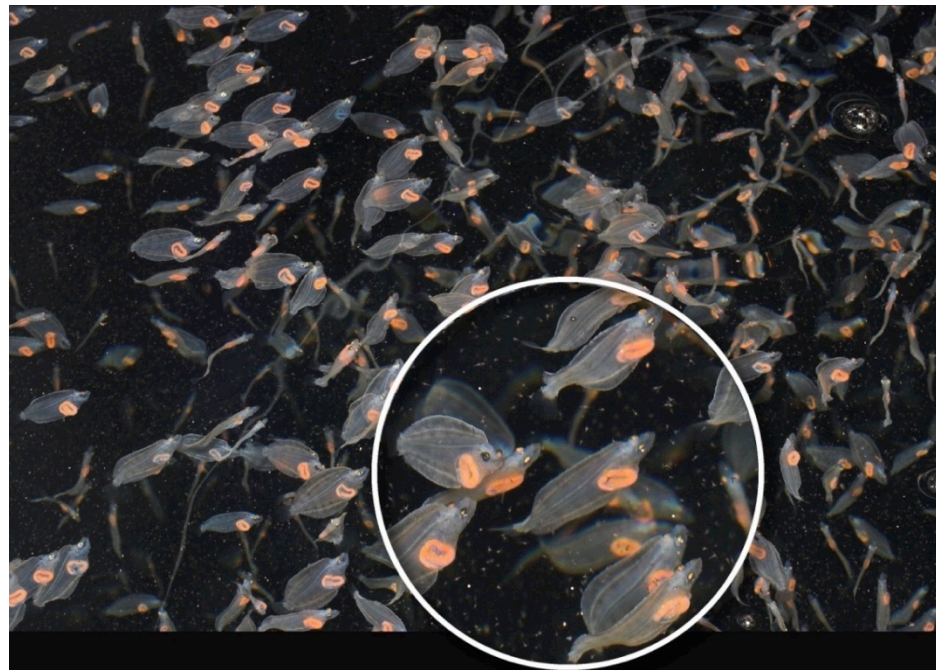




RECIRCULATION (RAS) VS FLOW THROUGH (FT) SYSTEMS DURING YOLK SAC AND FIRST FEEDING STAGES: EFFECTS ON REARING SYSTEM BACTERIOLOGY, SURVIVAL, QUALITY AND GROWTH OF ATLANTIC HALIBUT (*HIPPOGLOSSUS HIPPOGLOSSUS*) LARVAE.

Torstein Harboe, Sonal Patel, Audun H. Nerland, Nina Sandlund, Øivind Bergh and Birgitta Norberg.



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Background:

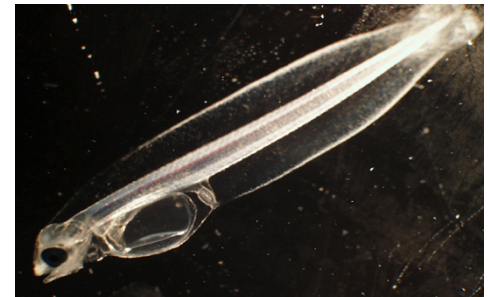
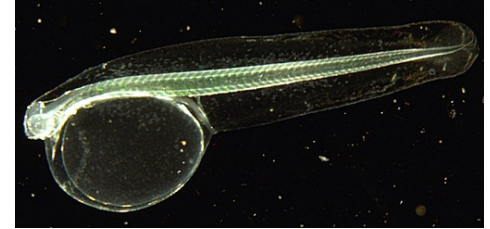
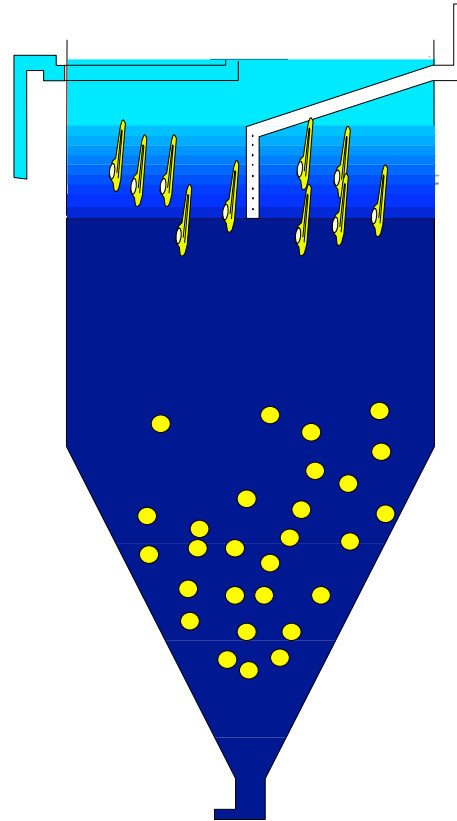
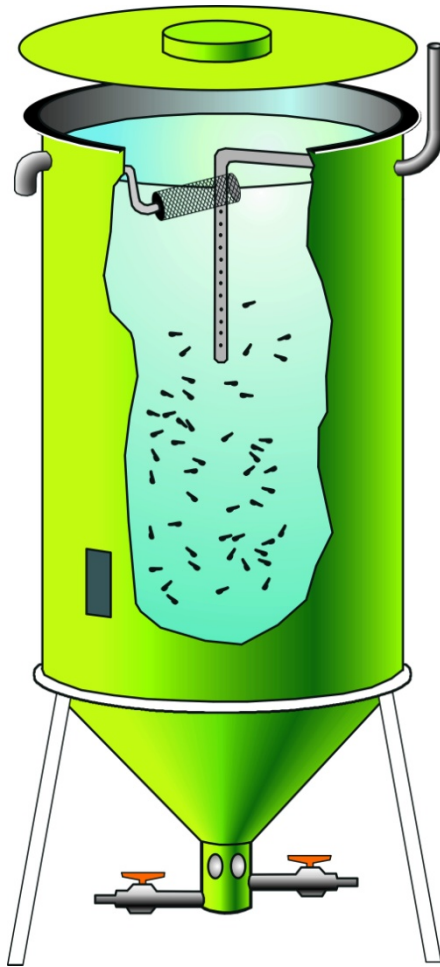
The commercial production of halibut fry is currently carried out in flow through systems (FT), while there is a growing consensus that a recirculation system (RAS) would offer more stable environmental and chemical water parameters that would lead to improved larval performance.



