



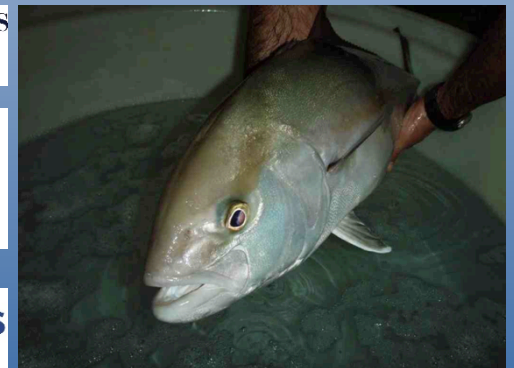
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Broodstock management and spawning induction of greater amberjack, *Seriola dumerili*

Mylonas, C.C., Fakriadis, I., Raftopoulos, A,
Iakovopoulos, G, Papandroulakis, N., Lisi, F.,
Sigelaki, I., Papadaki, M.

Hellenic Center for Marine
Research (HCMR)
Crete, GREECE



Reproduction in captivity

objectives of the project:

- Study the reproductive cycle of captive vs wild fish and identify potential dysfunctions
- Establish broodstock management procedures in tanks and sea cages
- Induce spawning using hormonal therapies
- Collect eggs in sea cages

Reproductive cycle studies

mid May - late July
19-26°C



UNIVERSITÀ
DEGLI STUDI DI BARI
ALDO MORO



Purse seine,
Lampedousa Island,
Italy

Sea cages,
Salamina Island,
Greece



Reproduction in captivity

Handling during early gametogenesis:



Arrested vitellogenesis
(smaller oocytes)



Low or lack of
sperm production

RESEARCH ARTICLE

Comparative Study of Reproductive Development in Wild and Captive-Reared Greater Amberjack *Seriola dumeril* (Risso, 1810)


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ORIGINAL ARTICLE

WILEY 

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The observed oogenesis impairment in greater amberjack *Seriola dumeril* (Risso, 1810) reared in captivity is not related to an insufficient liver transcription or oocyte uptake of vitellogenin

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Rearing in captivity affects spermatogenesis and sperm quality in greater amberjack, *Seriola dumeril* (Risso, 1810)¹

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Available broodstocks

Stocks	Rearing method	Number of individuals	Size (kg)	Feeding (pellets >2 yr)
ARGO	sea-cages	49	7.1-16.0	raw fish
GMF	sea-cages	28	6.3-15-6	live fish
SOUDA	sea-cages	12	7.4-14.8	moist pellet
AQUALABS	land-based	27	6.5-23.8	raw fish
ARGO	land-based	9	8.1-11.1	live, raw fish
FORKYS	land-based	22	7.7-10.3	raw fish, squid

Spawning induction period:

- mid May - late July
- 20-26°C

Initial design - two approaches

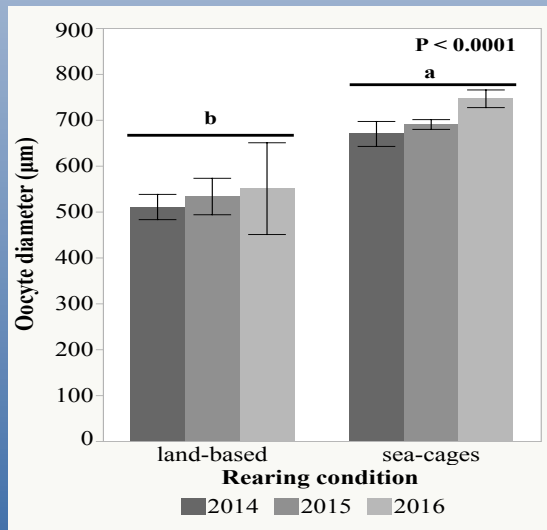
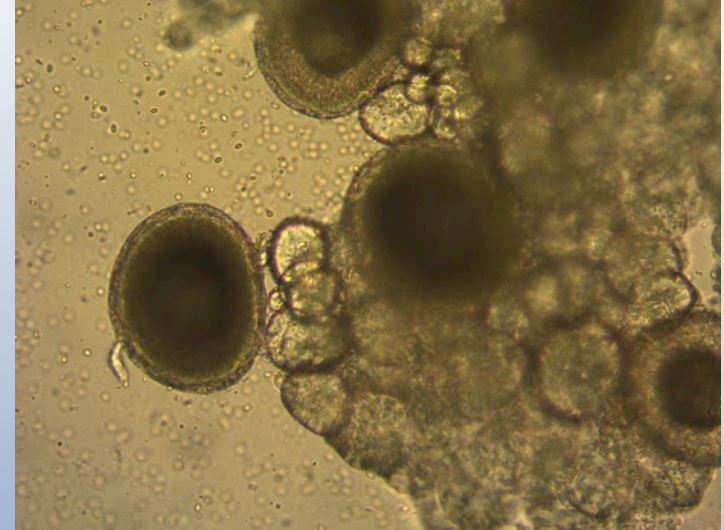
- Fish in tanks during the year
- spawning induced at the expected spawning season
- egg collection



- Fish in sea cages during the year
- spawning induced at the expected spawning season
- egg collection in cages

