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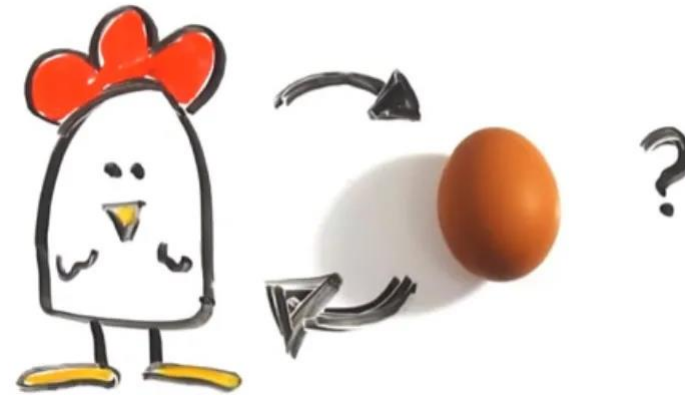
Blueprint for a viable hatchery of 3 marine commercially attractive species groups

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Context

- Growing interest in aquaculture/restoration in Belgium
 - Value@Sea, Edulis, CoastBusters, SeaConomy,...
 - Symapa, United, Wier en Wind,...
- Common problem: suitable starting material?
 - No marine hatchery in Belgium
 - Import often problematic:
 - Availability
 - Mortality during transport
 - Bio-security (SPF)
- Lots of expertise, but lack of concerted approach



General objectives

- Expand knowledge on hatchery techniques for 3 species groups
 - Adapt to local conditions (e.g. availability of water, energy, labour cost)
 - Specific local needs (species, genetic, disease status,...)
 - Increase ecological and economical sustainability
 - Specific activities of consortium partners
- Innovation beyond the state-of-the-art
- Set up a (multispecies) hatchery pilot as an incubator / accelerator



Specific goals

WP2: Seaweed



WP3: Mollusks



WP4: Shrimp



WP1: Synergies and integration?

- Hatchery-facilities
- Collection of local strains
- Life cycle control
- Genetic map / strain selection Ulva
- Provide starting material
- Bio-degradable substrate + seeding technique

- Hatchery- and nursery-protocol for local conditions
- Functional algae-based feeds
- RAS / automation
- Disease control
- Spuikom as nursery

- Tool for species selection
- Indigenous species
- Hatcheryprotocol for local conditions
- Functional algae-based feeds
- RAS / automation
- New disease testing tools

WP5: Ecological and economical gain

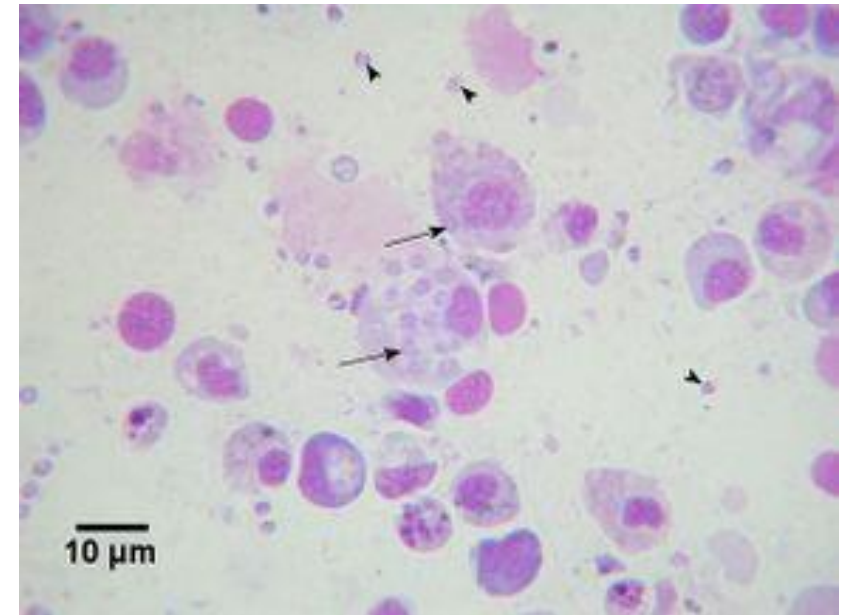
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- Flemish innovation and Entrepreneurship (Vlaio) - Blue Cluster - ICON-type project
 - Combination basic research / industrial research
 - Start: October 1, 2019; 39 months



Availability of flat oyster spat

- Limited number of hatcheries in neighbor countries (~32)
 - Mainly cupped oyster; small quantities flat oyster
 - Hatchery techniques for flat oyster less developed
- Disease status
 - *Bonamia ostreae*
 - In Belgium: mandatory to source Bonamia-free spat