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Yolksac stage

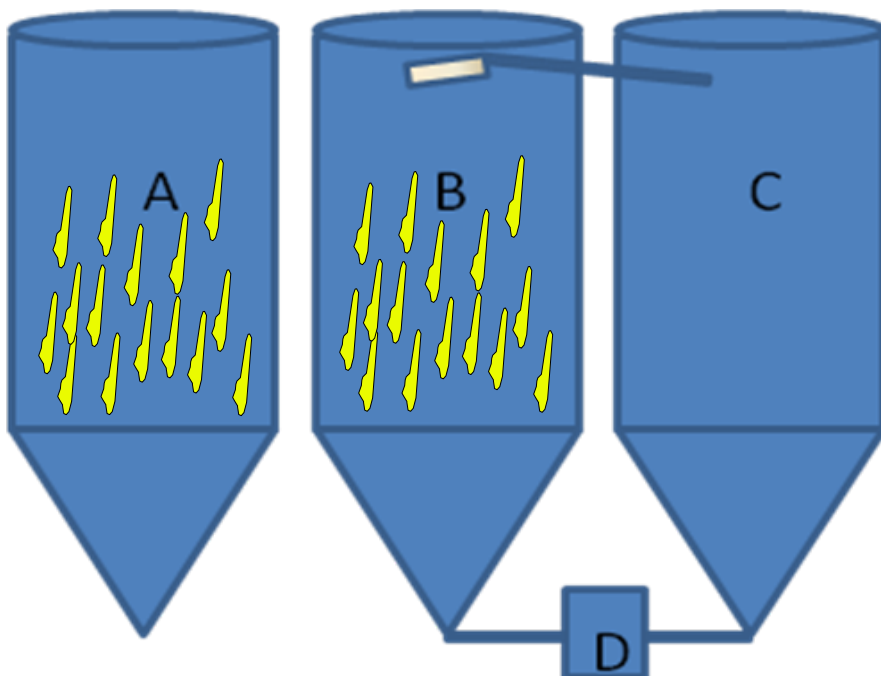


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Control



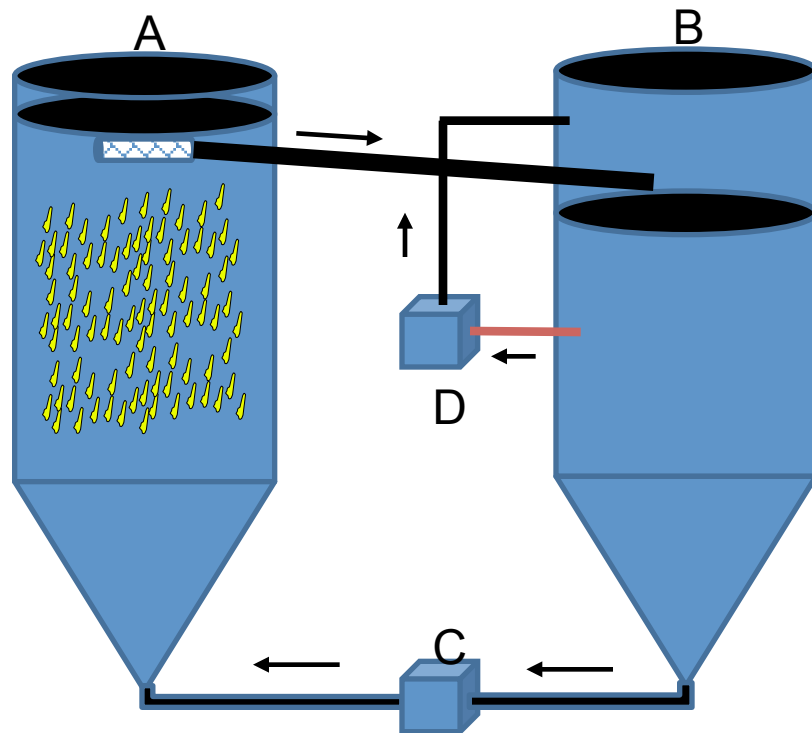
2015:
Water temperature
Adjustment between
the siloes.

2017:
Water temperature
adjustment in silo C.



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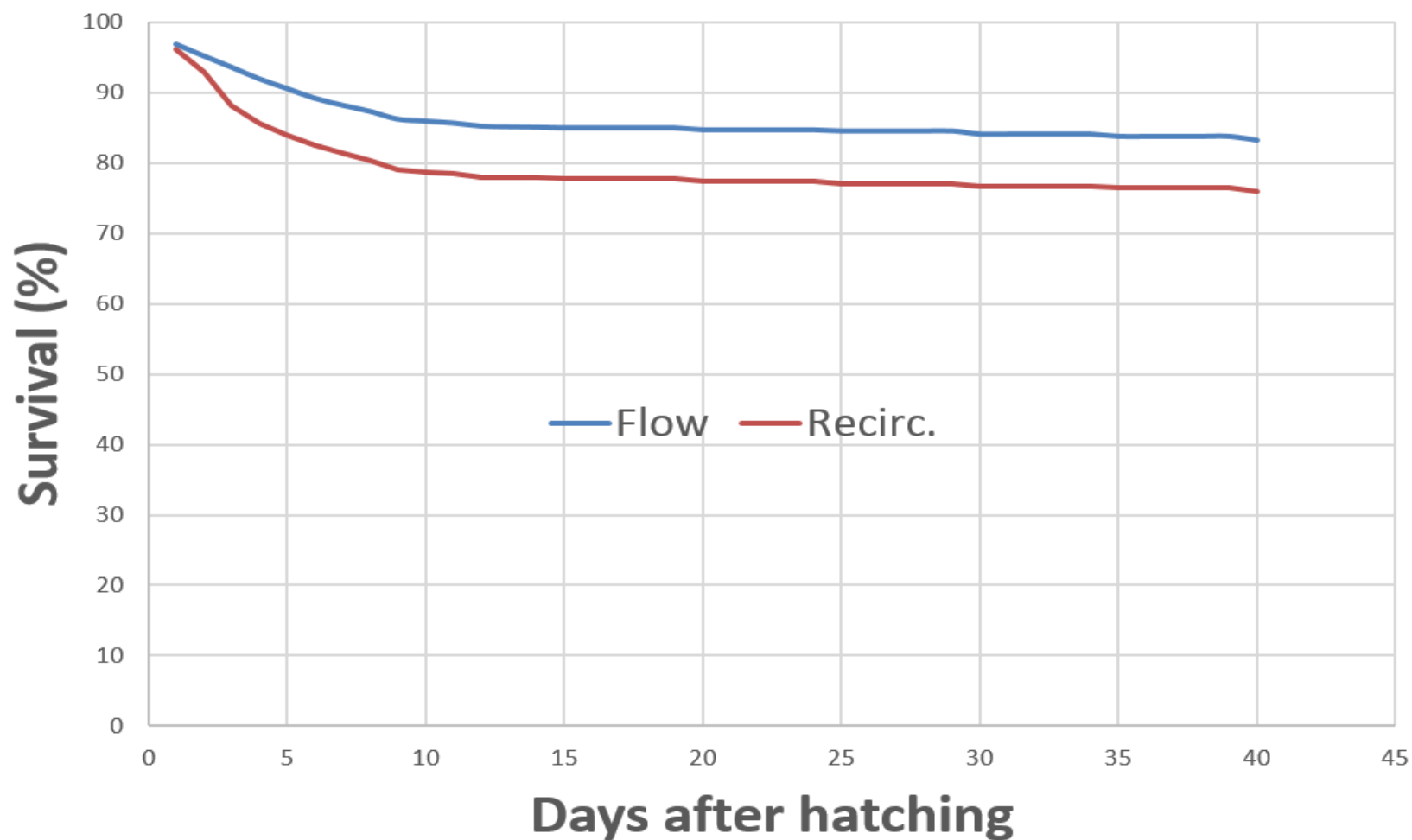