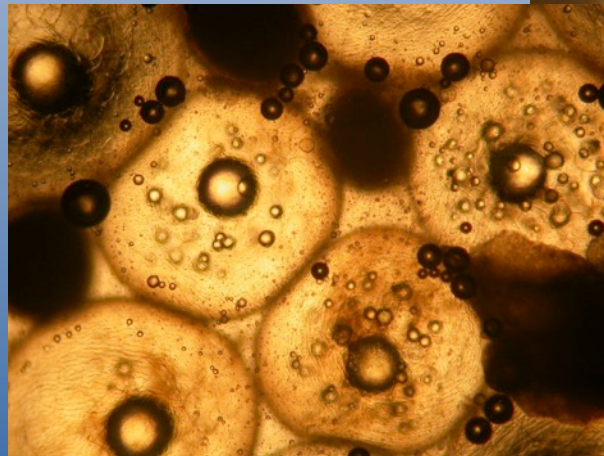
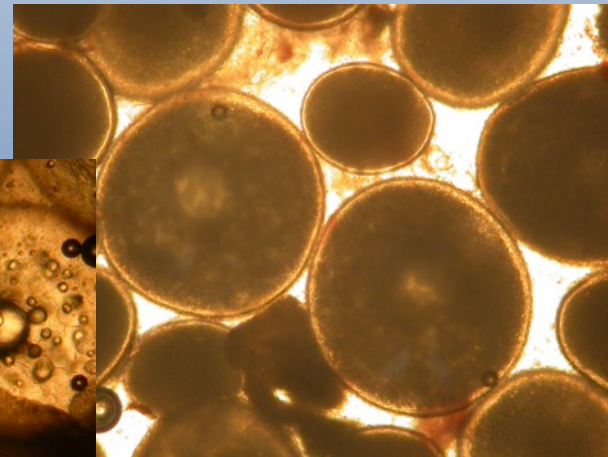
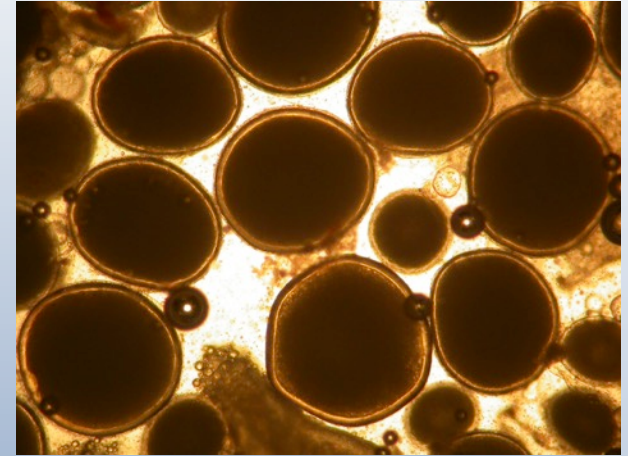
Broodstocks in tanks

- Inconsistent-incomplete gametogenesis (even w/out handling)
- Low or no sperm production
- Almost no production, or very poor egg quality



Broodstocks in sea cages

- Consistent and complete gametogenesis (also maturation),
- Still relatively low sperm production and quality
- Limited egg collection when spawning in the sea, but good egg quality

