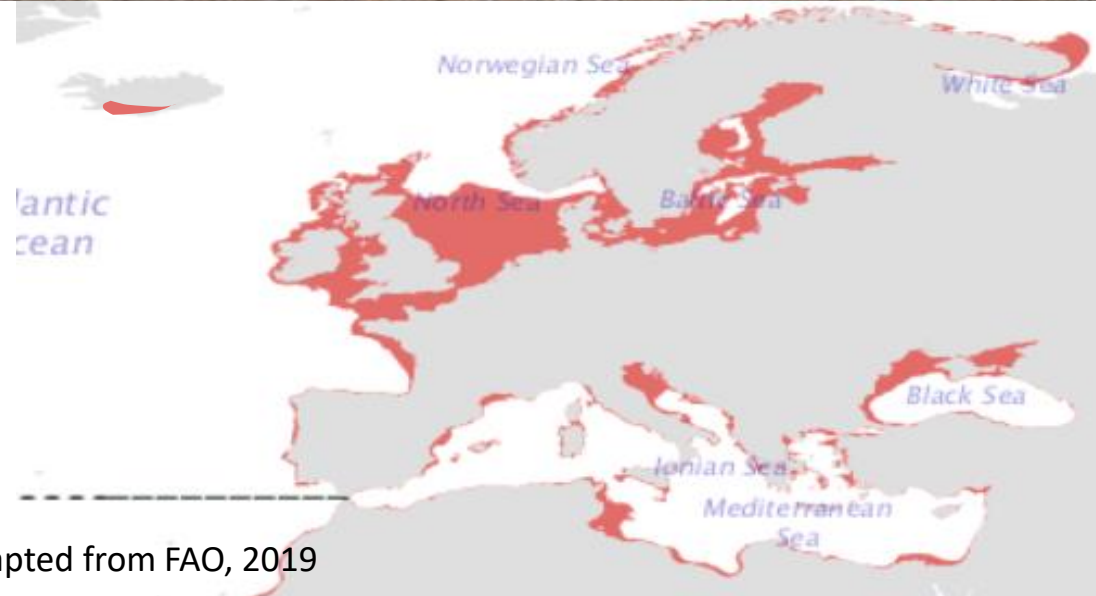


Improvements in larviculture of *Crangon crangon*

Steps towards its commercial aquaculture

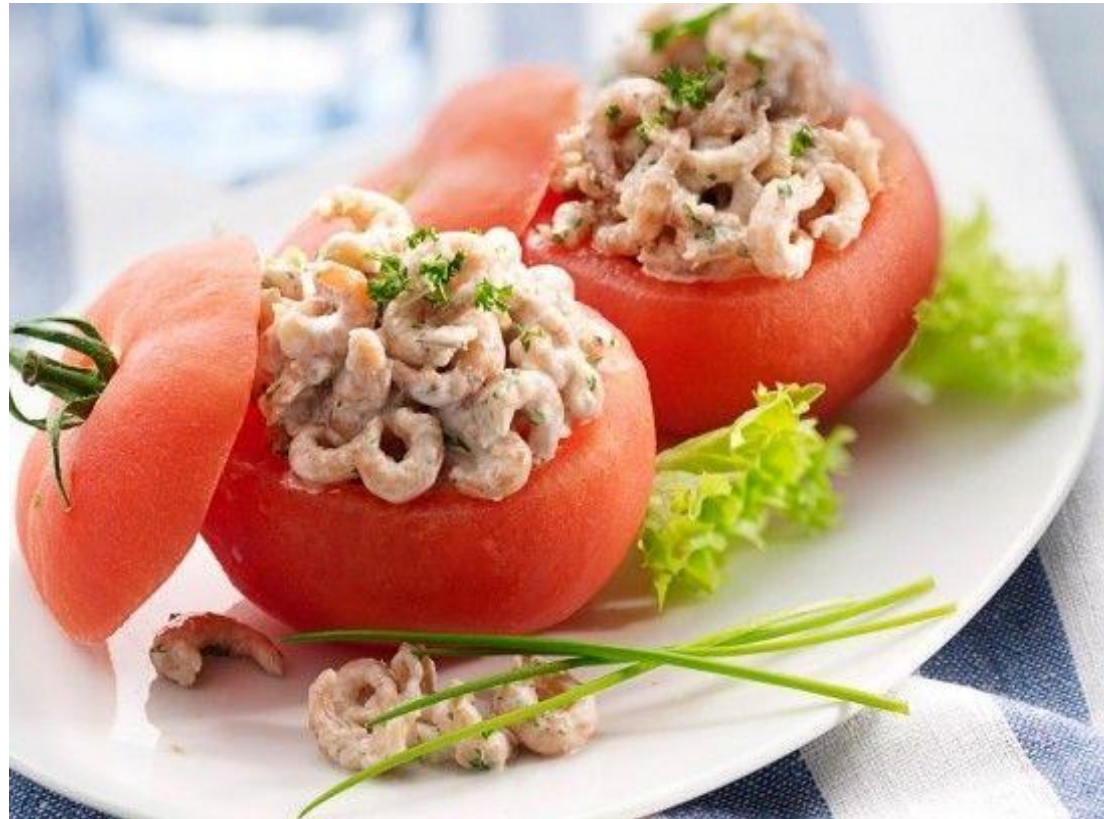
Benigna Van Eynde, David Vuylsteke, Olivier Christiaens, Kris Cooreman,
Guy Smagghe, Daan Delbare