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Yolksac stage 2015

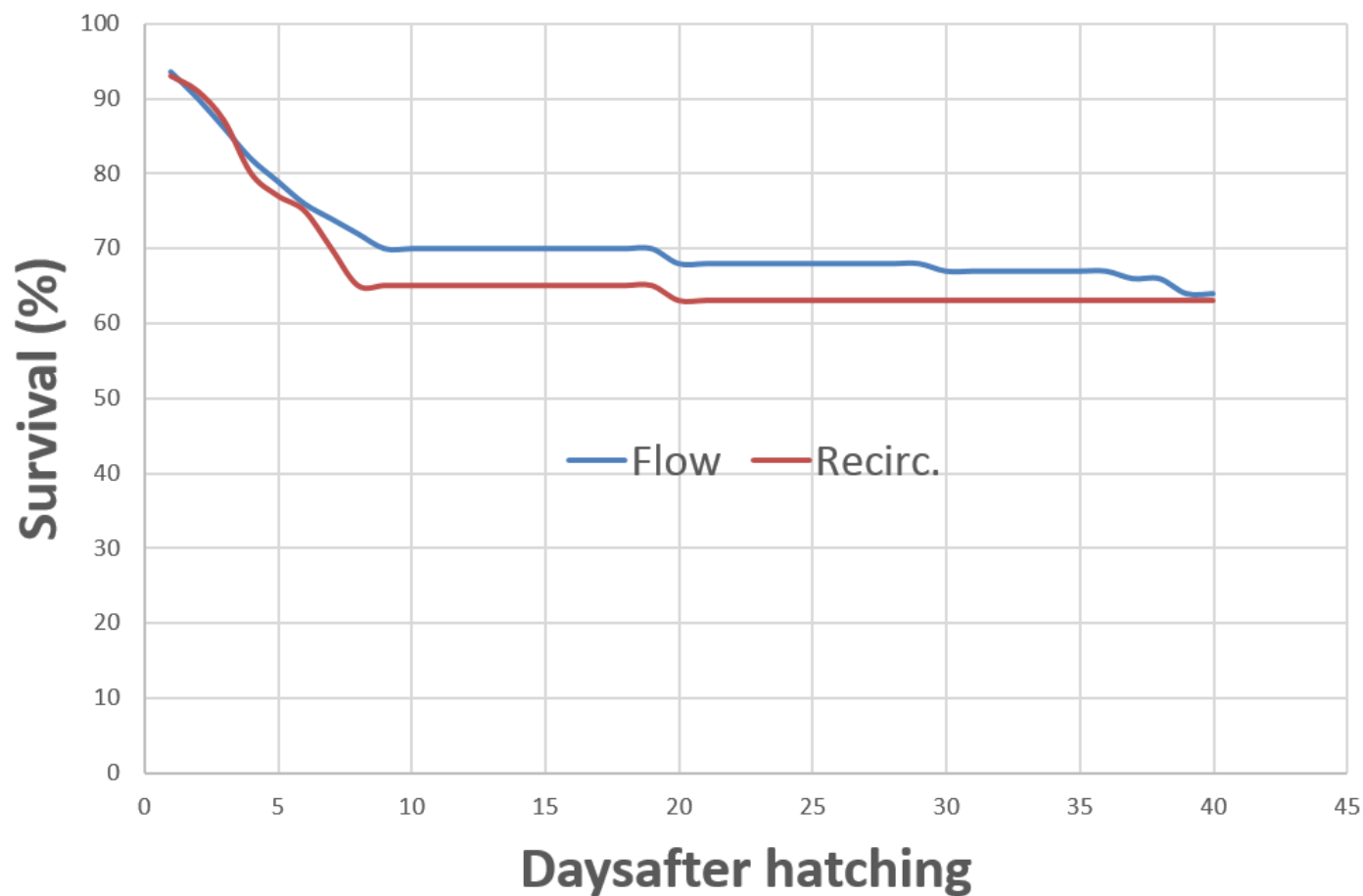


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Yolksac stage 2017

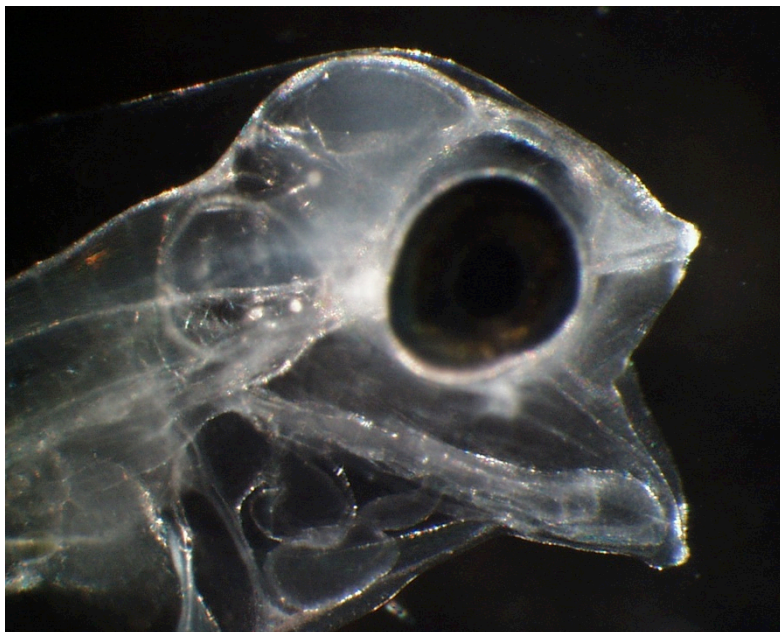


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Jaw deformed larvae



	Recirc.	Flow.
2015:	14%	9%
2017:	11%	17%



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First feeding:



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Tropical Marine centre



- Reservoir (650 liter) (1)
- Filter bags (2)
- Sand filter (3)
- Re-gassing / Trickling biofilter (4)
- Protein skimmer (5)
- UV (6)

Parallel-construction,
Not in-line.