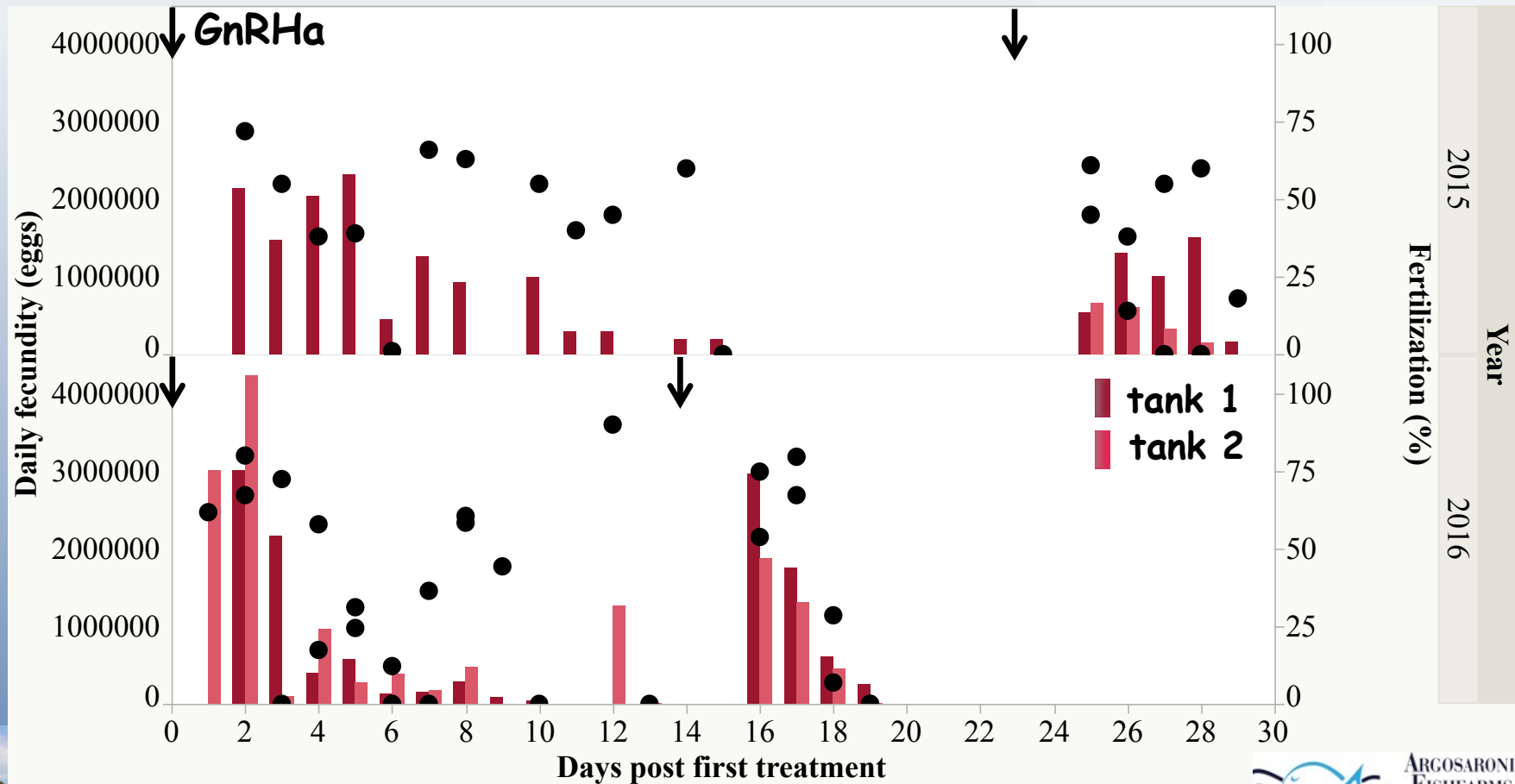


New approach

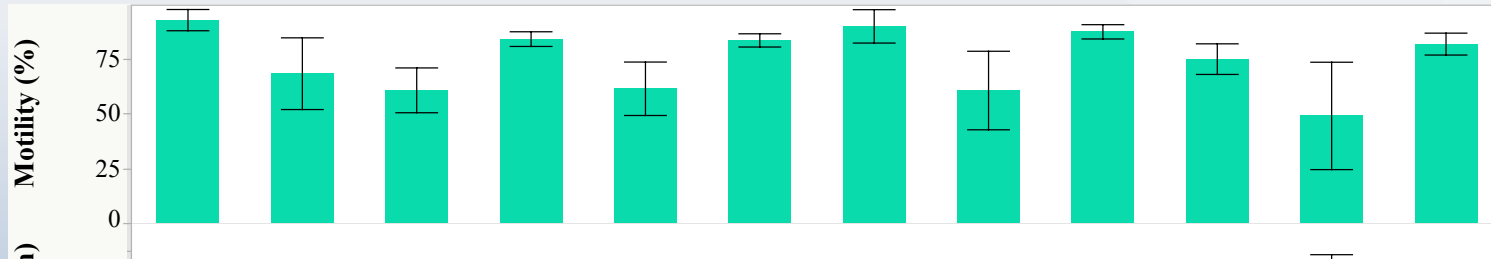
- Fish in sea cages during the year
- Spawning induced at the expected spawning season
- Transfer immediately to land-based tanks
- Egg collection in tanks



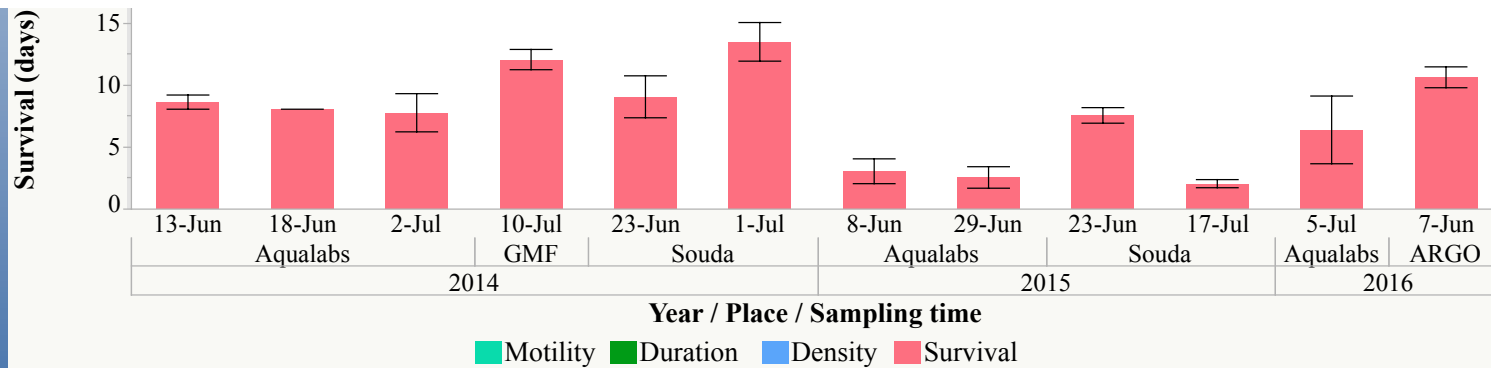
First cage-to-tank results



Sperm quality of amberjack



	N	Motility (%)	Duration (min)	Density (10^9 szoa ml ⁻¹)	Survival (days)
Tanks	27	72±6	2.84±0.35*	28.4±1.5	6±1*
Sea-cages	49	80±3	4.13±0.30**	30.3±2.8	9±1**



