In situ production of omega-3 polyunsaturated fatty acids (PUFA) in shrimp ponds.

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Global fisheries reaches maximum levels.

Limited resources fish meal and fish oil (omega-3).

Omega-3 essential diet ingredient for growth of aquaculture species.

Shrimp aquaculture sector facing sustainability issues & sector-expansion hindered.

Goal...
Without compromising on current production rates, decrease dependency on external recourses by increasing quality and contribution of natural food in shrimp ponds.

Change fertilizing properties of the feed: feed the whole system.

Shrimp ponds are eutrophic ecosystems and contain natural food webs, not only shrimp.

Faster nutrient turnover & mineralization in pond.

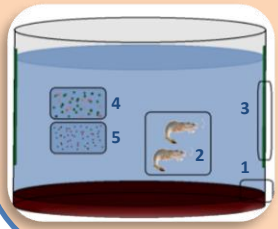
- Improve internal purification to manage **water quality**;
- Decrease water use and environmental **eutrophication**;
- Decrease disease outbreak and use of medicines/chemicals;
- Increase **omega-3 content** of pond's natural food;
- Improve **nutrient transfer** in pond's food web.
- Produce **high quality seafood** more **sustainable** and efficient.

Bottleneck: Unknown driving forces nutrient transfer in pond's food web...
→ Study **ecological stoichiometry (C:N:P)**
Focus on flow phosphorous (P) and omega-3 fatty acids

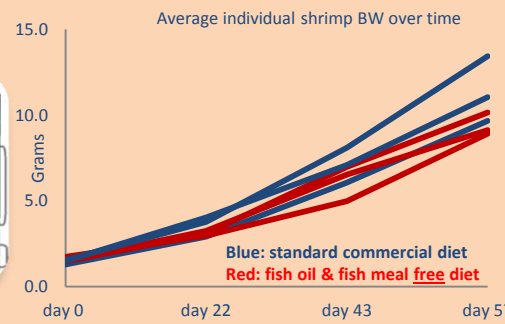
1. Detritus
2. Shrimp
3. Periphyton
4. Bioflock (>30mu)
5. Seston (<30mu)

Alter input to the system through novel feed formulation:
Decrease P:N and P:C
Fully replace fish oil and fish meal (casein and coconut oil)

Analyse mass balance over food web compartments



Mesocosm system



Preliminary results

- In mesocosm systems, full exclusion of fish meal and fish oil has no significant effect on growth, survival and fatty acid content of shrimp.
- 50% Phosphorous reduction has no effect on omega-3 fatty acid production and transfer through the food web in shrimp ponds.
- 40% Feeding level reduction in combination with dietary fish oil and fish meal exclusion and addition of C and N fertilizer has no effect on growth performance.
- Next step: study stable isotope profiles of entire food web.

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