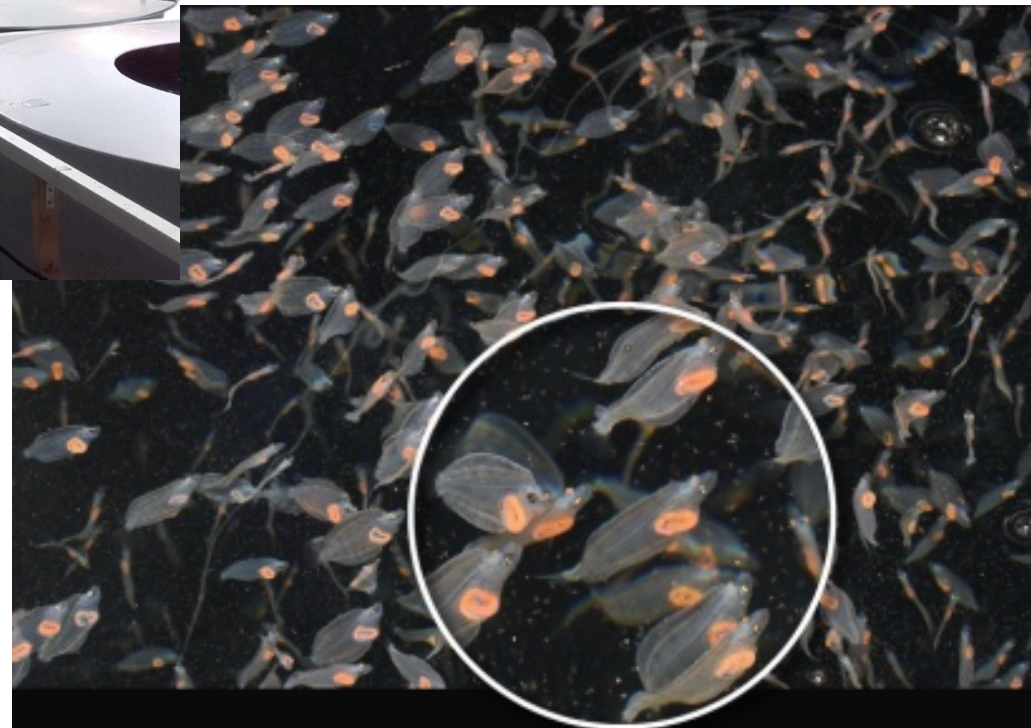
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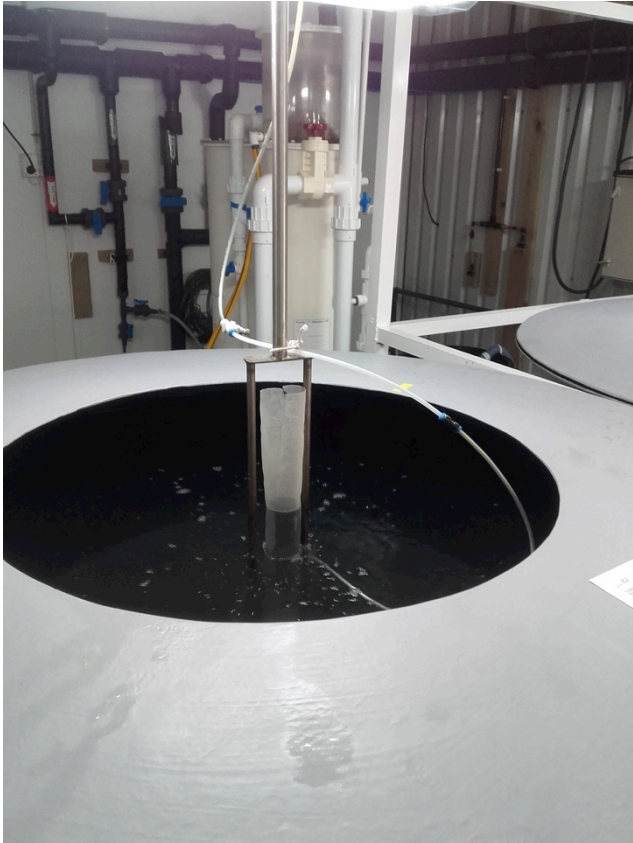