■ Motility
 ■ Duration
 ■ Density
 ■ Survival

Optimization of spawning induction method

1. Implants or multiple injections of GnRHa
2. Different doses of GnRHa
3. Timing of application within the season



Implants vs multiple injections

implants

mean weight 17 ± 3 kg
sex ratio 1:1

injections



implants



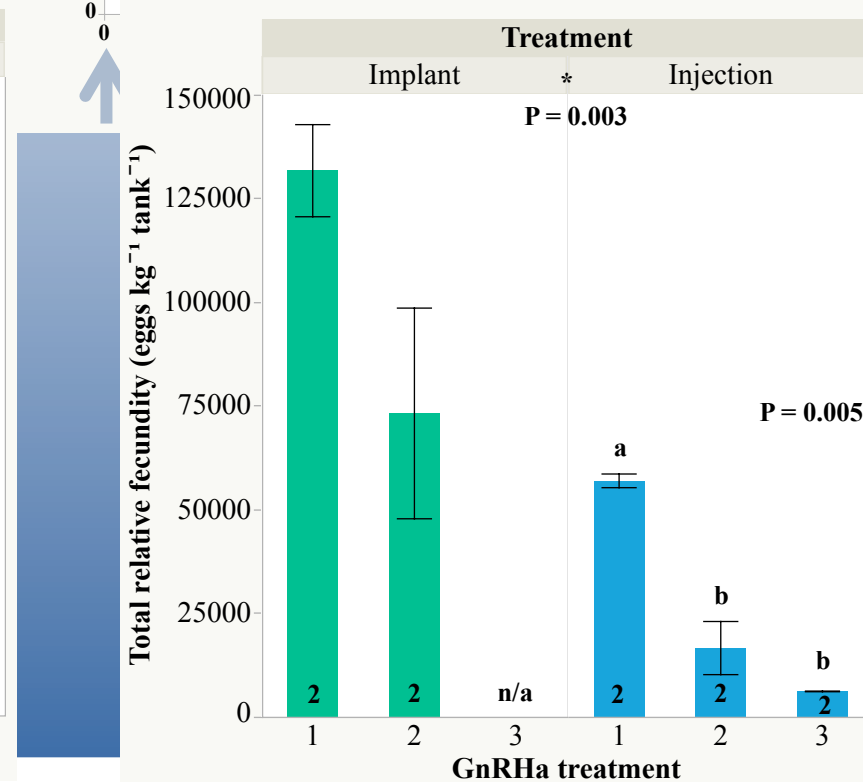
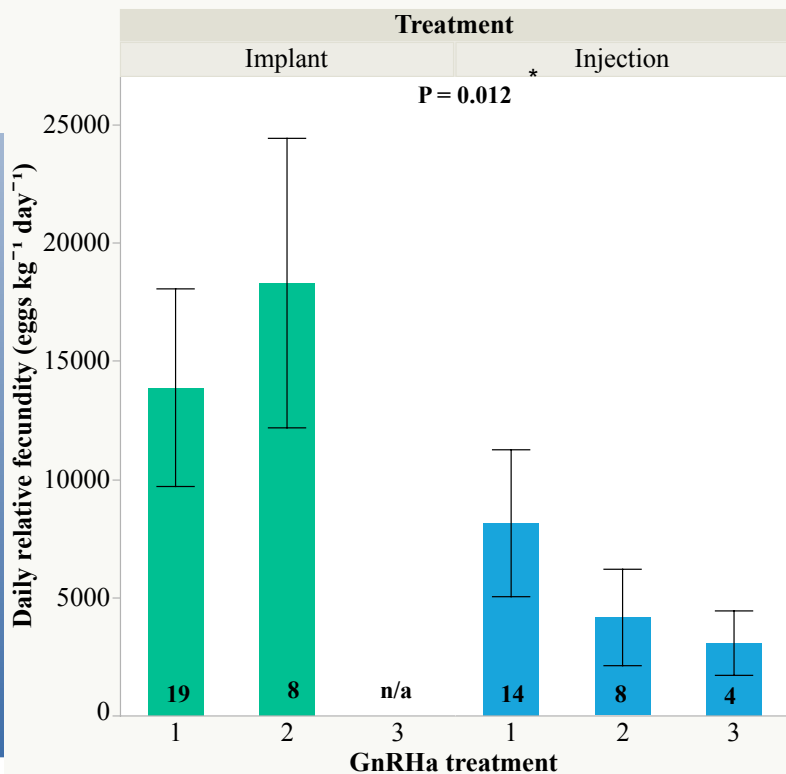
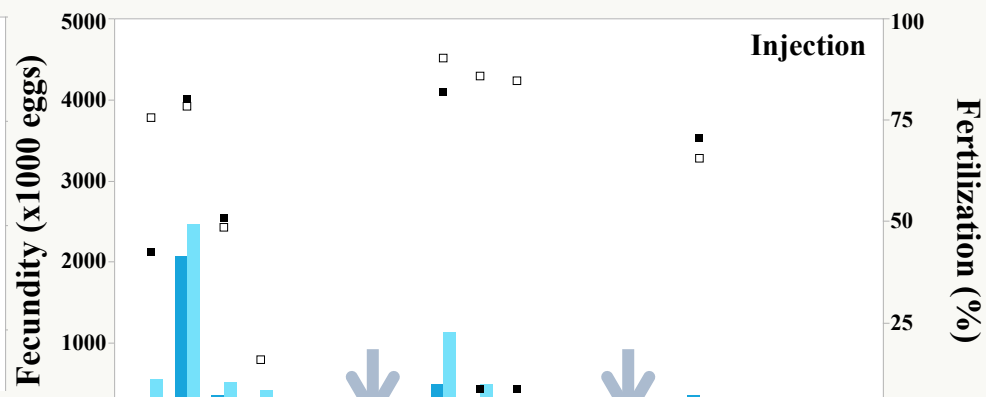
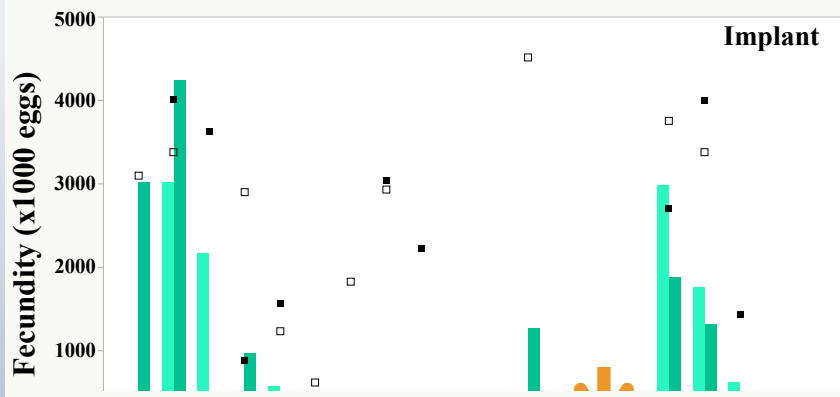
injections