Crangon crangon – European brown shrimp



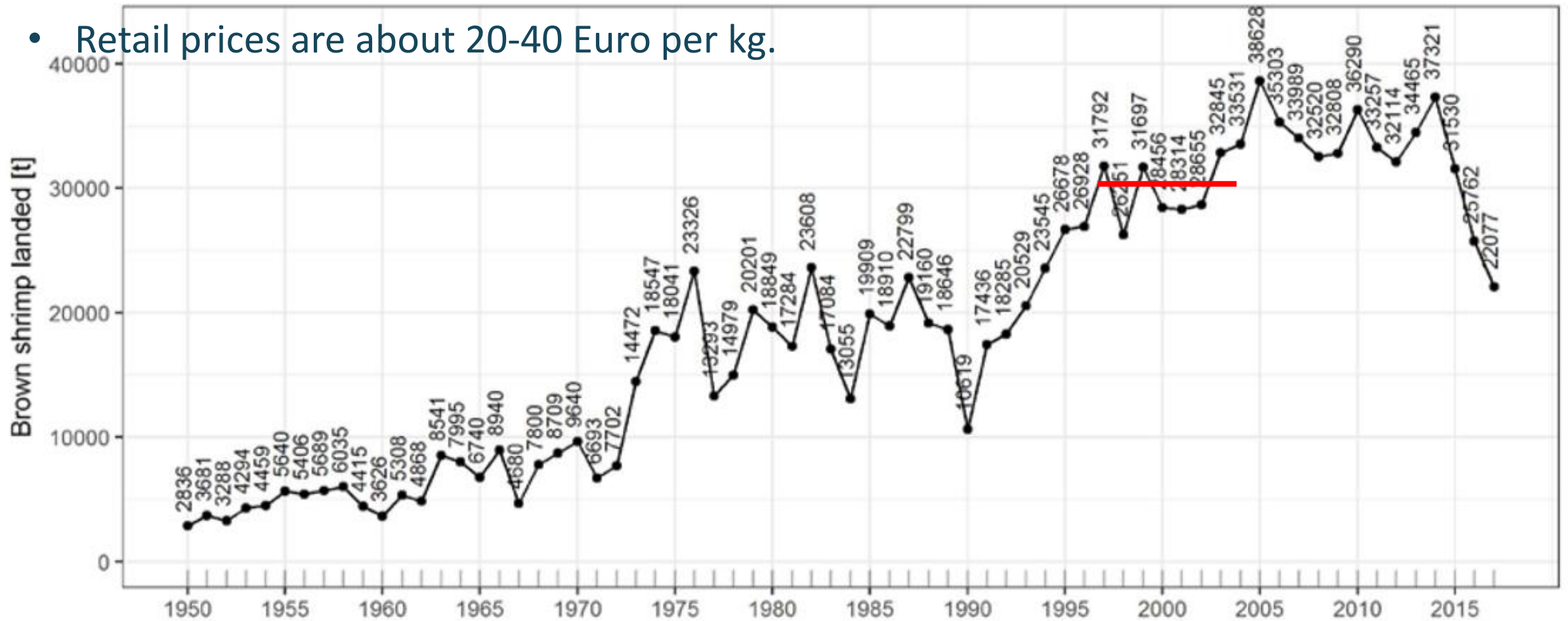
adapted from FAO, 2019

Crangon crangon – European brown shrimp



Crangon crangon – Economics

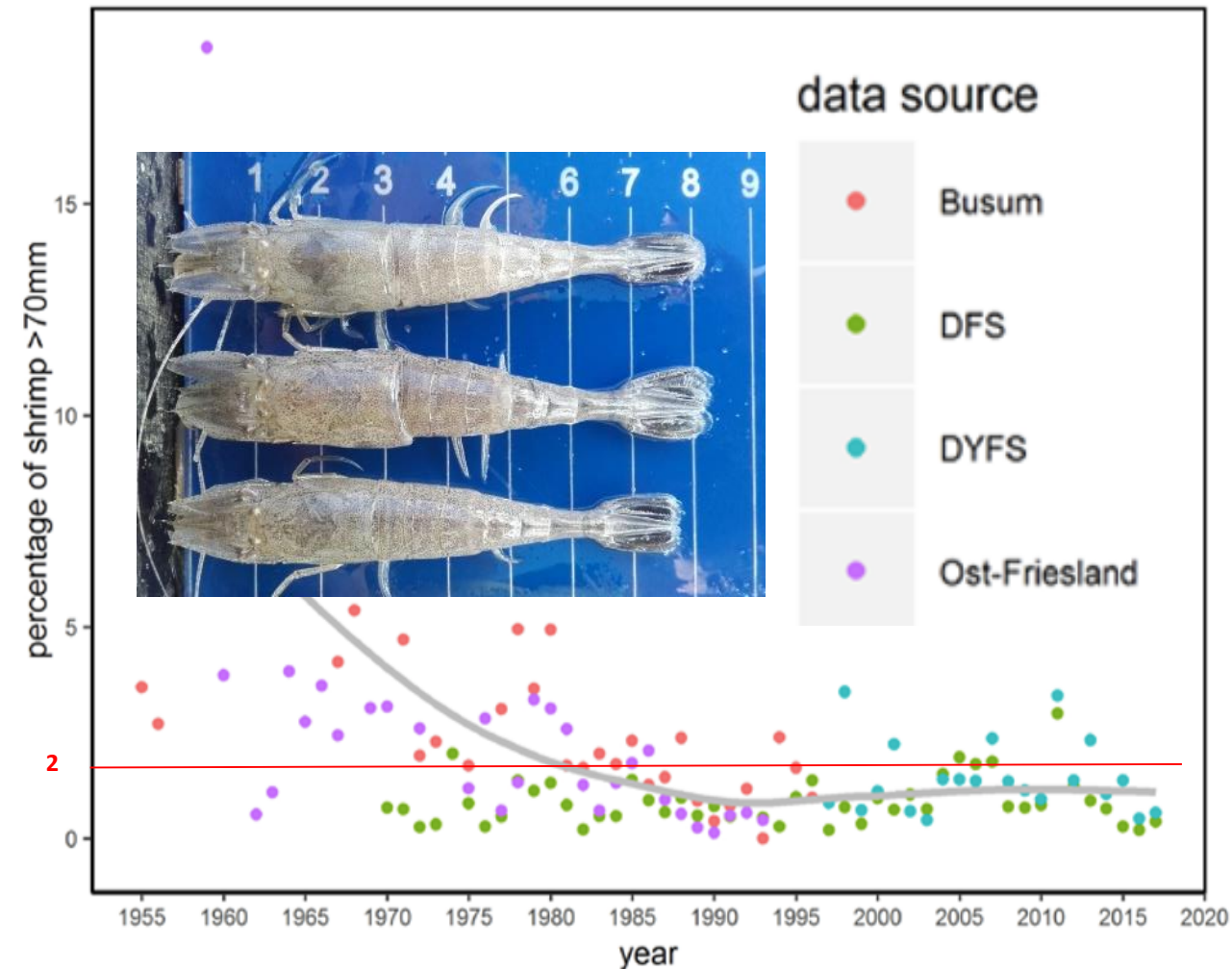
- 35 000 tons with a total value of 100 MEuro until 2014. Annual landings decreased to 22 077 tons in 2017.
- Retail prices are about 20-40 Euro per kg.



Crangon crangon – Aquaculture candidate

Demand rises for big live shrimps: more culinary possibilities

- Share of large shrimps (> 7 cm) in wild catch decreases (only 2%)
- Difficulties for fishermen
 - Small supply
 - Manual sorting
 - Complex landing procedures
- Is a high valued product
→ € 20-30/kg)



Crangon crangon – Why not in aquaculture?

