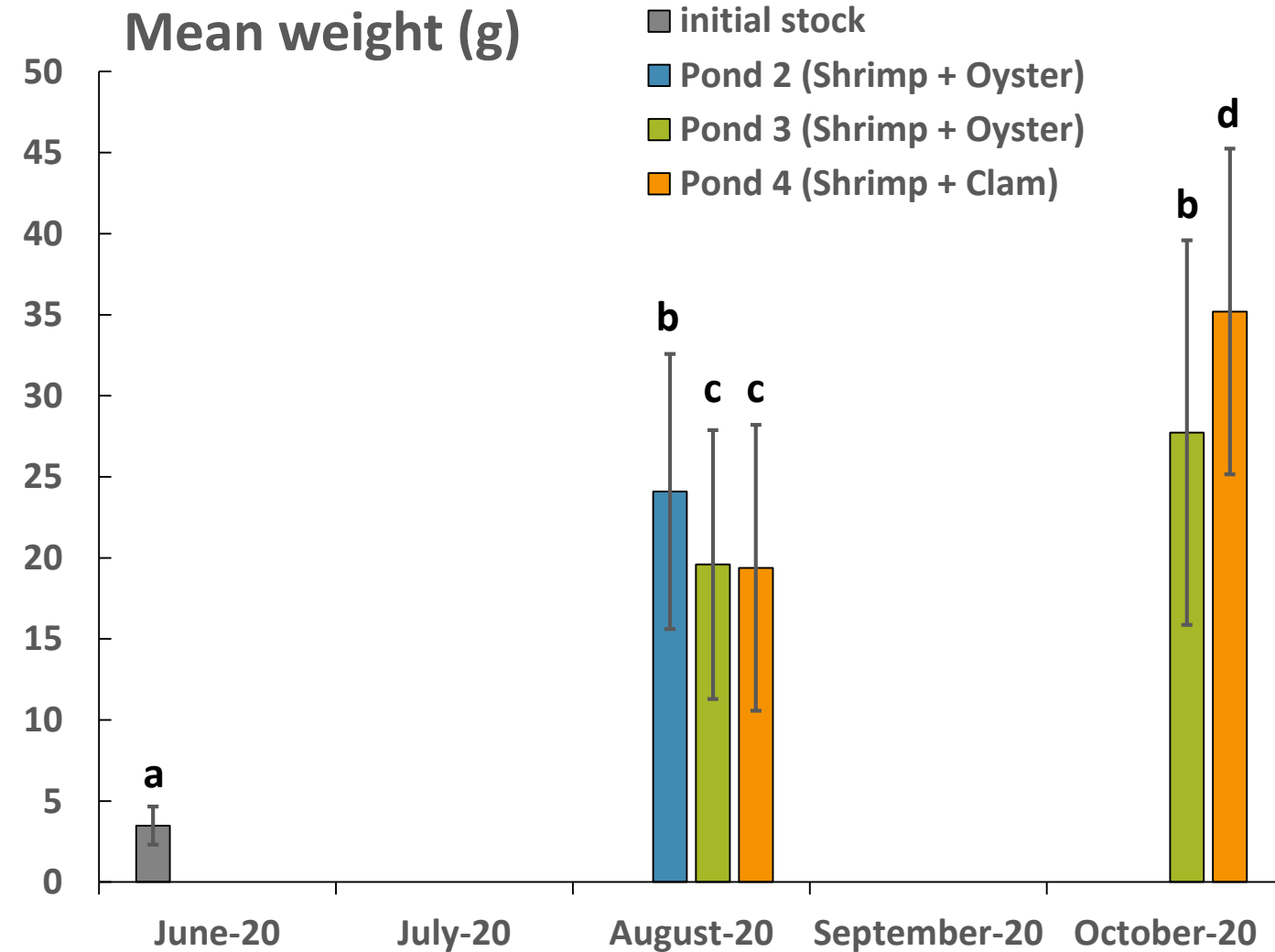
Gilthead seabream



- **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 (g)