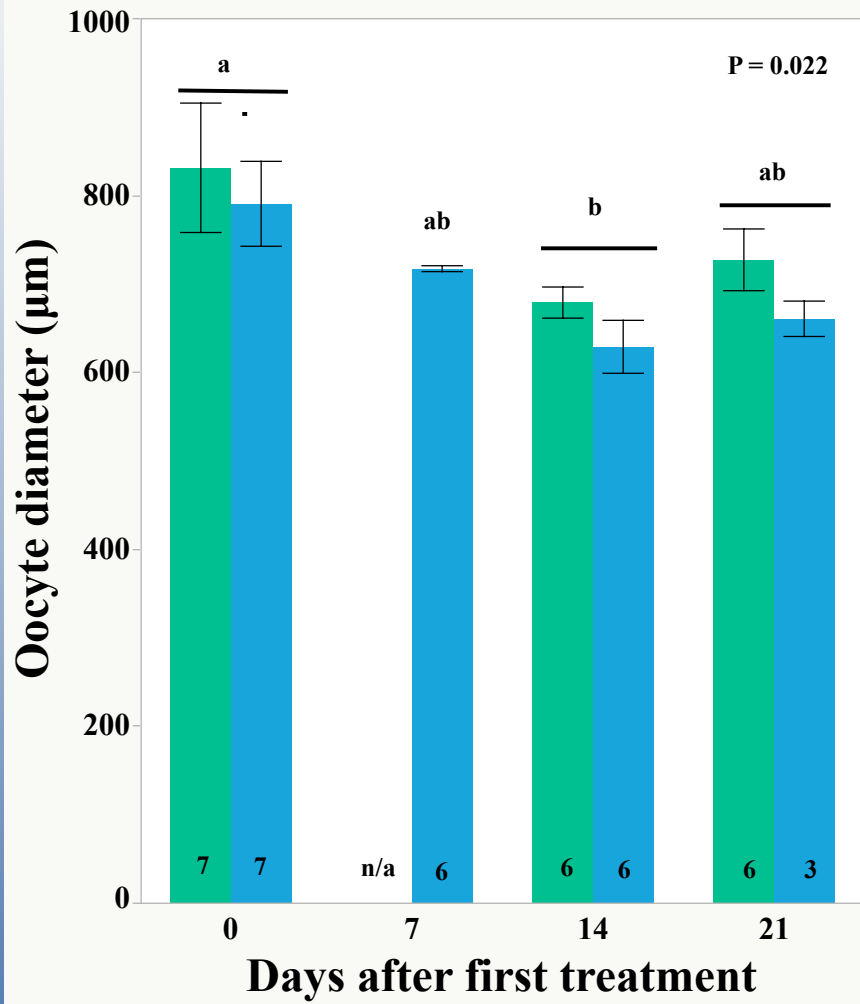
21 days



Spawning kinetics



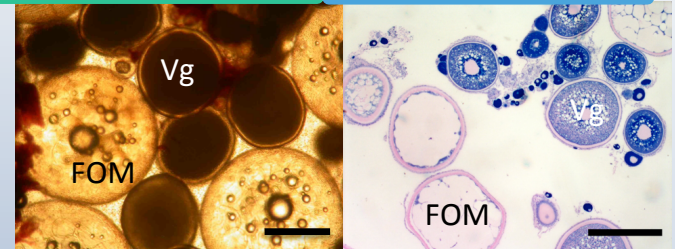
Oocyte diameter



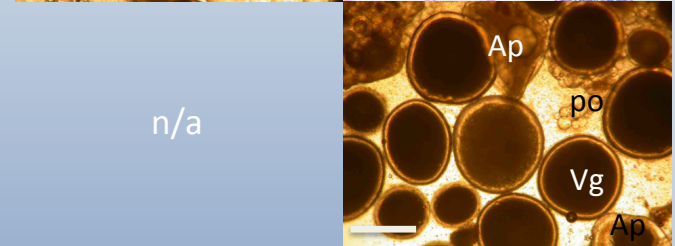
implants

injections

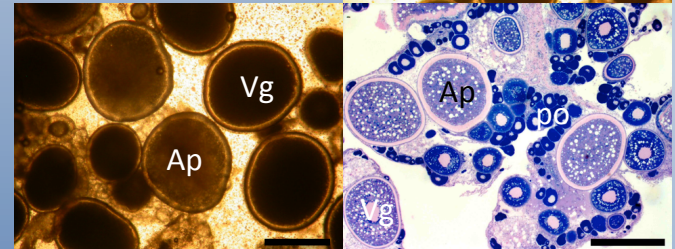
Day 0



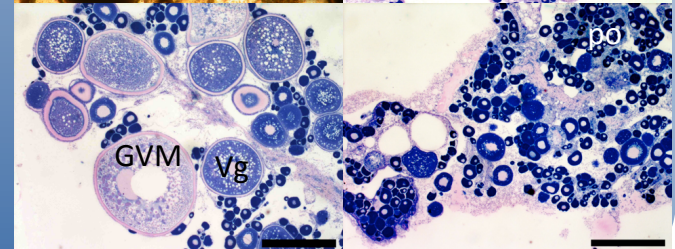
Day 7



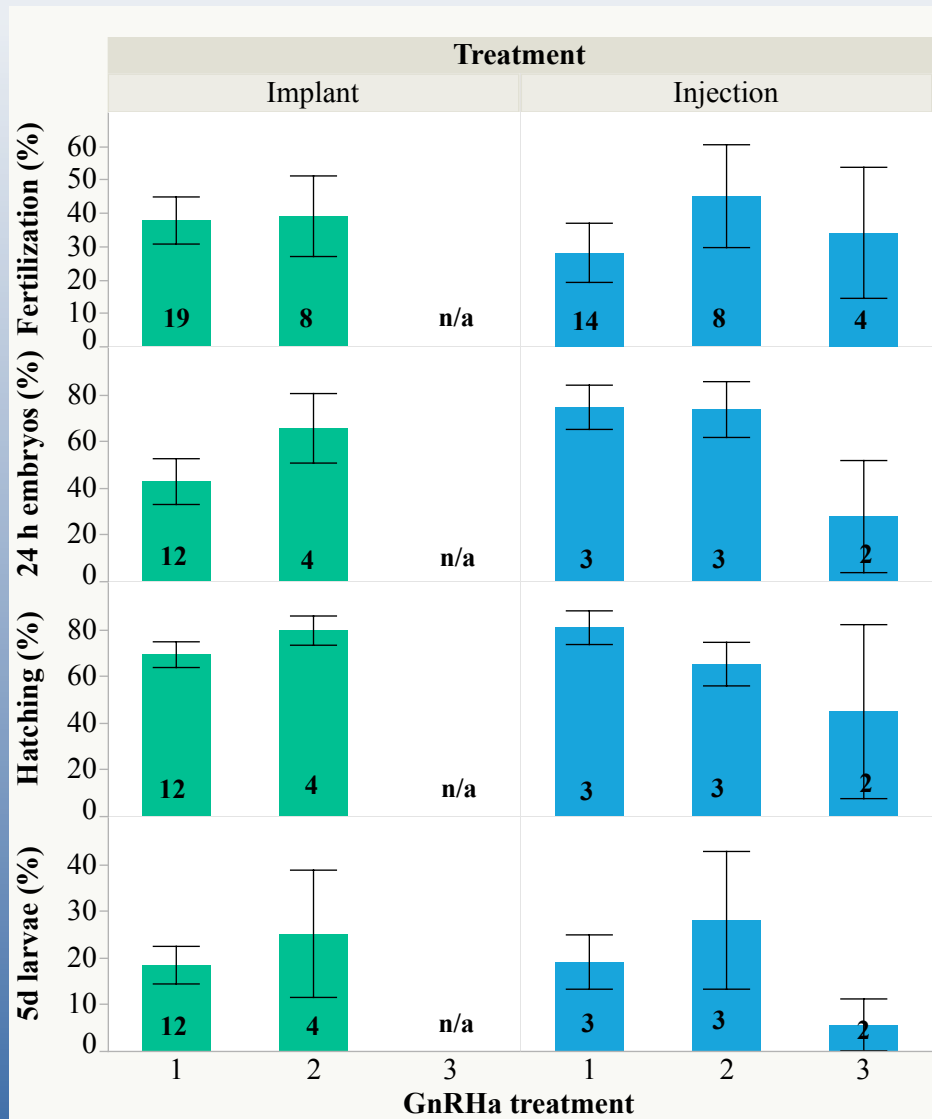
