



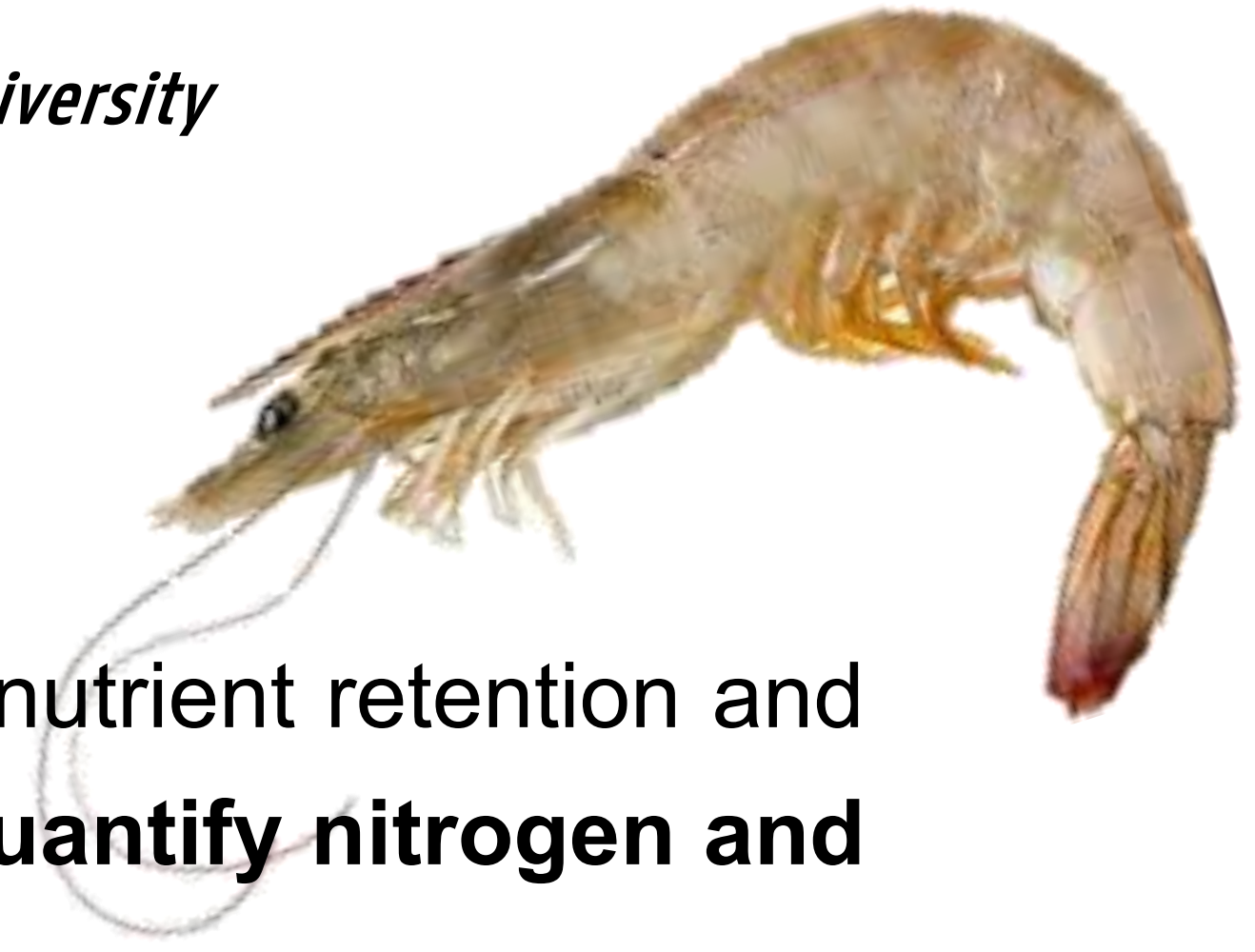
Evaluation of nutrient dynamics and performance of whiteleg shrimp larvae in conventional and recirculating hatchery systems