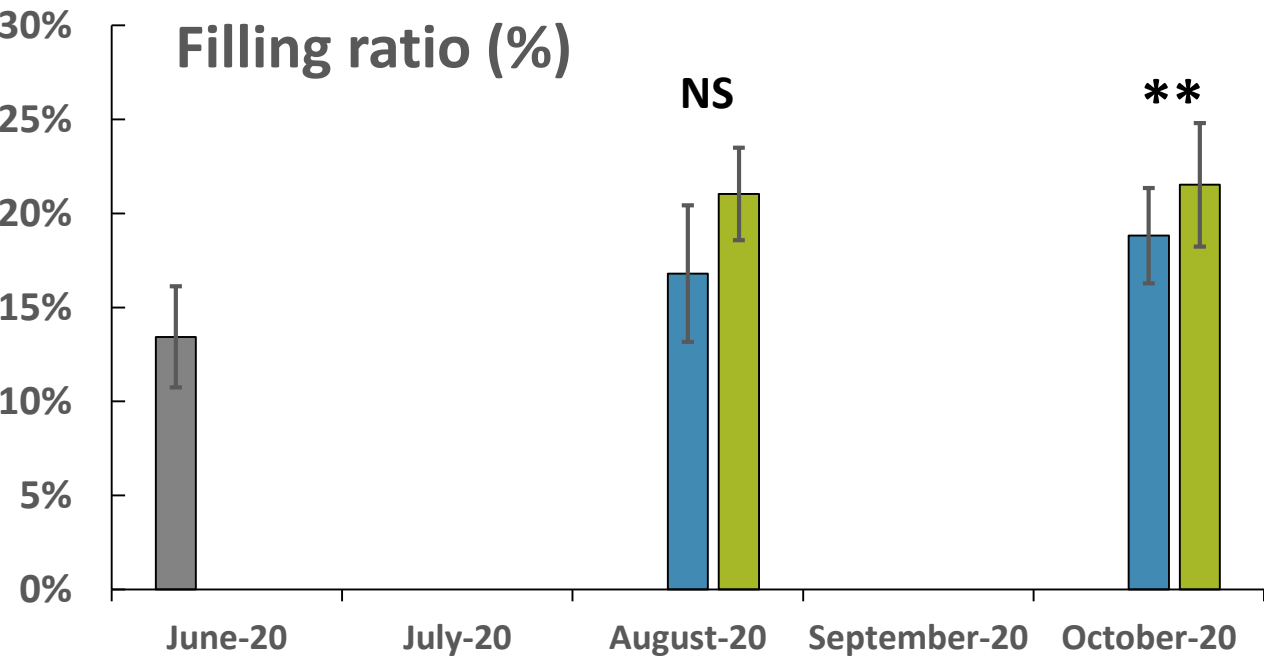
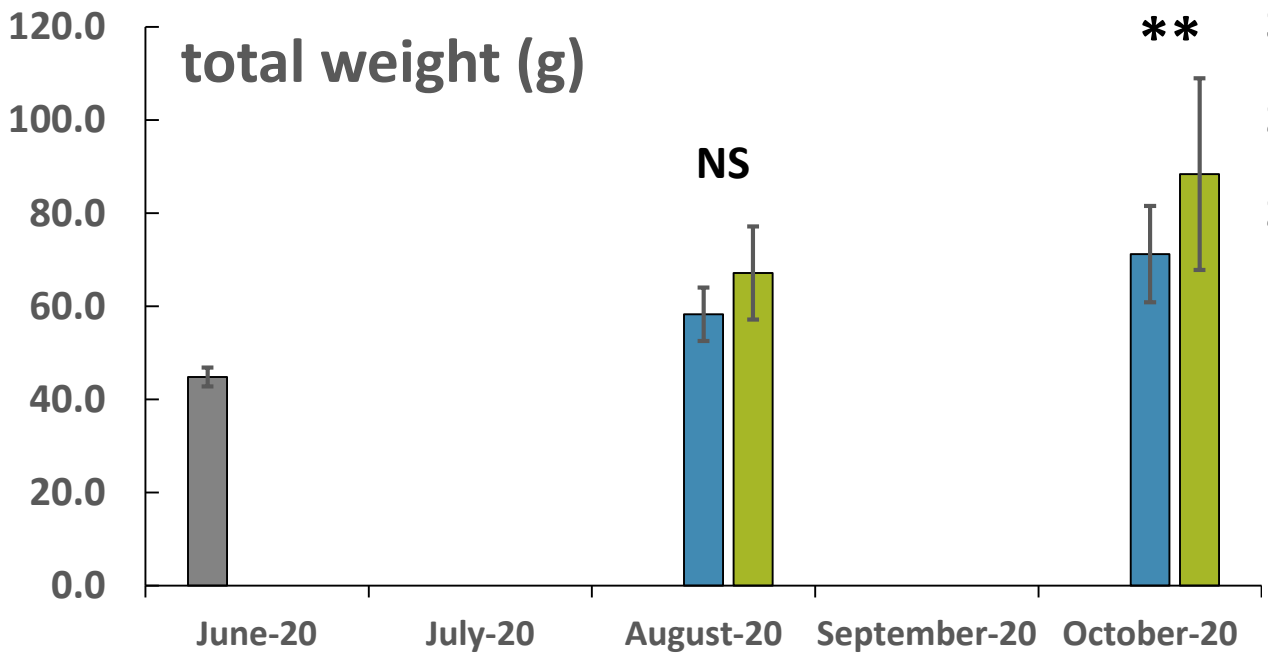