Reviews in Aquaculture (2014) 6, 1–21

doi: 10.1111/raq.12068

Rearing European brown shrimp (*Crangon crangon*, Linnaeus 1758): a review on the current status and perspectives for aquaculture

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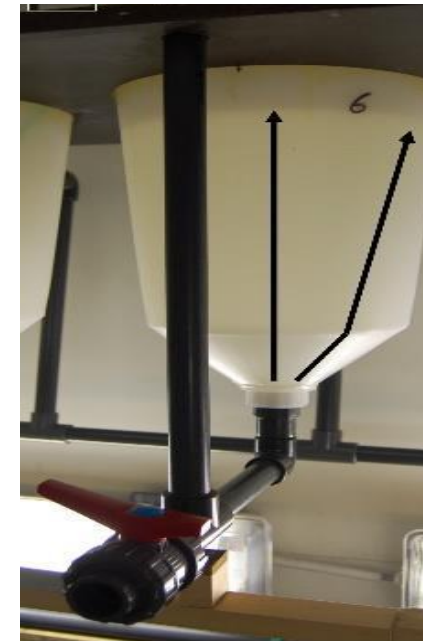
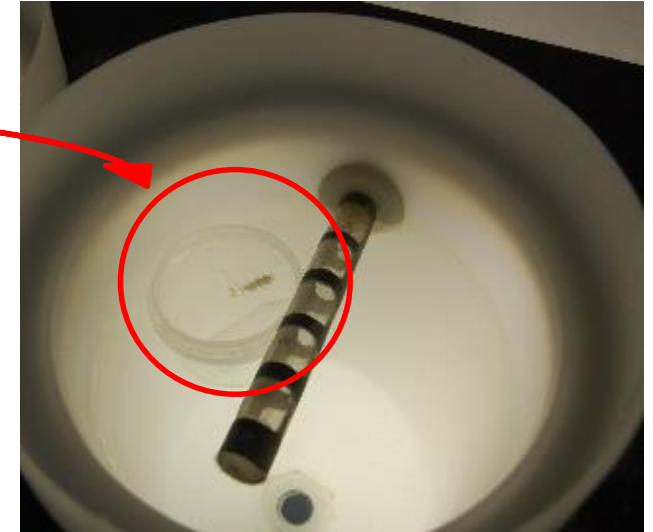
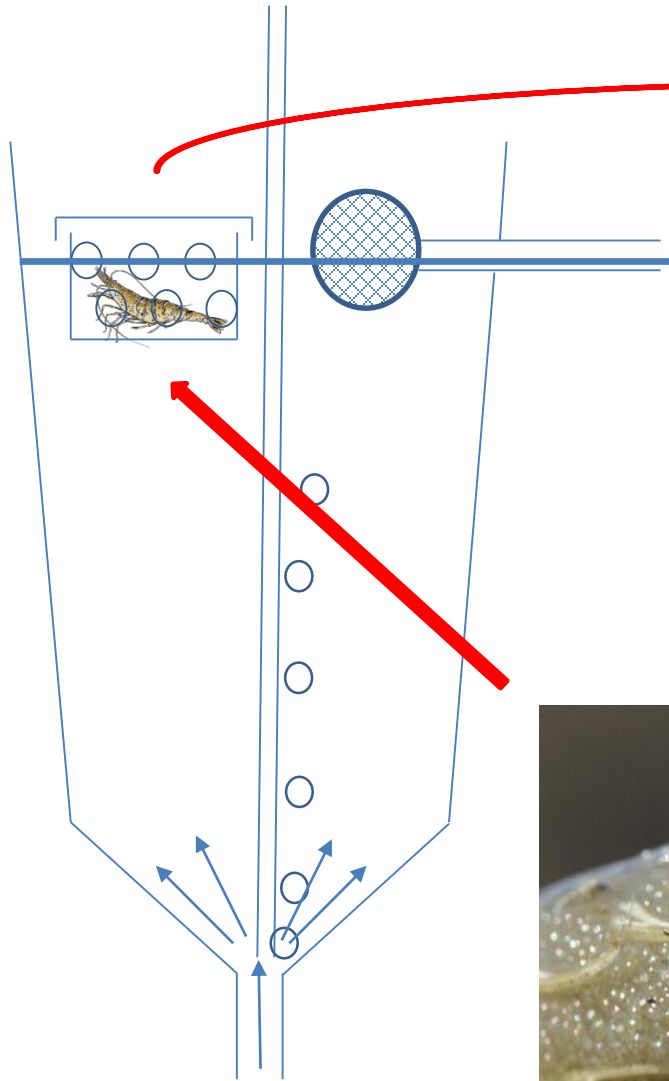


Crangon crangon – Larval rearing experiments

- 6 Zoea stadia (pelagic)
- 2 Postlarvae stadia (benthic)
- Juvenile → adult (benthic)

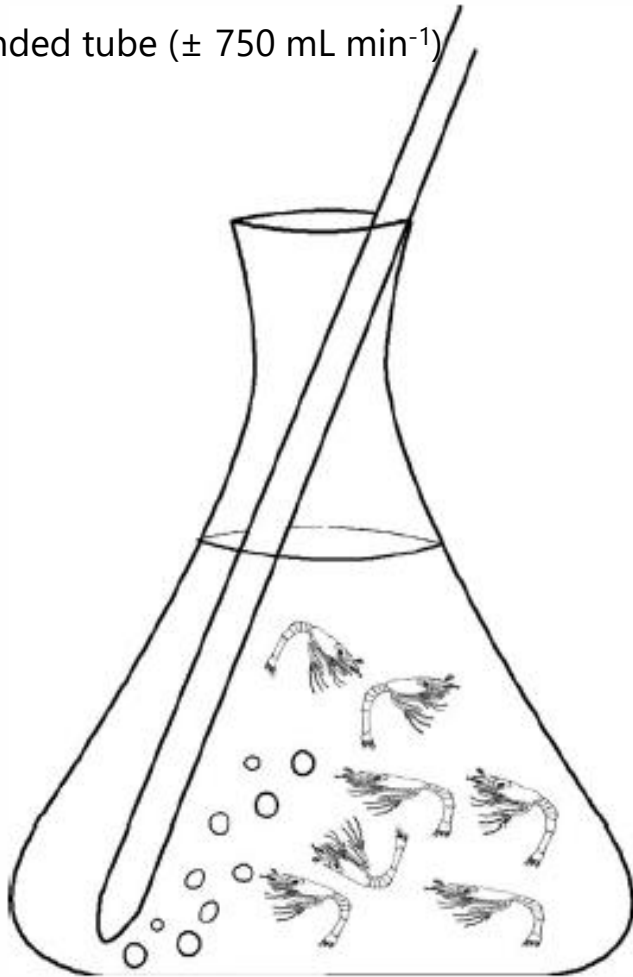


Crangon crangon – Larval rearing experiments



Crangon crangon – Larval rearing experiments

open-ended tube ($\pm 750 \text{ mL min}^{-1}$)