Triplicate tanks

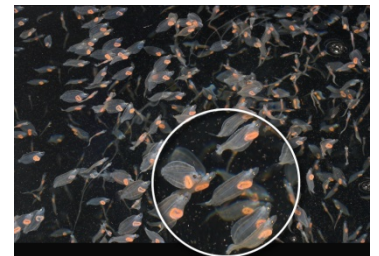


Artemia





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“grey water” technique



Photo: IMR

Distinct meals of Artemia



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Paste



Clay



Photo: IMR



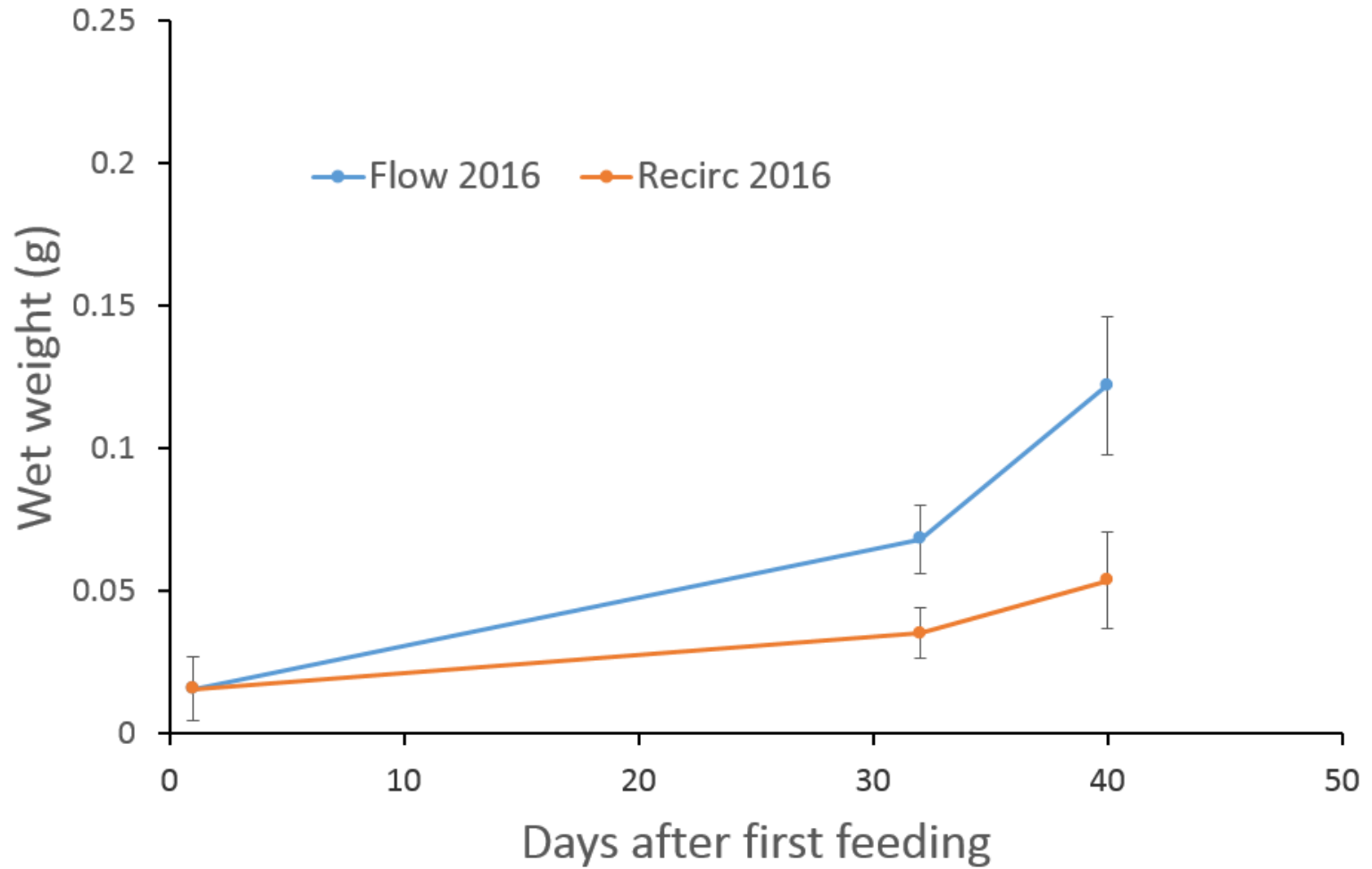
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Larval growth