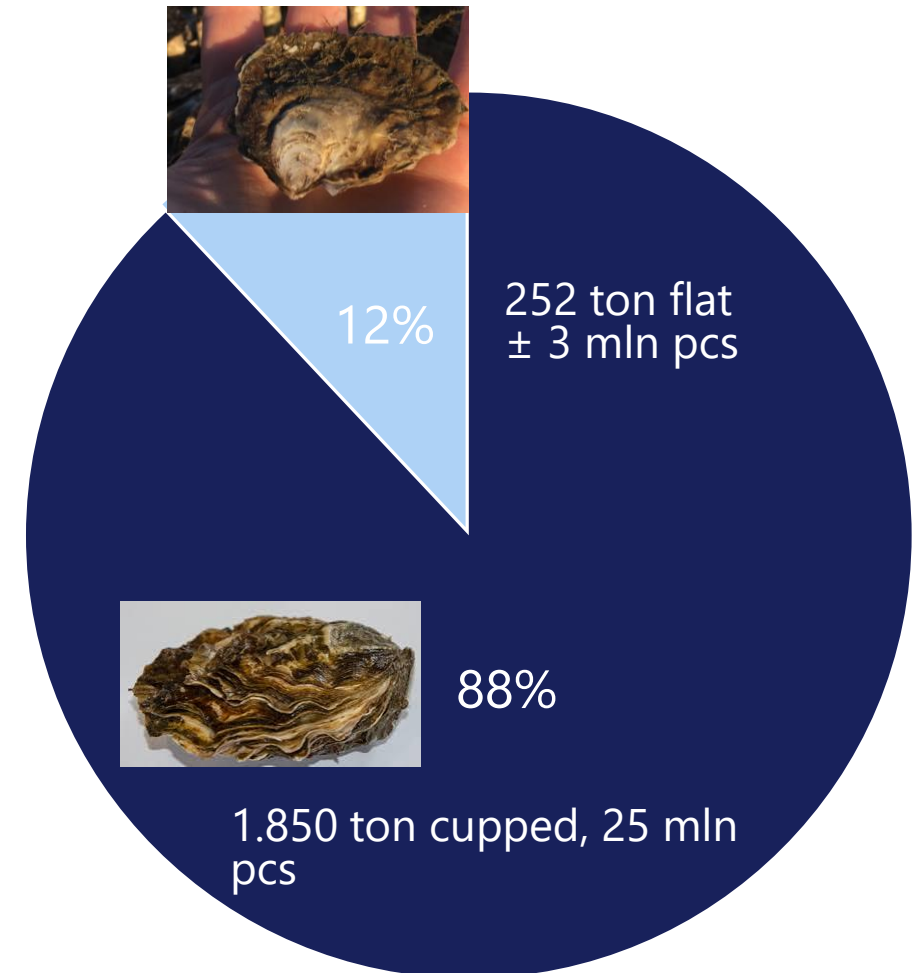
Flat oyster spat

Country	Number hatcheries	of shellfish	Species	Source
The Netherlands	2		Mainly cupped oyster and carpet shells, small quantities of flat oyster	Reproseed 2012
France	16		Mainly cupped oyster, small quantities of flat oyster	Agreste – Filière conchyliculture 2018
UK	2		Mainly cupped oyster, small quantities of flat oyster, clam & cockles	Adamson et al. 2018
Ireland	4		Mainly cupped oyster, small quantities of flat oyster	BIM 2017 – Annual Aquaculture Survey
Norway	1		King Scallop	Reproseed 2012
Spain	4		Clams, flat oyster	Reproseed 2012
Denmark	1		Blue mussel, flat oyster	Reproseed 2012
Sweden	1		Flat oyster	Reproseed 2012
Italy	1		Clams, cupped oyster, blue mussel	Reproseed 2012