North Sea



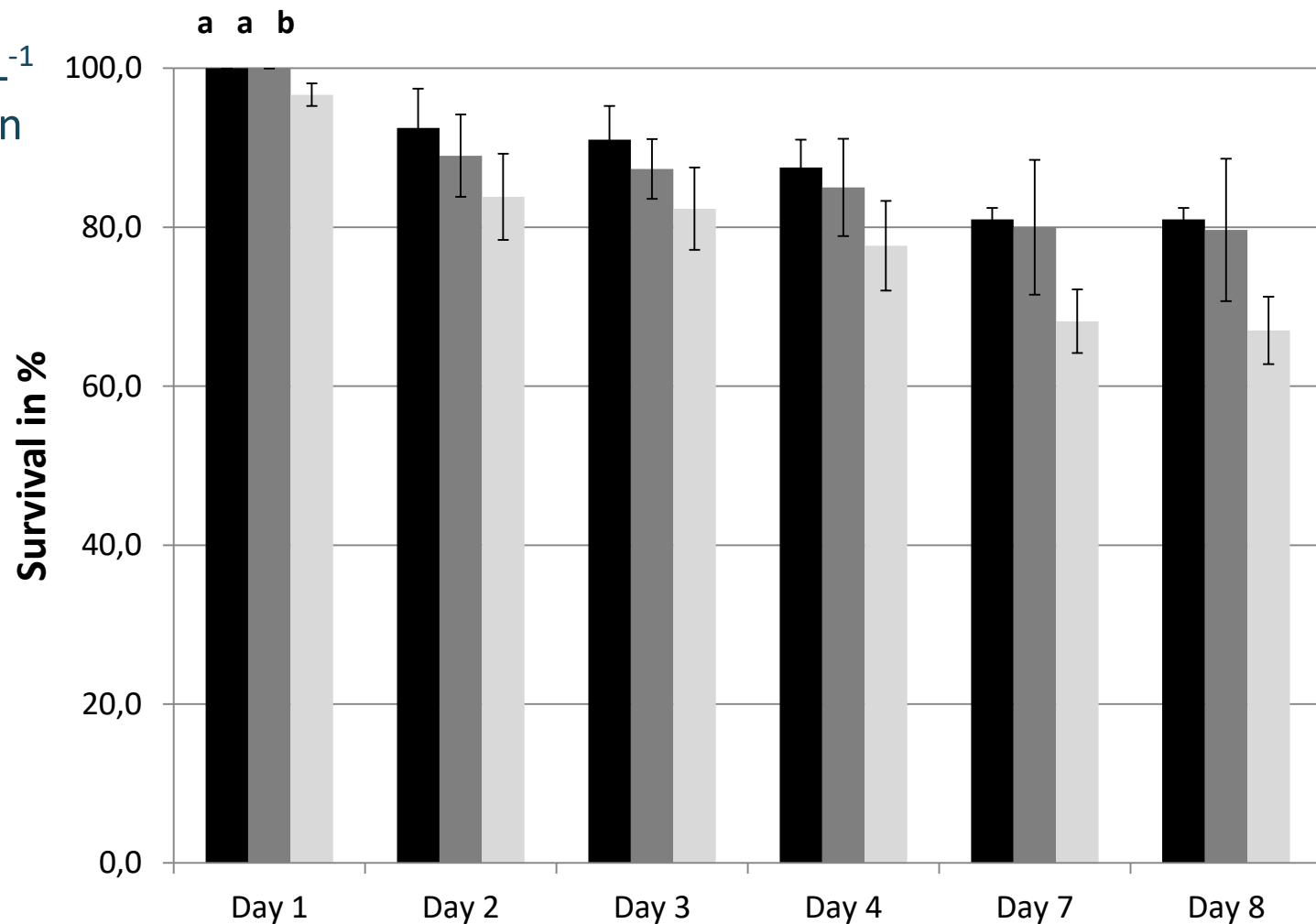
FIGURE 1 Schematic representation of the rearing system for eggs and larvae with heavy aeration through an open-ended tube

Crangon crangon – Initial stocking density

Test conditions:

- Temperature: 18°C
- N° of replicates: 3
- Stocking density: 100, 200, 300 larvae.L⁻¹
- Feed: Artemia nauplii, fed until satiation
- Duration: 8 DPH

Results:

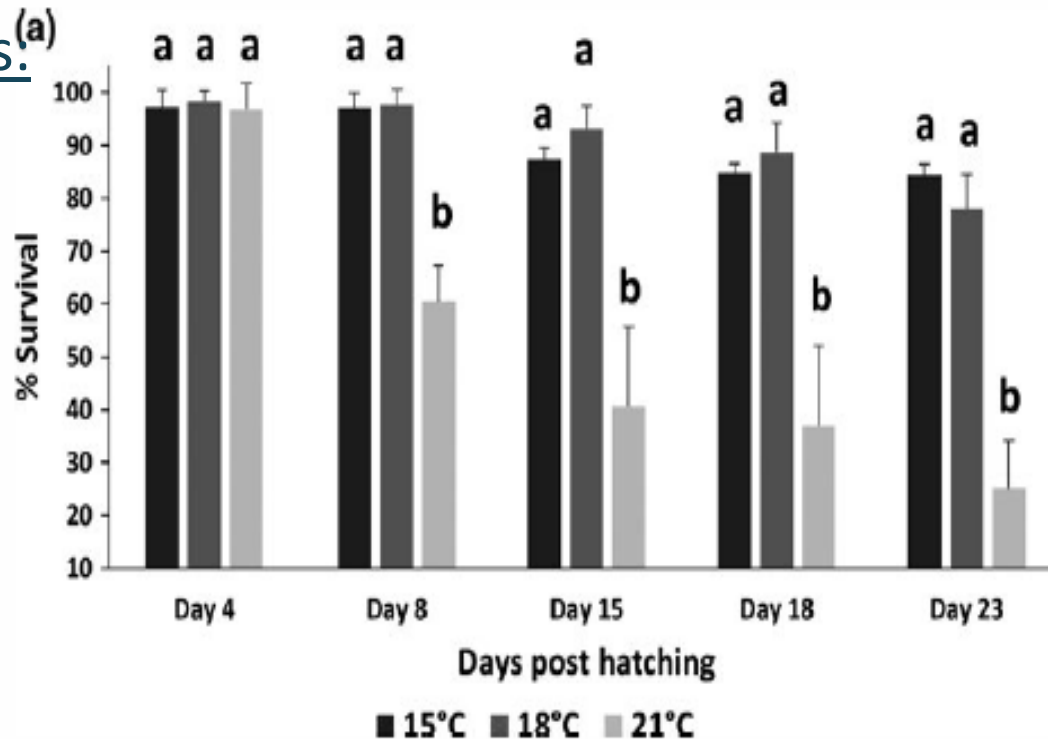


Crangon crangon – Optimal temperature

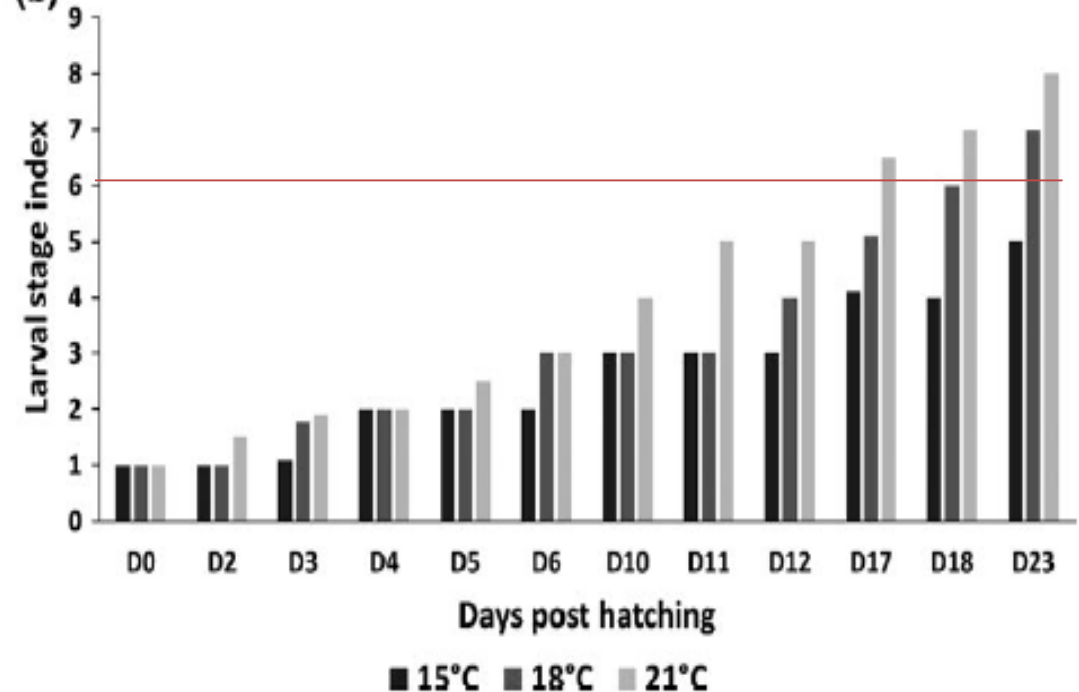
Test conditions:

- Temperature: 15°C, 18°C and 21°C
- N° of replicates: 3
- Stocking density: 300 larvae.L⁻¹
- Feed: Artemia nauplii, fed until satiation
- Duration: 23 DPH

Results.^(a)



(b)