Semmouri Ilias¹, Flor Nachtergale¹, Vincent Vermeylen², Jana Asselman¹, Annelies M. Declercq^{2*}, Colin R. Janssen^{1*}

¹Blue Growth Research Lab, Ghent University, Ostend Science Park, Wetenschapspark 1, 8400 Ostend, Belgium

²Laboratory of Aquaculture & Artemia Reference Center, Faculty of Bioscience Engineering, Department of Animal Science and Aquatic Ecology, Ghent University

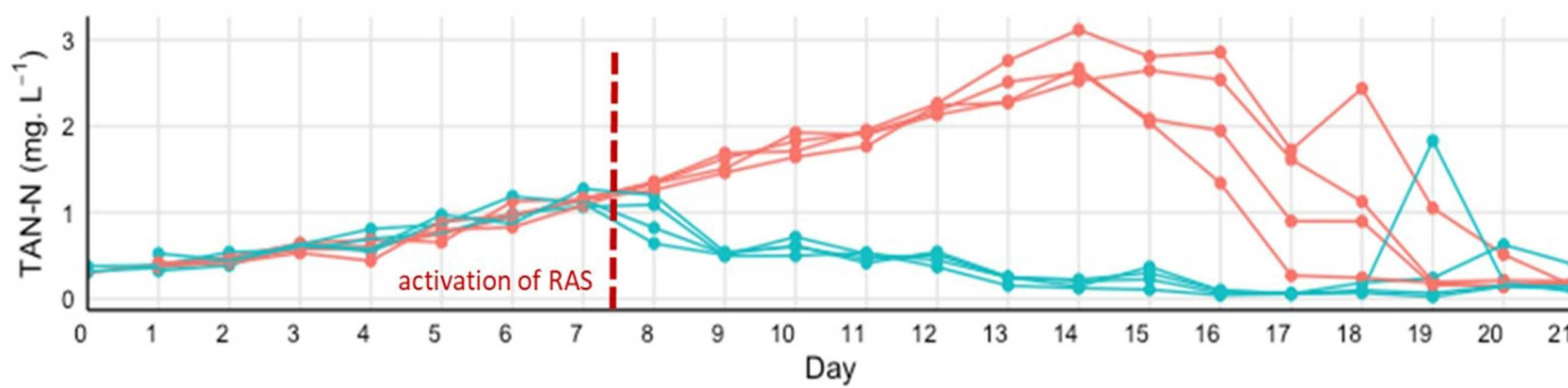
*These authors jointly supervised this work and share senior authorship



