

NEW MICROAEROPHILIC ASSIMILATION (BIOFLOC) - MBR BASED RAS

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Introduction:

- Assimilation-MBR based RAS is a novel and promising sustainable alternative to conventional RAS:
 - ✓ Near zero water exchange.
 - ✓ Nutrients released into the water are effectively converted into protein-rich microbial biomass, thus mitigating potential environmental pollution.
 - ✓ Using microbial biomass as a supplementary fish feed: a) reduce the dependence on costly protein sources; b) enhance fish immunity; and c) lower production costs.
- Biofloc quality including its size, composition, and protein content is affected by the: a) external carbon source; b) C/N ratio; and c) redox potential (O₂ level) in the reactor.

Research aim:

Testing and optimizing novel assimilation (Biofloc) based RAS with membrane bioreactor for barramundi fish culture and high nutritional value Biofloc product

System setup:

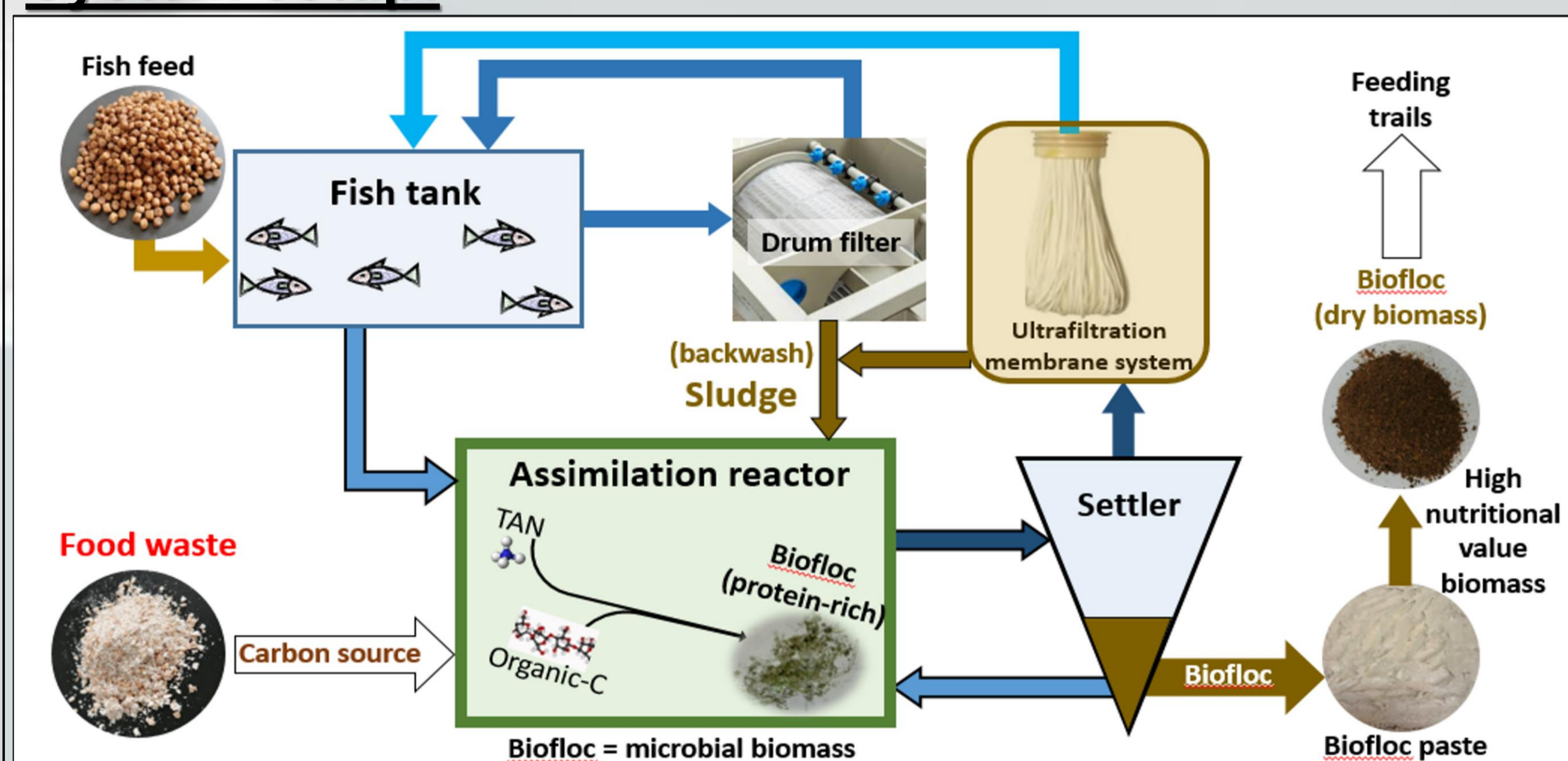


Fig. 1. Schematic representation of the novel Biofloc system with MBR

Methods:

- Routine water quality analyses: pH, DO, ORP, N formations, Total suspended solids, organic C, C/N ratio.
- Fish performances
- Microbial biomass; Properties (Protein and mineral content)
- Off-flavor

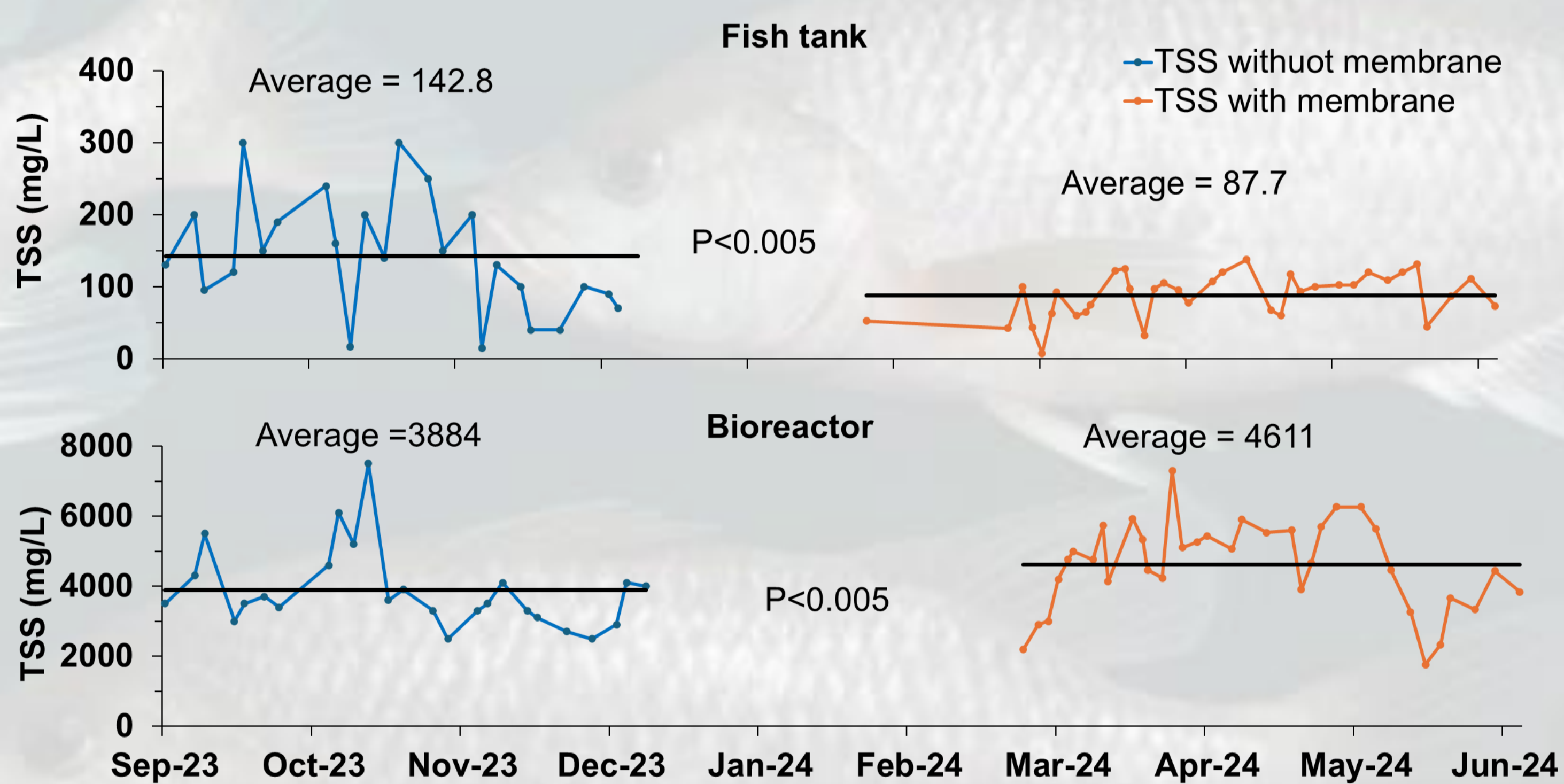
Results:

Water quality - fish tank

Parameters	Mean ± SD
TAN	1.5 ± 0.9
NO ₂ ⁻ -N	0.4 ± 0.4
NO ₃ ⁻ -N	2.3 ± 1.8
TEMP (°C)	26.1 ± 1.5
PH	8.0 ± 0.1
EC (mS/cm)	4.1 ± 0.1
DO	6.9 ± 0.5

Unit: mg/L

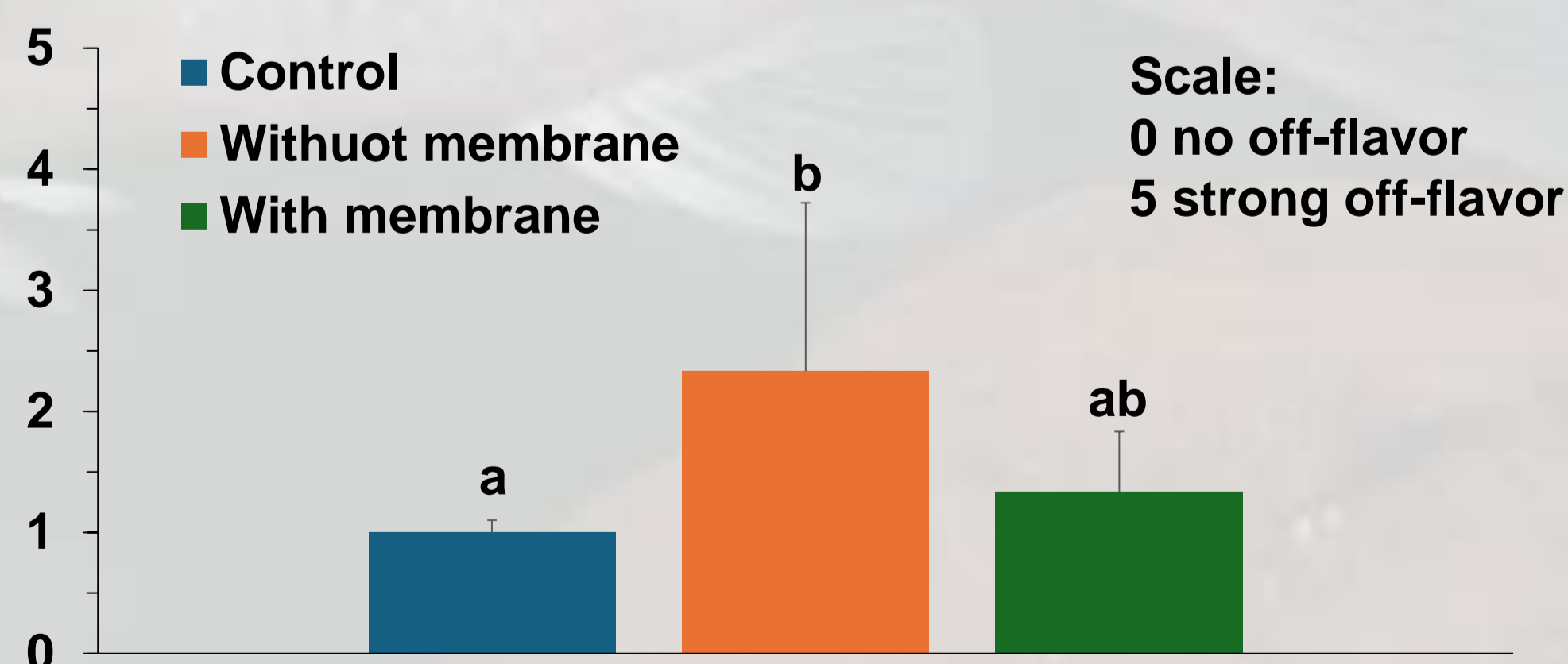
Addition of MBR to the system significantly reduced TSS concentration in the fish tank and increased its concentration in the bioreactor



Fish and Biofloc performance

Parameter	without membrane	with membrane
Time (days)	99	107
Specific growth rate (%/day)	3.1	2.9
FCR	1.6	1.7
Survival (%)	100	100
Protein in bioflocs (%)	43.5 ± 3.5	

Off-flavor in fish



Conclusions:

- The membrane reduced the concentration of TSS in the fish tank.
- The bioflocs meet expectations and exhibit high percentages of protein
- The membrane treatment reduced off-flavor of the fish.

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