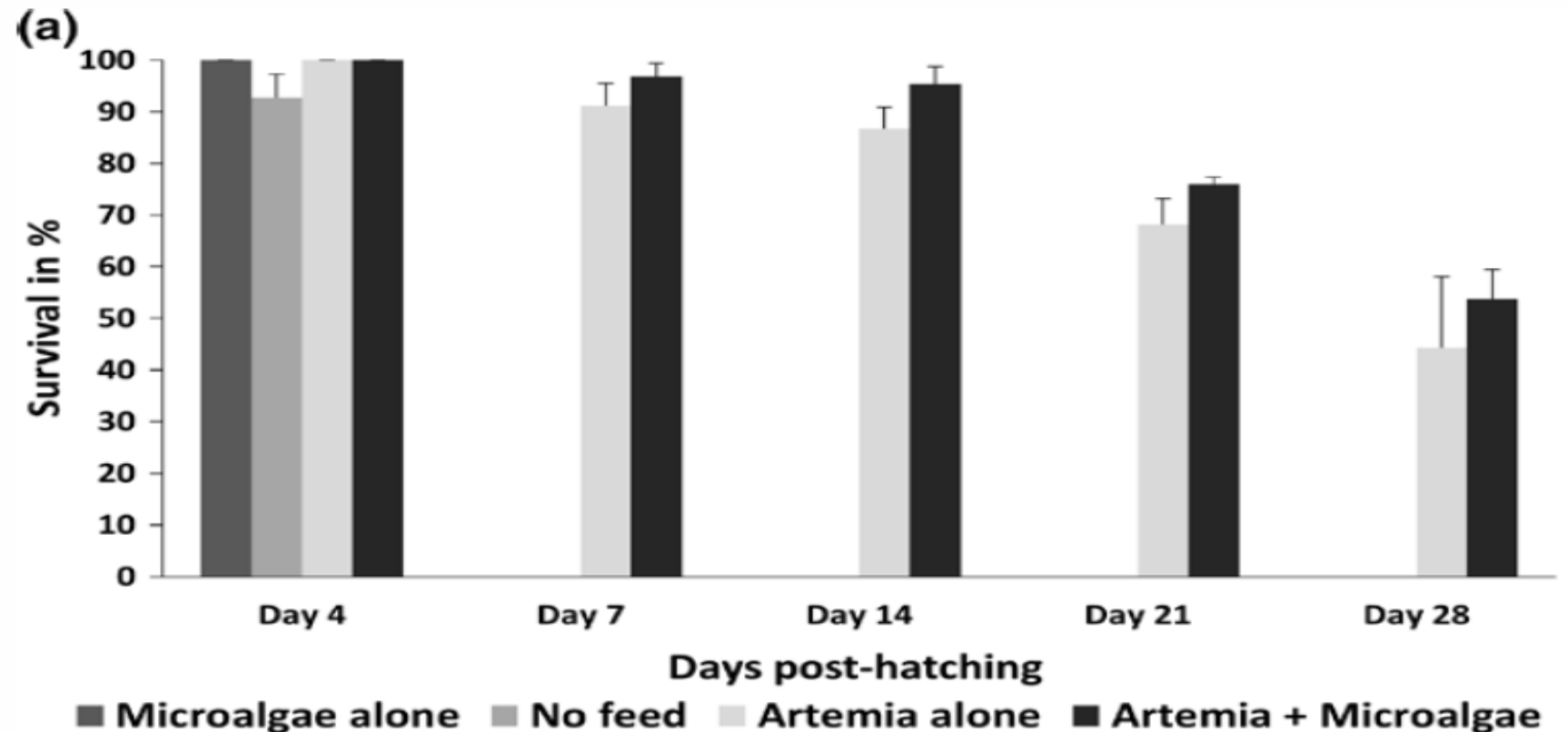


Crangon crangon – Optimal larval feed

Test conditions:

- Temperature: 18°C
- N° of replicates: 3
- Stocking density: 300 larvae.L⁻¹
- Feed: Artemia nauplii, *Nannochloropsis* sp., Artemia+Nano, No feed
- Duration: 28 DPH

Results:

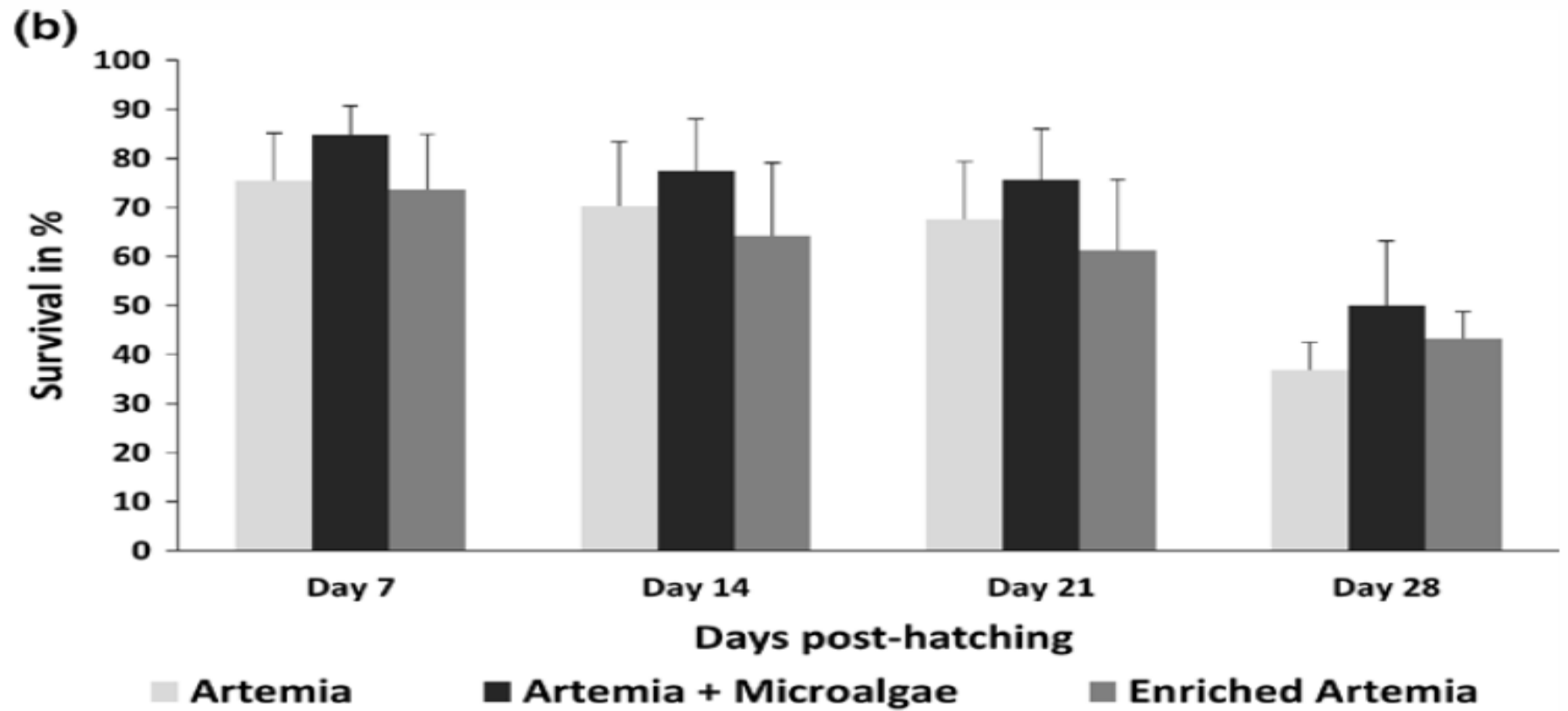


Crangon crangon – Quality larval feed

Test conditions:

- Temperature: 18°C
- N° of replicates: 4
- Stocking density: 230 larvae.L⁻¹
- Feed: Artemia nauplii, Artemia+Nano, 1 day old metanauplii + DHA Selco®
- Duration: 28 DPH

Results:



Crangon crangon – Quantity larval feed

Test conditions:

- Temperature: 18°C
- N° of replicates: 8
- Stocking density: 1 larva.well⁻¹ (3 ml)
- Fixed feeding regime
- Duration: 30 DPH

DPH	N° of Artemia nauplii per larva per day
T1	10
T2	30
T3	50

Results:



Period	Average number of Artemia nauplii eaten per day	Feeding rate proposal Artemia nauplii per day
Day 1-Day 3	9	10
Day 4-Day 7	13	15
Day 8-Day 17	22	25
Day 18-Day 25	35	35
Day 26-Day 30	45	50