Day 14



Day 21



Egg & larval quality



36%

53%

70%

20%

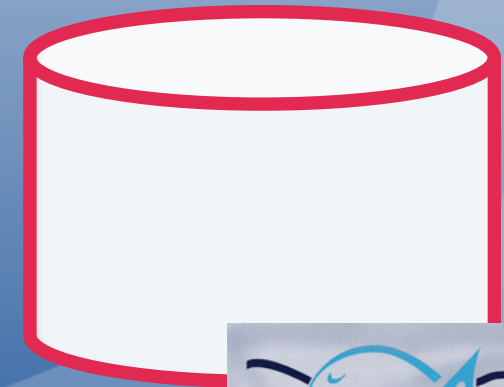
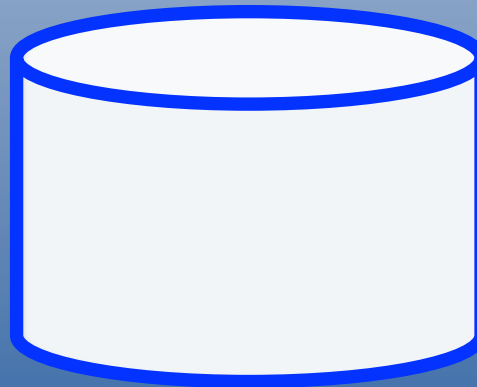


Different doses of implants

MEDIUM ($50 \mu\text{g GnRHa kg}^{-1}$) in previous year

LOW ($25 \mu\text{g kg}^{-1}$)

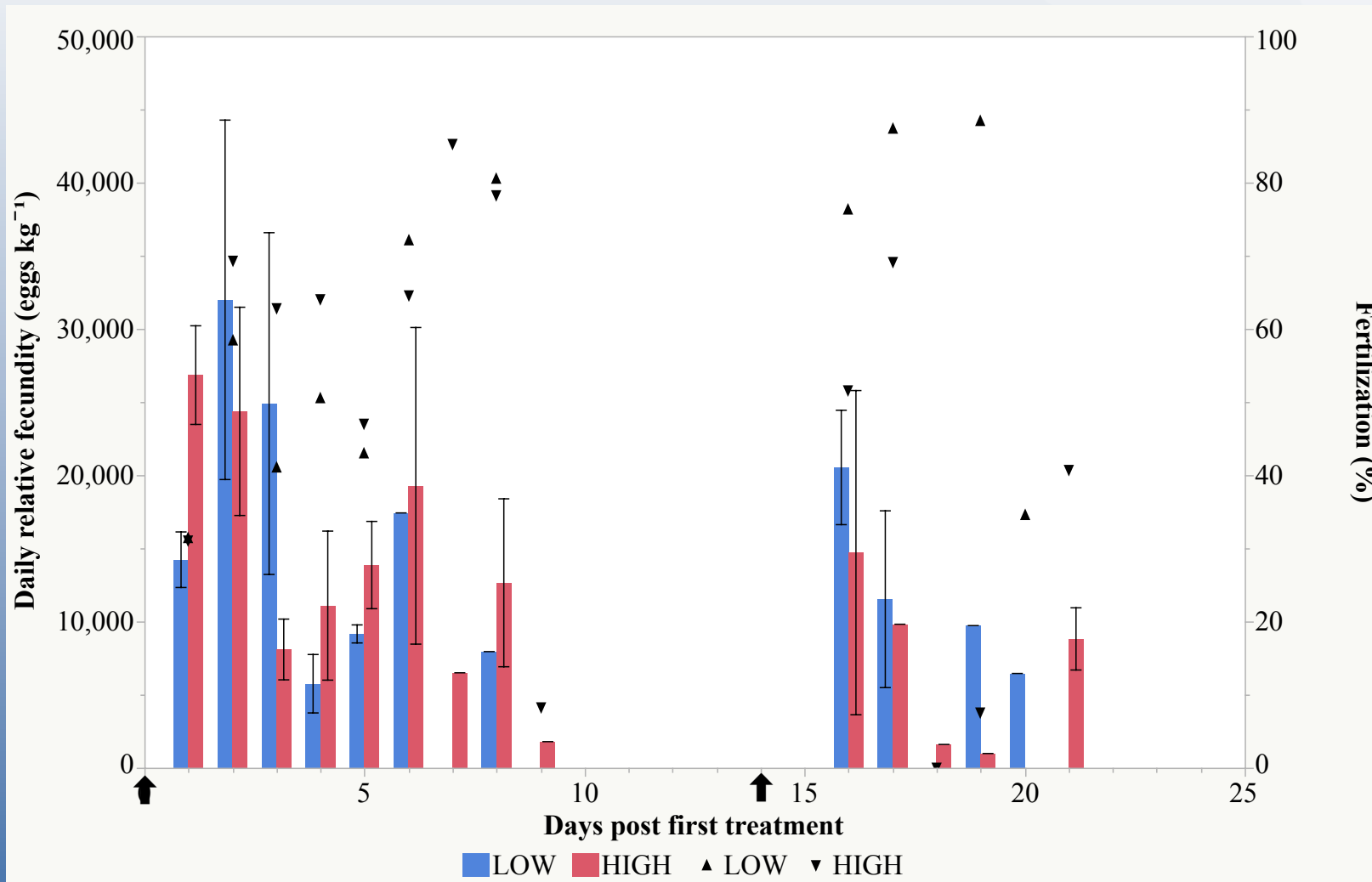
HIGH ($75 \mu\text{g kg}^{-1}$)