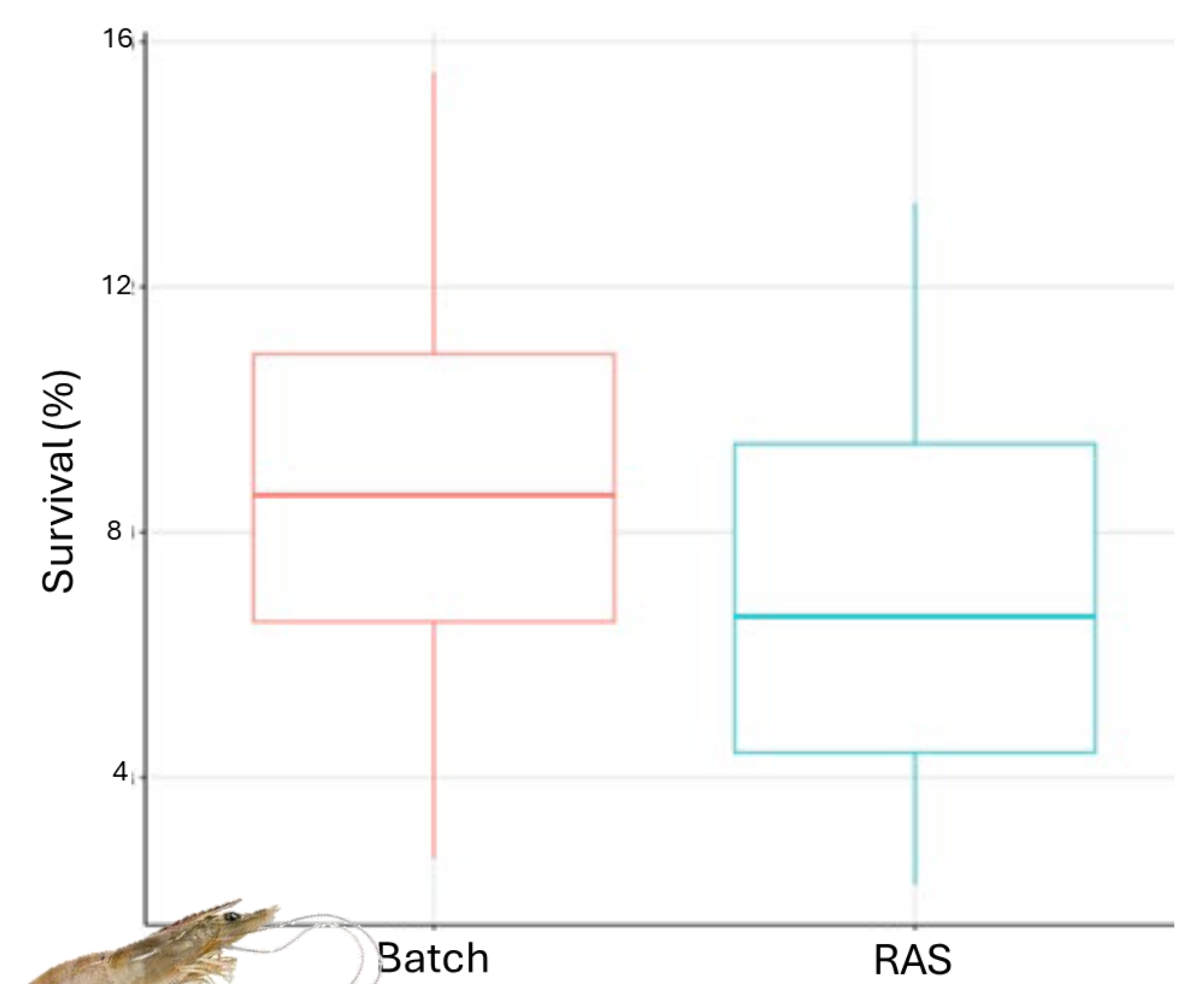
Introduction & methodology

- Nutrient dynamics are essential to larval shrimp recirculating aquaculture systems (RAS).
- Yet, **empirical data on nutrient dynamics in larval shrimp RAS remain limited**, particularly regarding nutrient retention and loss pathways during early larval stages. This study aimed to **evaluate larval shrimp performance** and **quantify nitrogen and phosphorus mass balances** in RAS to identify unexplained nutrient losses.
- Therefore, a 21-day experimental trial was conducted to compare nutrient cycling, retention and shrimp performance between a traditional batch system, and a hatchery-scale RAS. In four tanks per system, *Litopenaeus vannamei* were reared from nauplius to postlarval (PL10) stage.