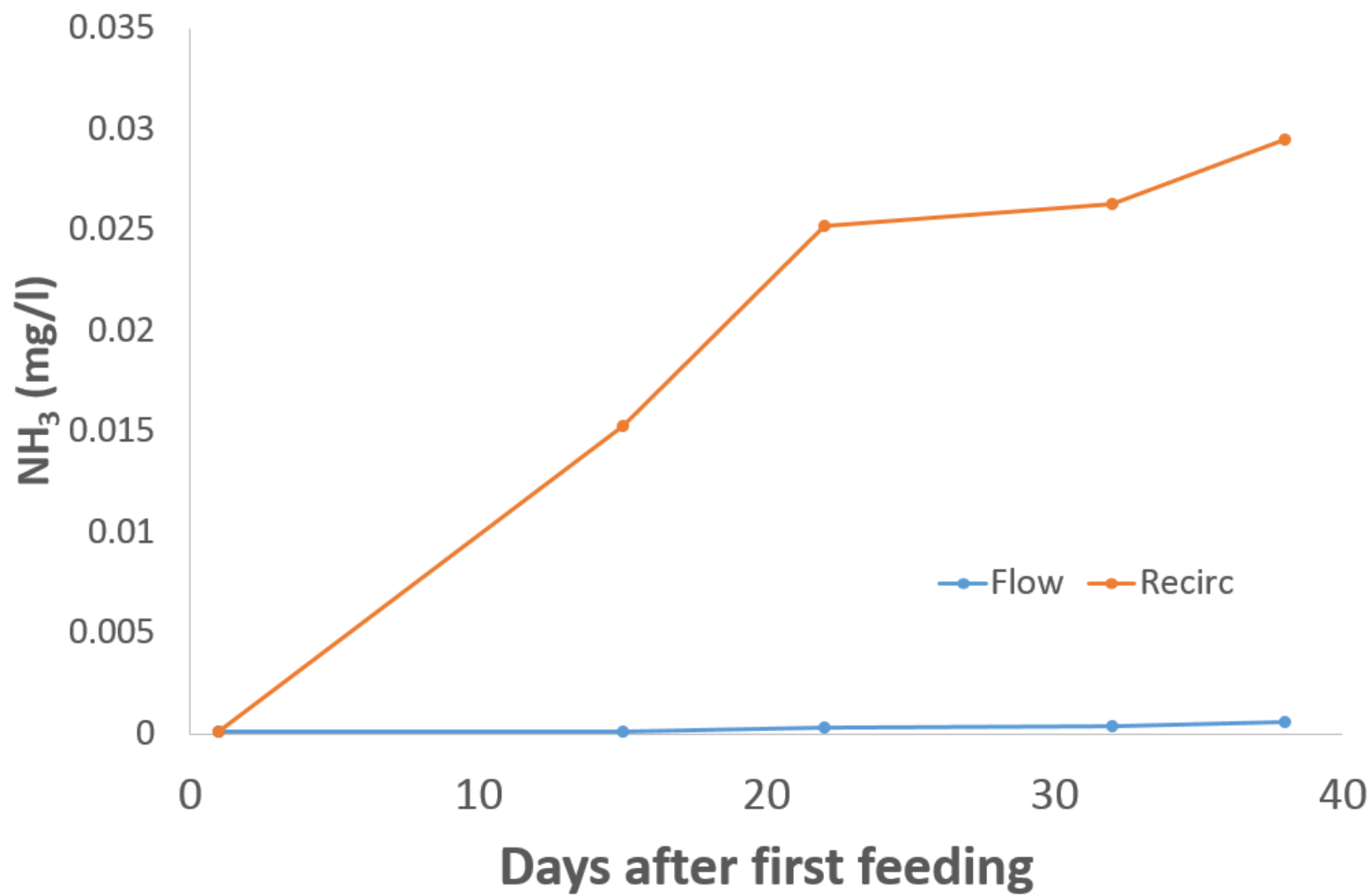


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Un-ionized ammonia 2016

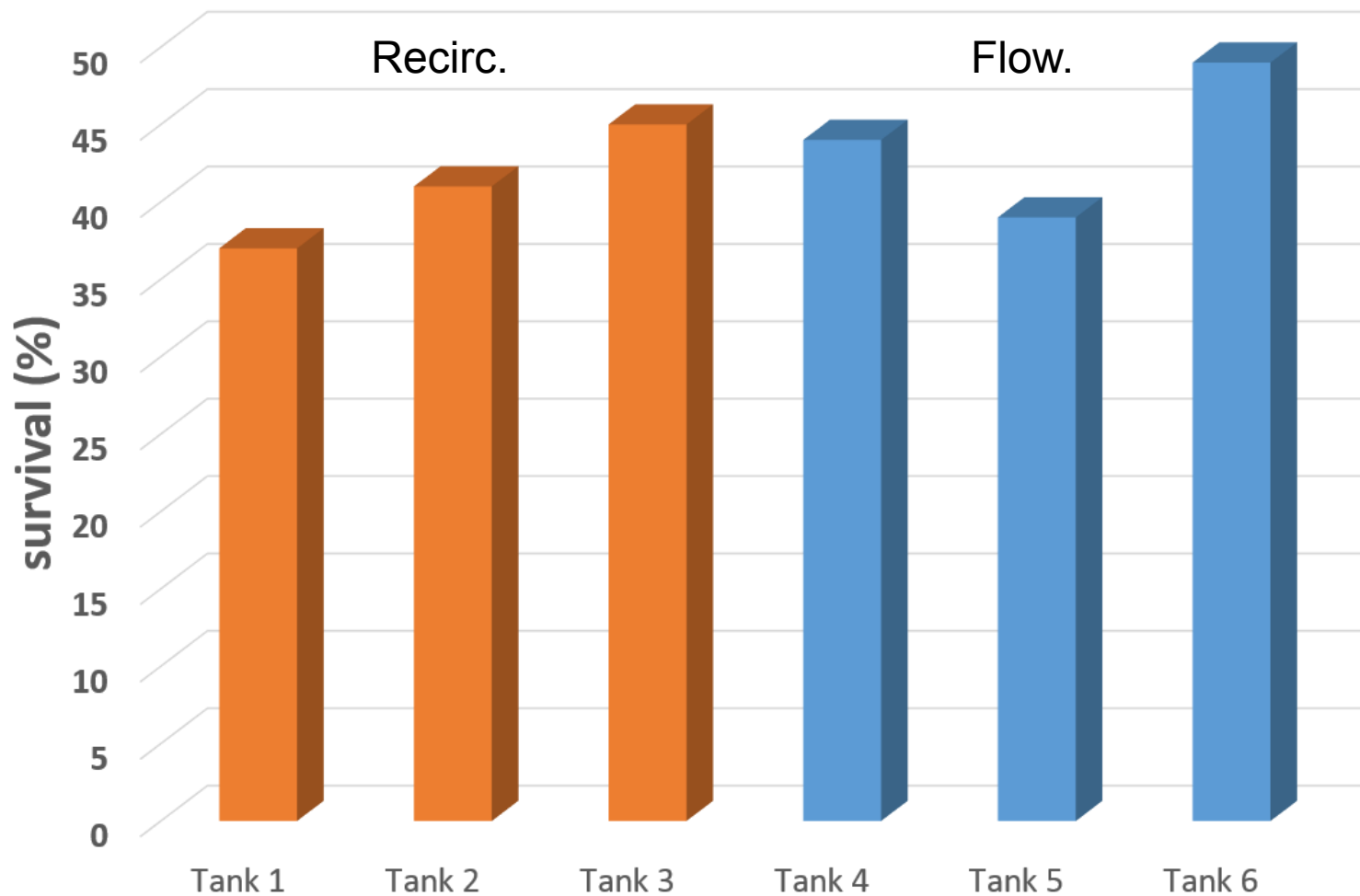


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Survival during first feeding 2016