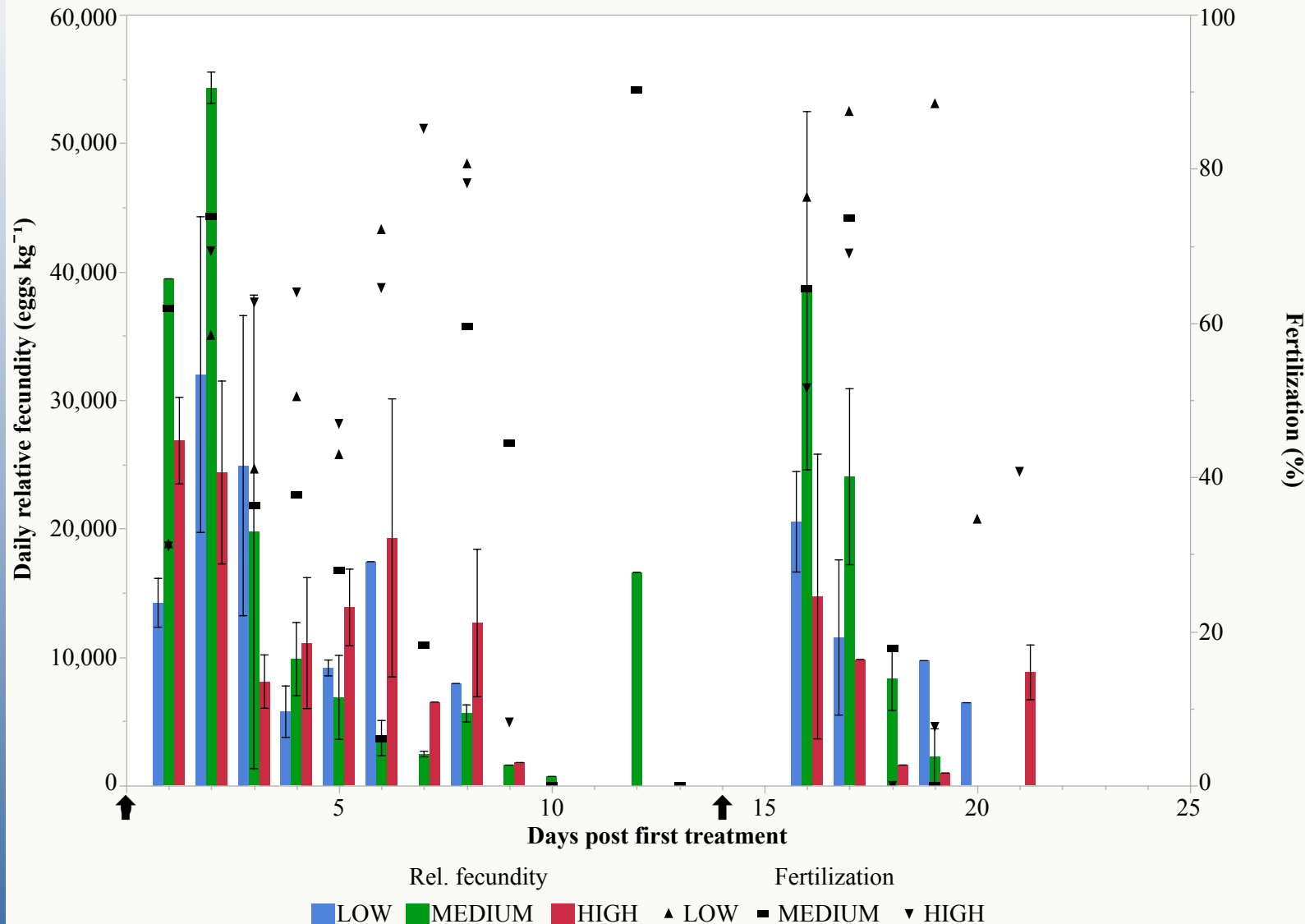
- Spawning kinetics
- Egg production and quality
- 5d larval survival