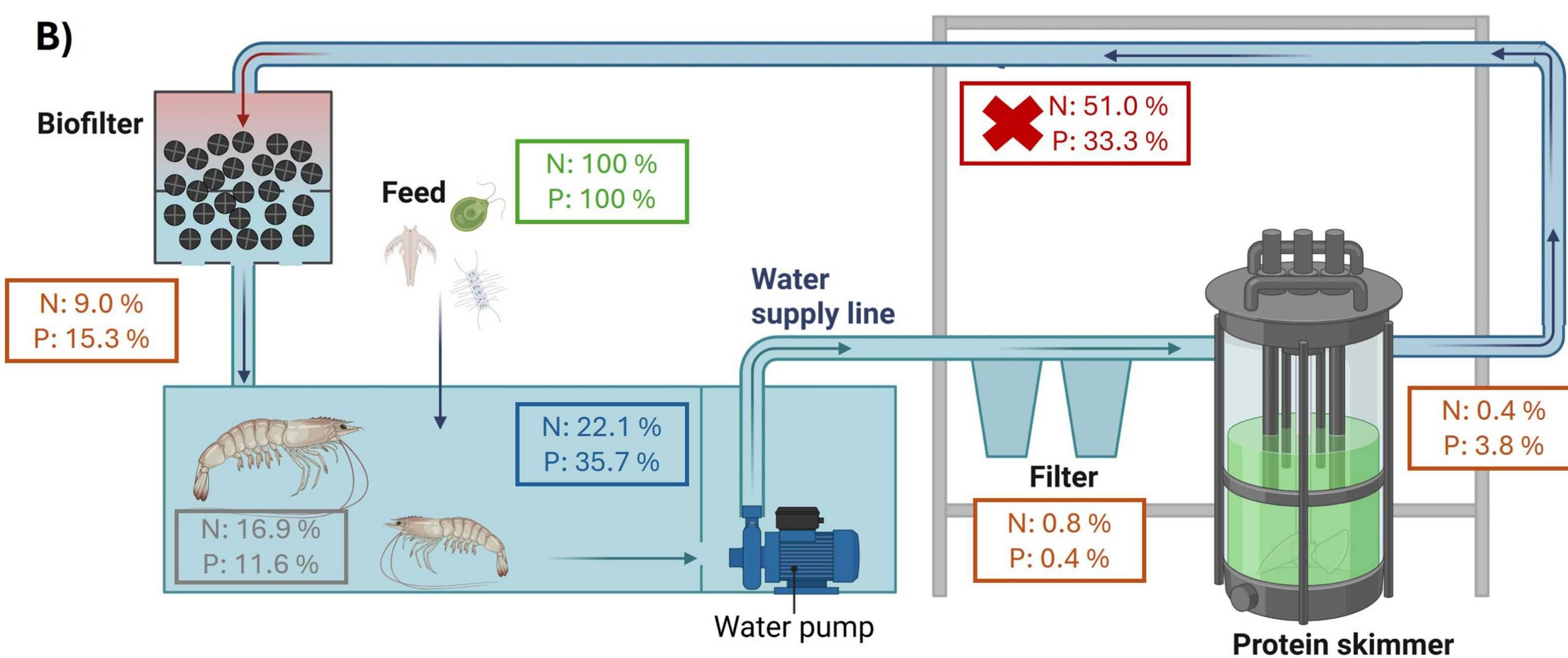
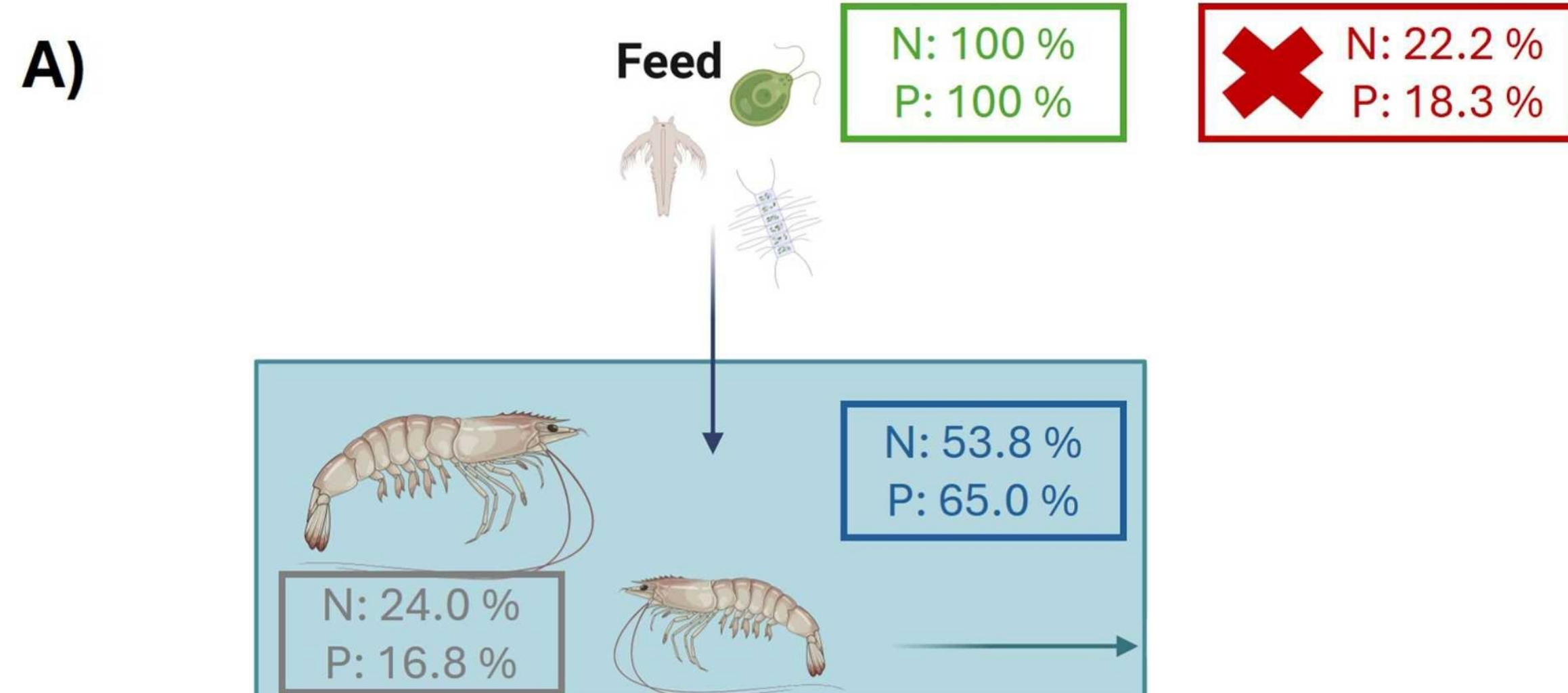
Results