- Mean weight increased 9-fold
- Final weight similar to fed shrimps
- High variability due to sexual dimorphism
- All shrimps from the pond 2 died, just a few days before harvesting.
- survival rate : 38% pond 3, 58% pond 4 (predation by eels ?)

Oyster



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

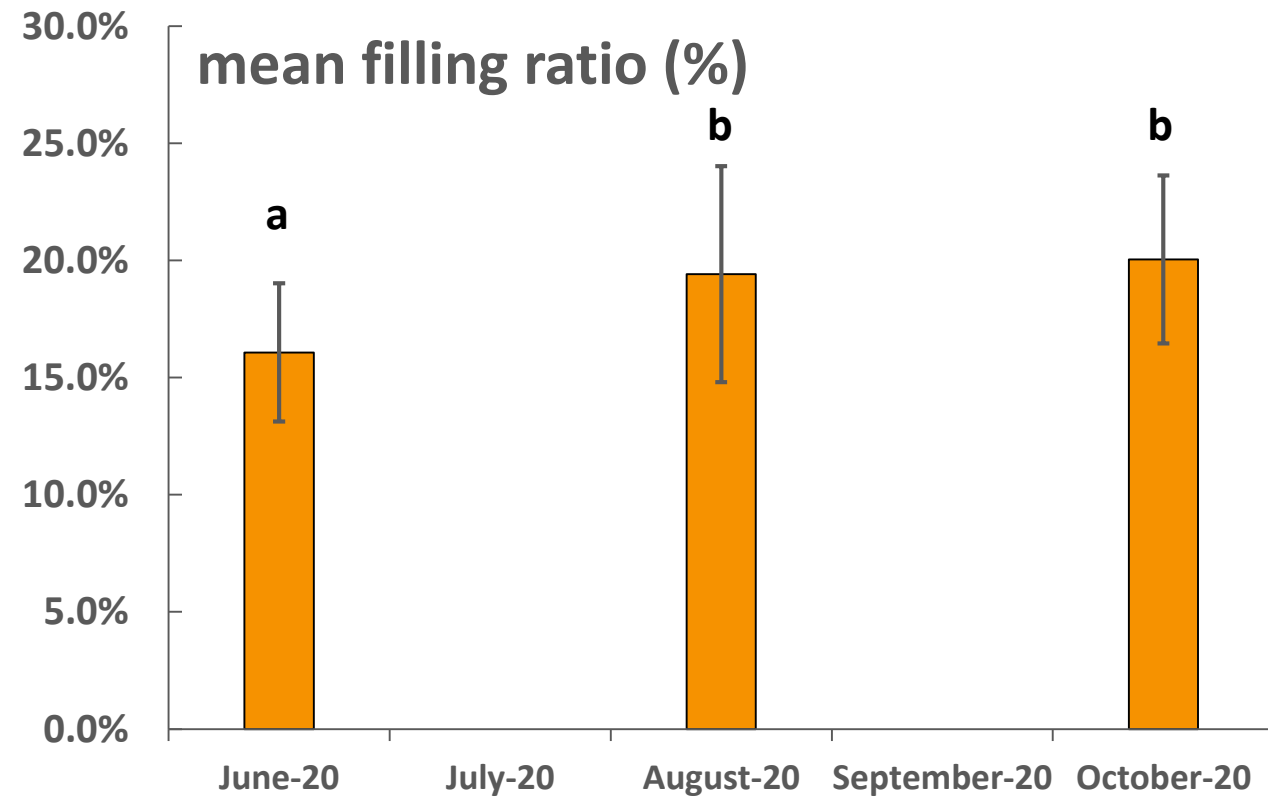
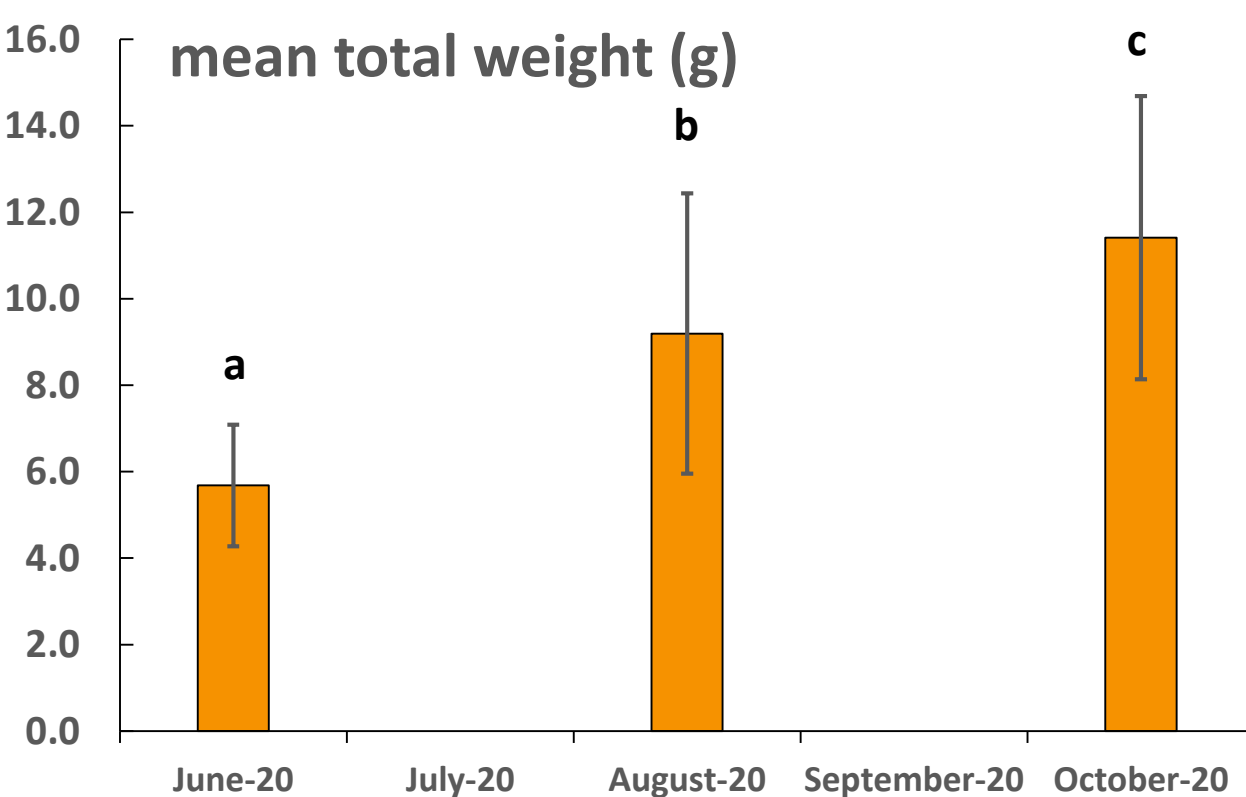


■ initial stock ■ Pond 2 (Shrimp + Oyster) ■ Pond 3 (Shrimp + Oyster) ■ initial stock ■ Pond 2 (Shrimp + Oyster) ■ Pond 3 (Shrimp + Oyster)