Different doses of implants



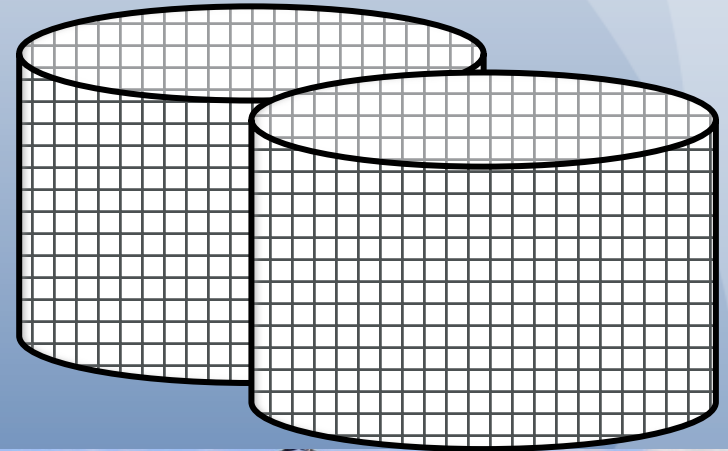
Different doses of implants



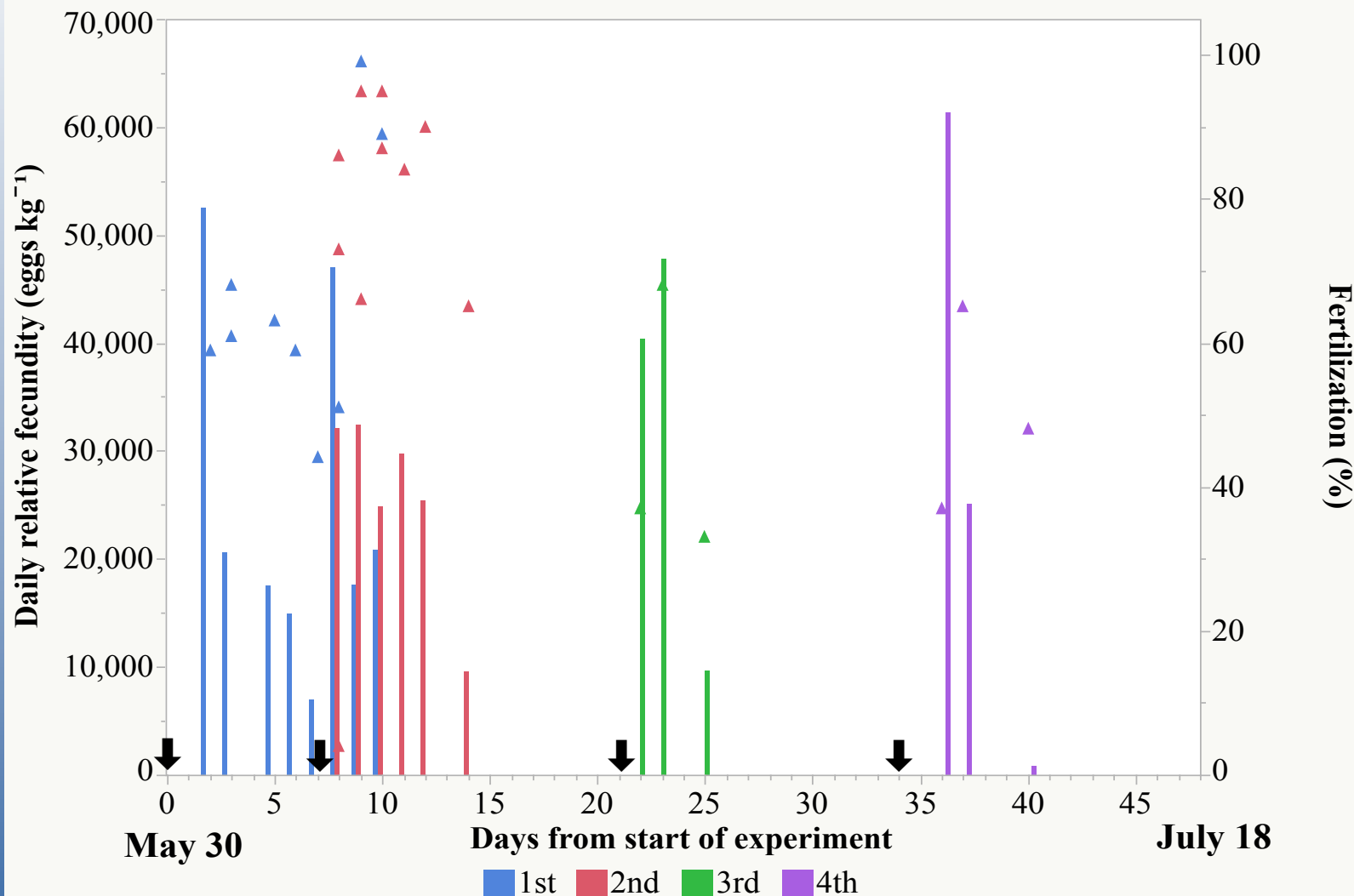
Timing of application within the reproductive season

4 different times in the reproductive season

- Spawning kinetics
- Egg production and quality
- 5d larval survival



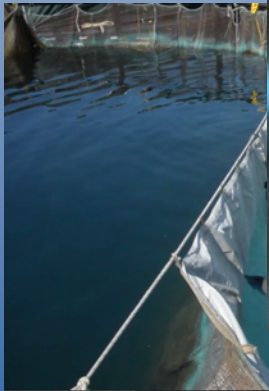
Timing of application within the reproductive season



Recommended protocol

- Fish in sea cages during the year with no handling after March-April!!
- Spawning induced at any time between late May - early June
- Use of ...
- Trans ...
- Return ...

weeks

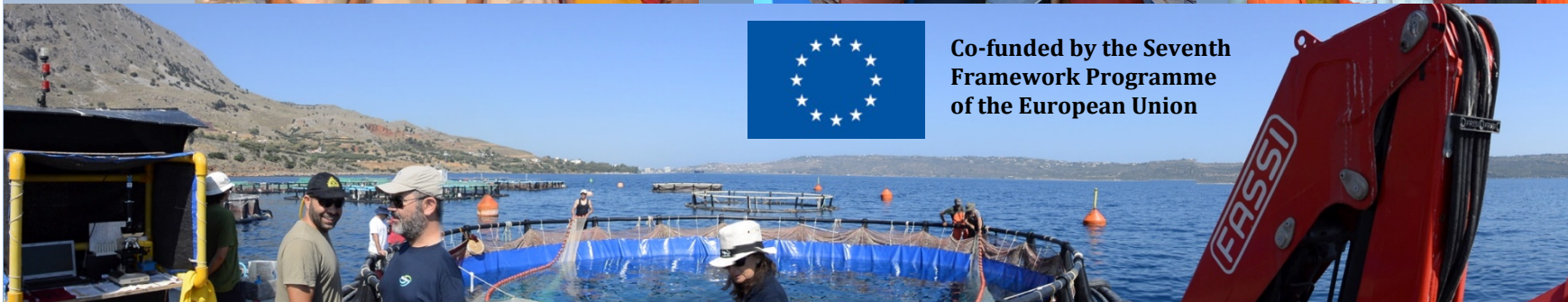


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