WP3: Innovations in mollusk hatchery techniques

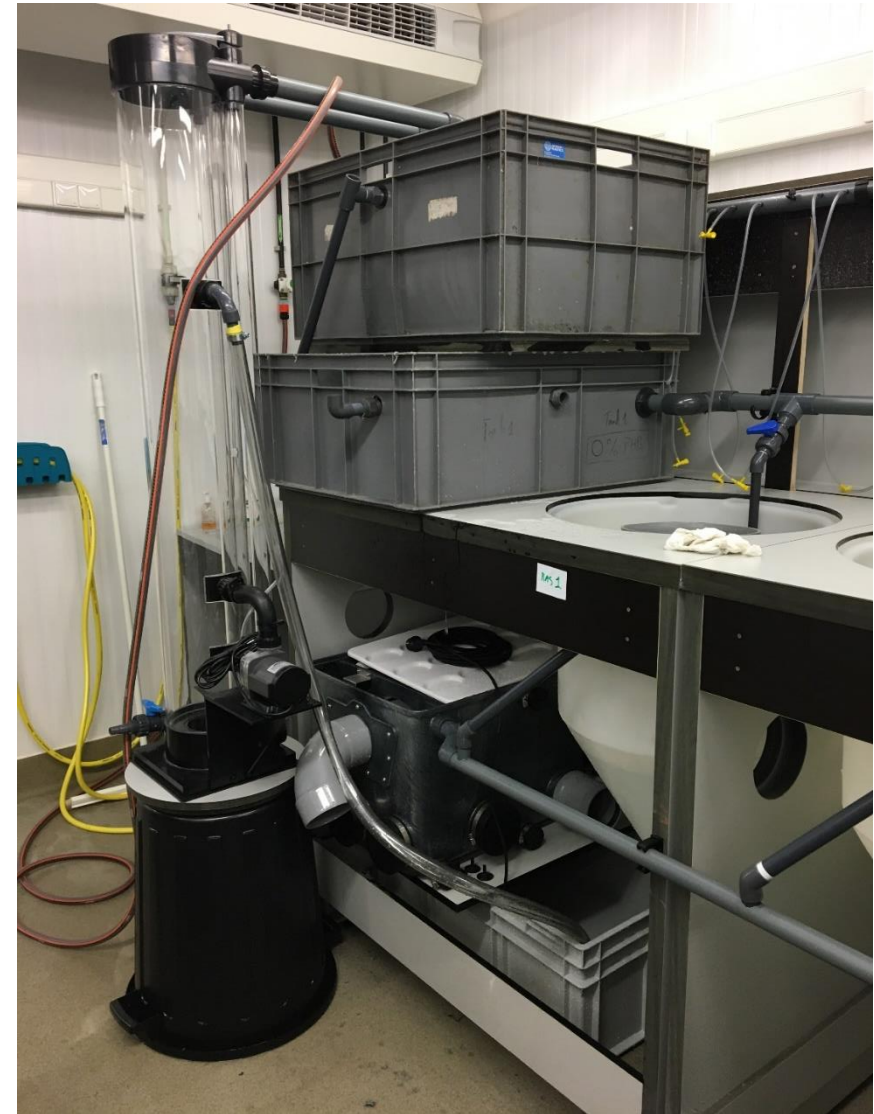
- **Task 3.1: Oyster species selection**

- Mapping of origin and volume of flat oysters that enter the Belgian market
- Estimation of Bonamia-free flat oyster seed demand for restoration in Europe
- Identification of the procedure to obtain legally certified SPF-flat oysters



WP3: Innovations in mollusk hatchery techniques

- **Task 3.2: RAS system in function of bivalves**
 - <-> Traditional flow through
 - 3 RAS-systems (3 100-L tanks each):
 - Drum filter, protein skimmer, biological filter
 - Start with pacific cupped oyster (*C. gigas*)
 - Optimize RAS parameters
 - Algae loss in RAS components
 - Water flow rate for specific set-up
 - Stocking density for specific set-up
 - Different water sources
 - Natural ("mature") seawater
 - Diluted brine
 - Artificial seawater



WP3: Innovations in mollusk hatchery techniques

- **Task 3.3: Water quality monitoring**

- Oxygen, pH, N-compounds
- Mineral balance (zinc, iodine, selenium)
- Nursery fase: Ca, carbonate (Calcium carbonate supply system)
- Inline monitoring

- **Task 3.4: Microalgae as feed**

- Mono- and mixed-species diets
- Substitution of live algae with freeze-dried algae
- Mineral-fortified algae (Proviron)
- Automated feeding system



WP3: Innovations in mollusk hatchery techniques

- **Task 3.5: Disease control / microbial management**

- Immune-modulating compounds / natural antimicrobial compounds / probiotics
- Dosing and frequency of application
- Synergistic mixtures

- **Task 3.6 and 3.7: Spuikom (Ostend) as nursery**

- Follow up of algae population: species composition, density
- Environmental conditions: nutrient levels, chlorophyll, suspended solids (POM) temperature, salinity, oxygen, ...
- Spat performance: survival, weight, fouling, parasites, ...



Thank You!