Clam

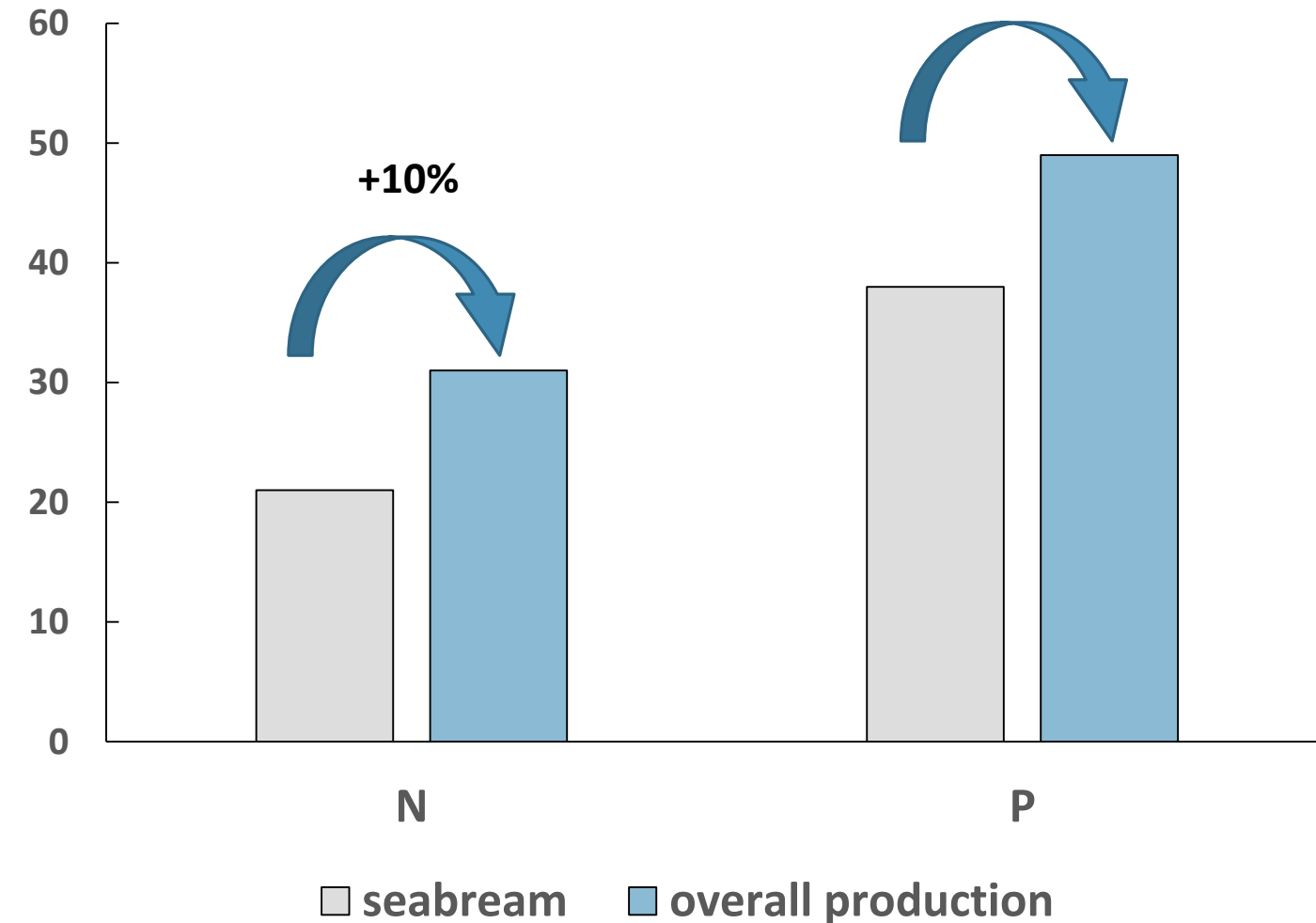


- Mean total weight doubled until a marketable size
- Mean filling ratio 20% at harvest (vs 16% at stocking)
- Survival rate estimated around 70%



Nutrient use efficiency

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