Above: Concentration profile of total ammonium nitrogen (TAN-N) in both batch and RAS systems over time. Each line represents data from a single tank, illustrating variability among the replicates from each system. Similar profiles were obtained for nitrite-N, nitrate-N and organic N, but are not displayed on this poster.



Above: Boxplots of shrimp survival rates in batch and RAS systems at the end of the 21-day experiment. The boxes represent the interquartile range (IQR), while horizontal line inside the box indicates the median survival rate. There was no significant difference between the treatments (ANOVA, $p > 0.05$).



Left: Conceptual schematic illustrating the percentage distribution of nitrogen (N) and phosphorus (P) derived from feed (100%) across various compartments within the larval culture of *L. vannamei* larvae in (A) a batch system, consisting of 4 individual and separate tanks and (B) a recirculating aquaculture system (RAS), consisting of 4 tanks, a 250 μm mesh sieve, a 35 L protein and a 90 L biofilter, more specifically a moving bed biofilm reactor (MBBR). Mass balances were established for both the RAS and the batch system by comparing N and P pools at the start and end of the 21-day experiment.

CONCLUSION

- Shrimp performance was comparable between systems, with no significant difference in both survival and growth.
- Shrimp assimilated only a limited portion of the nutrients provided in the feed, especially under RAS conditions. In contrast, RAS demonstrated superior water quality
- Mass balance models for both systems confirm our observations, but a substantial portion of the nutrient input remains unaccounted for and requires further investigation.