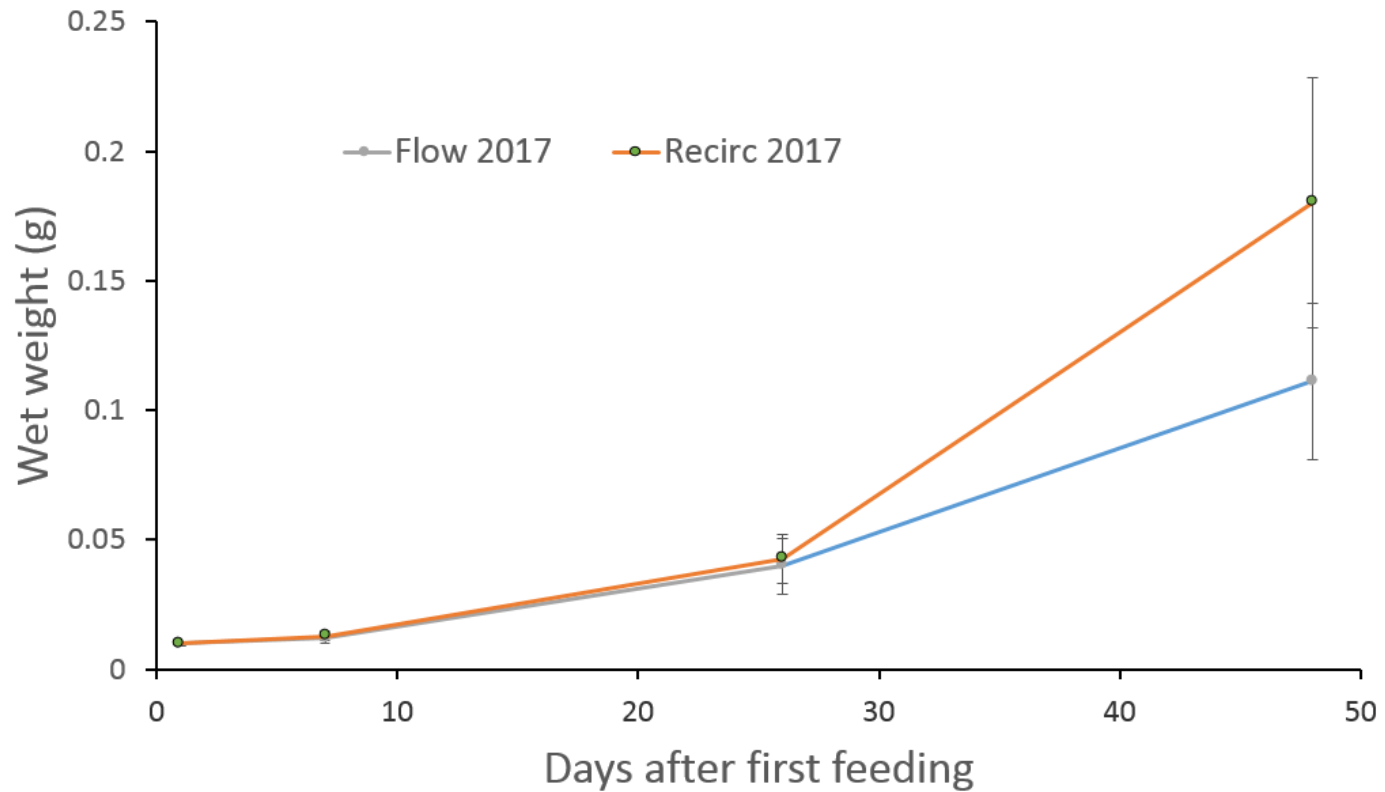


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Larval growth

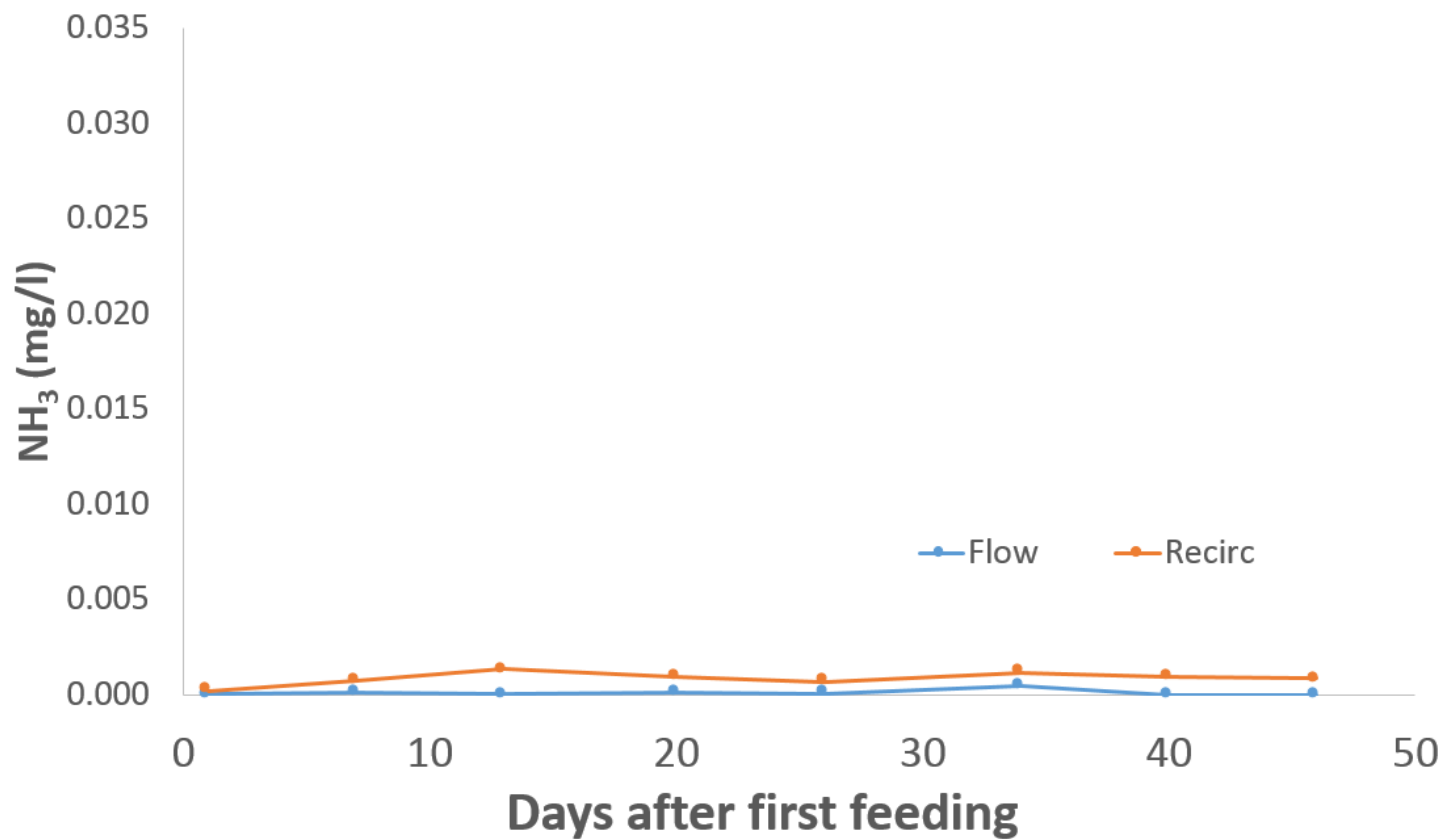


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Un-ionized ammonia 2017

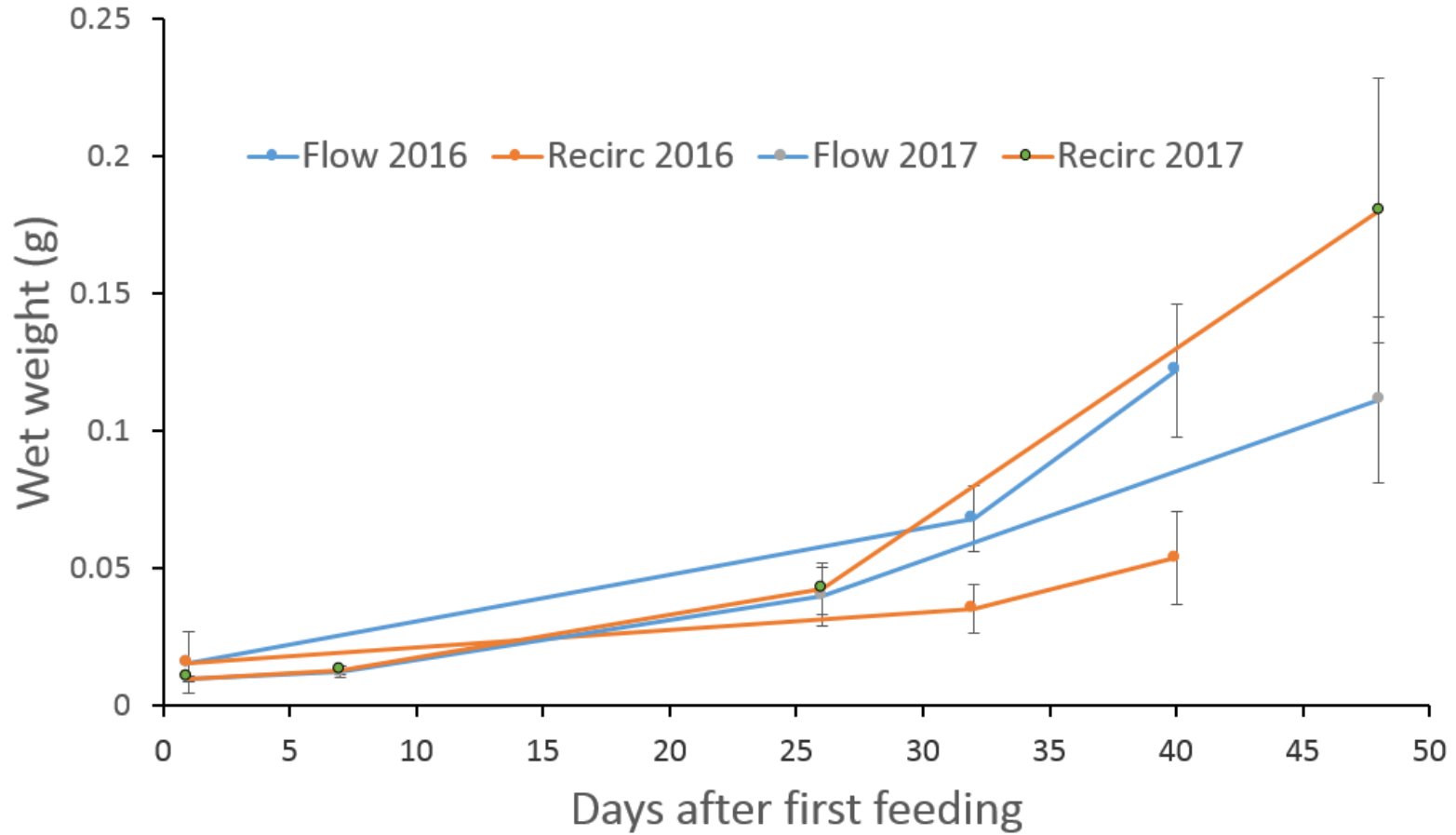


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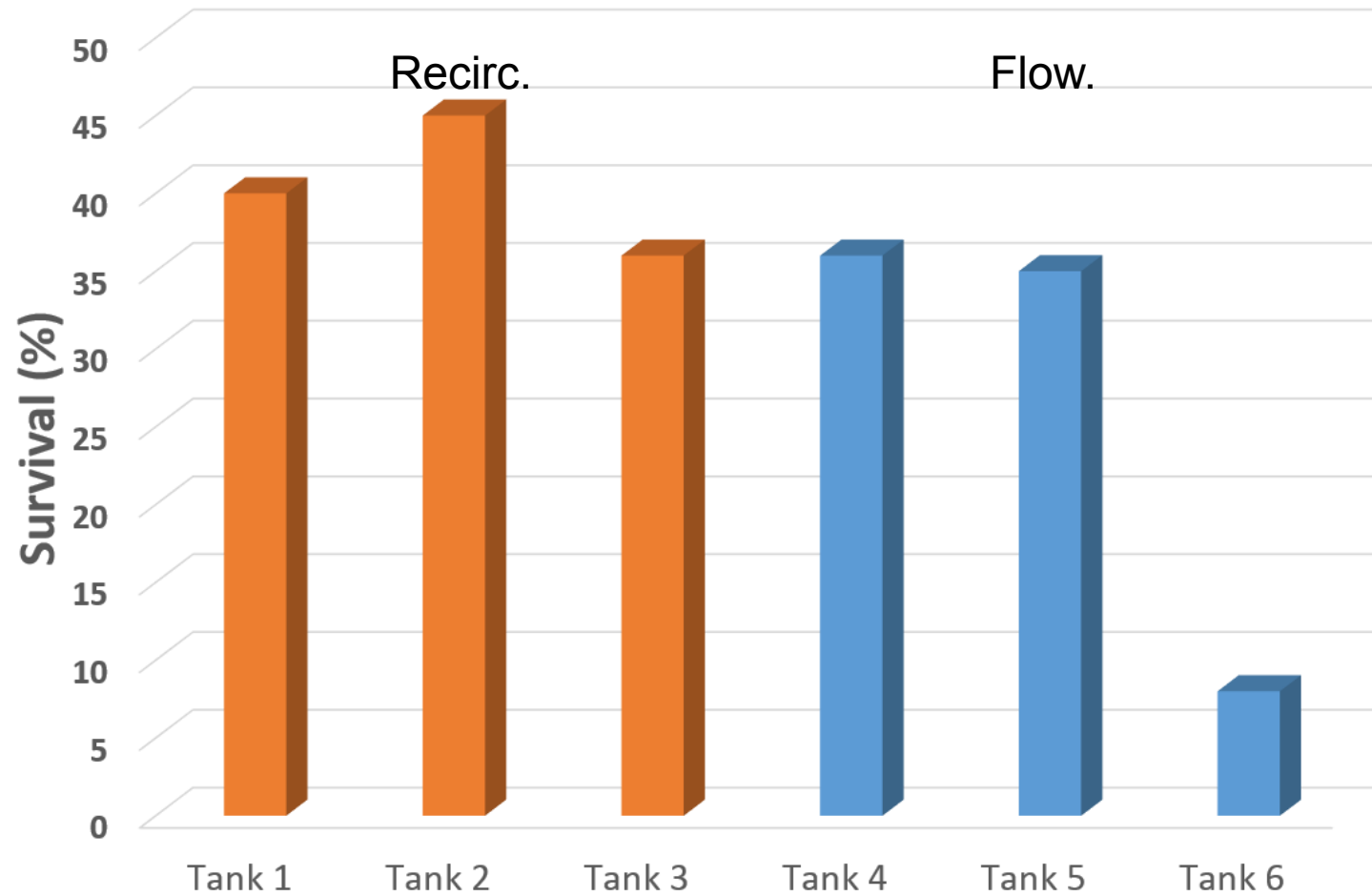


Larval growth





Survival during first feeding 2017



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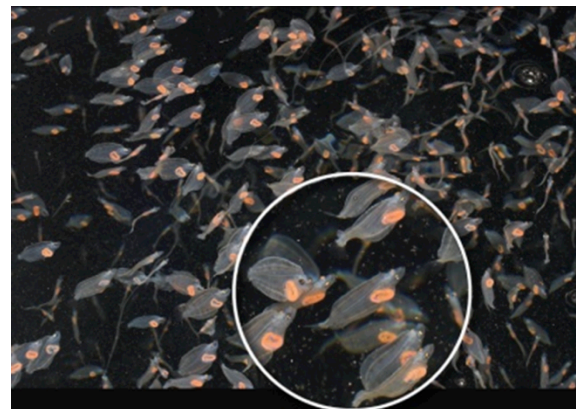
Microbiome characterization:

Bacteriological samples were taken through the experimental periods:

- from yolk-sac and first-feeding larvae
- from all incubation and first-feeding systems

DNA has been isolated

Sequence analyses (HiSeq) are underway



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