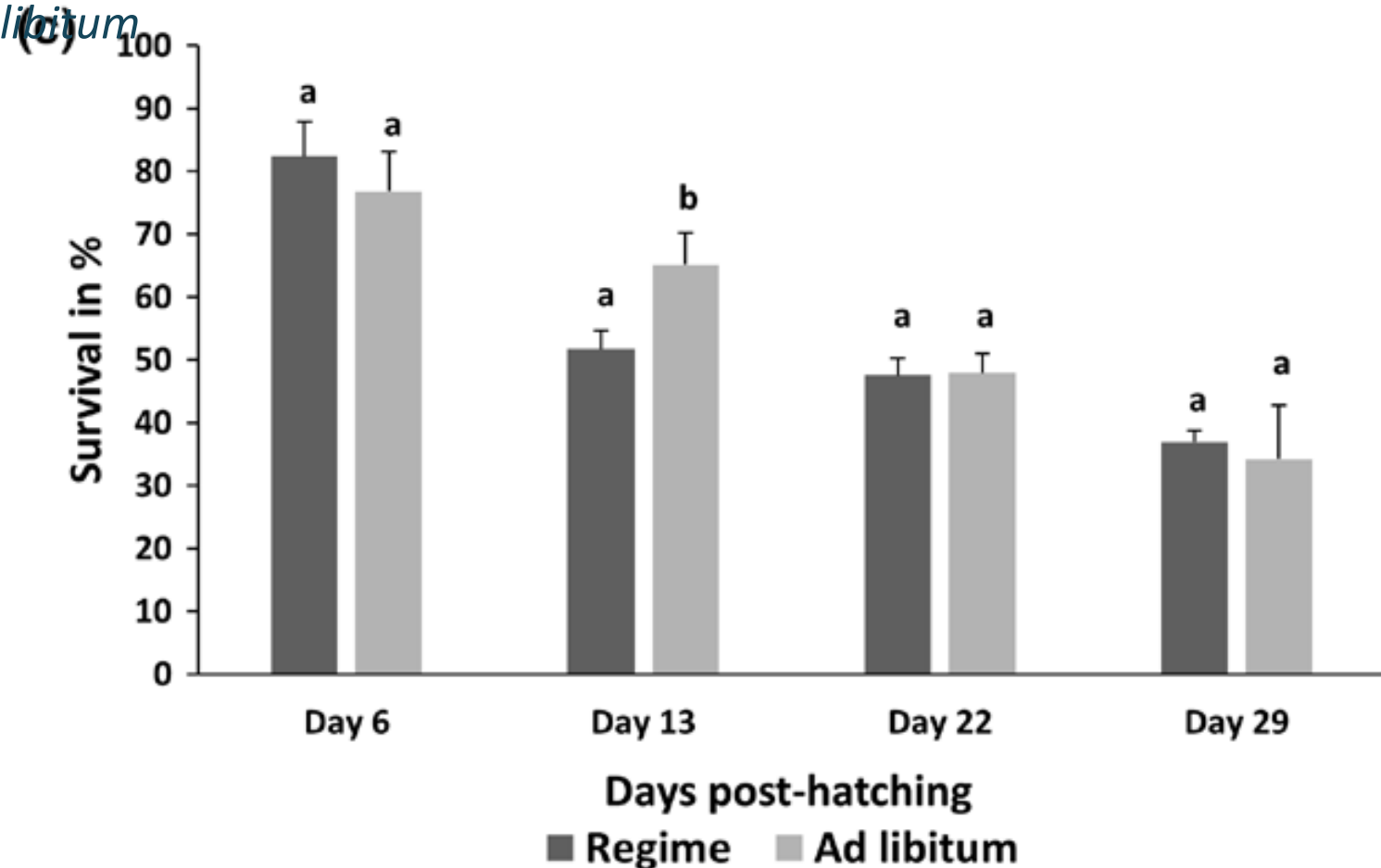
Crangon crangon – Quantity larval feed

Test conditions:

- Temperature: 18°C
- N° of replicates: 3
- Stocking density: 250 larvae.L⁻¹
- Fixed feeding regime vs. *Ad libitum*
- Duration: 28 DPH

DPH	N° of Artemia nauplii per larva per day
1-3	10
4-7	15
8-17	25

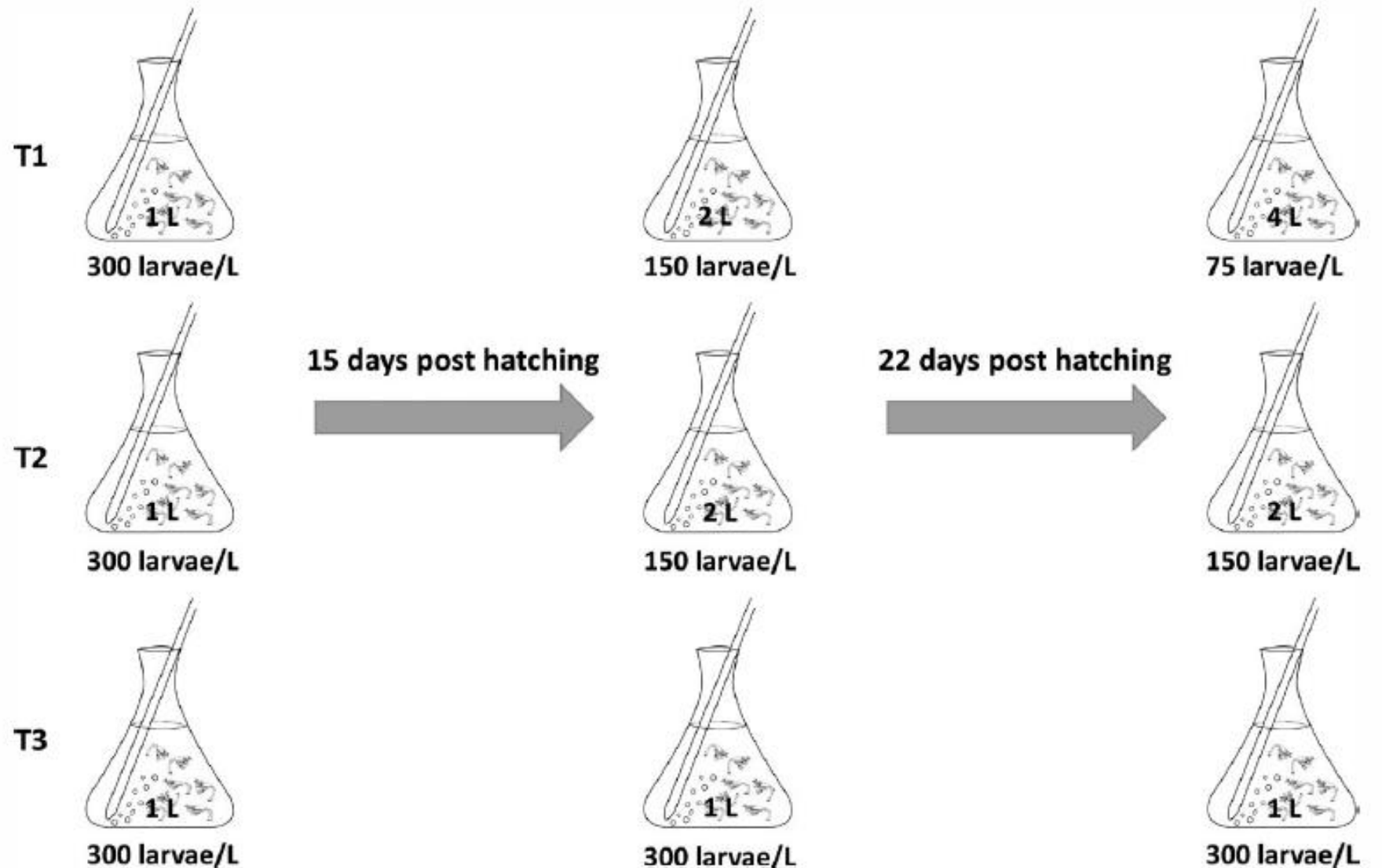
Results:



Crangon crangon – Stocking density

Test conditions:

- Temperature: 18°C
- N° of replicates: 3
- Fixed feeding regime
- Duration: 28 DPH

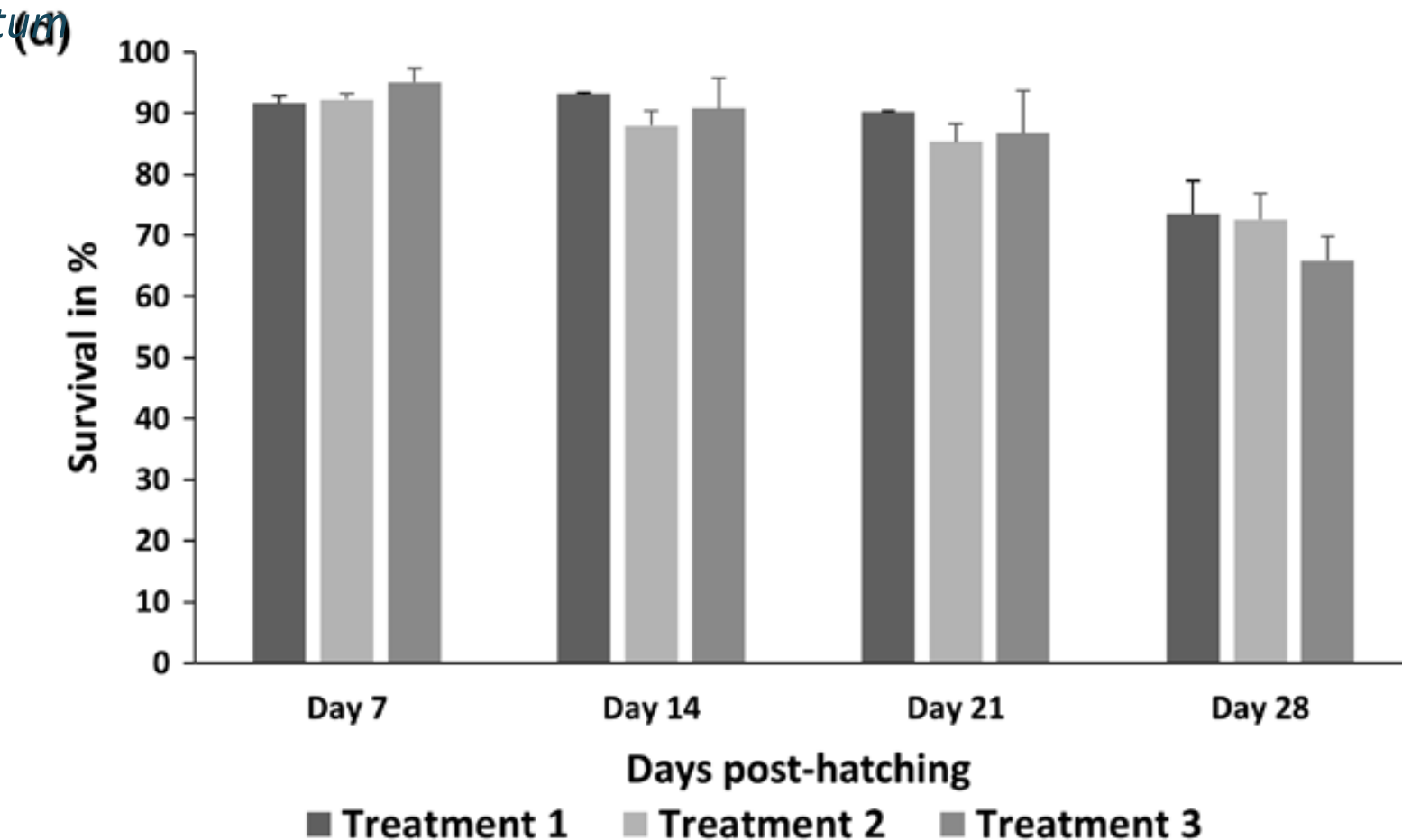


Crangon crangon – Stocking density

Test conditions:

- Temperature: 18°C
- N° of replicates: 3
- Stocking density: T1=75 larvae.L⁻¹; T2=150 larvae.L⁻¹ & T3=300 larvae.L⁻¹
- Fixed feeding regime vs. *Ad libitum*
- Duration: 28 DPH

Results:



Lessons learned

- Survival of the larvae can be enhanced with high aeration rate, up to 60-90% until onset metamorphosis (21 DPH).
- Low survival after 21 DPH: due to increased stock density (3D → 2D) and raptorial feeding behavior: cannibalism.
- Larval development to the post-larval stage can be shortened by 3 days when temperature is increased from 15°C to 18°C, without influencing survival => complete metamorphosis within 30 DPH.
- Optimize feeding regime to avoid oversupply of expensive *Artemia* nauplii.

Lessons learned

Days post hatching	D1	D4	D8	D15	D18	D22	D26	D31 – D56
Rearing conditions								
Artemia per larvae	10	15	25	25	35	/	/	/
Micro-algae	Yes	Yes	Yes	Yes	Yes	No	No	No
Enriched Artemia per larvae	/	/	/	/	/	35	50	<i>Ad libitum</i>
Density (Larvae.L ⁻¹)	300	300	300	150	150	/	/	/
Density (Post larvae.m ⁻²)	/	/	/	/	/	3300	3300	3300
Substrate	No	No	No	No	No	Sand	Sand	Sand
Water exchange (every two days)	50 %	50 %	50 %	50 %	50 %	50 %	50 %	50 %

Thank you



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