

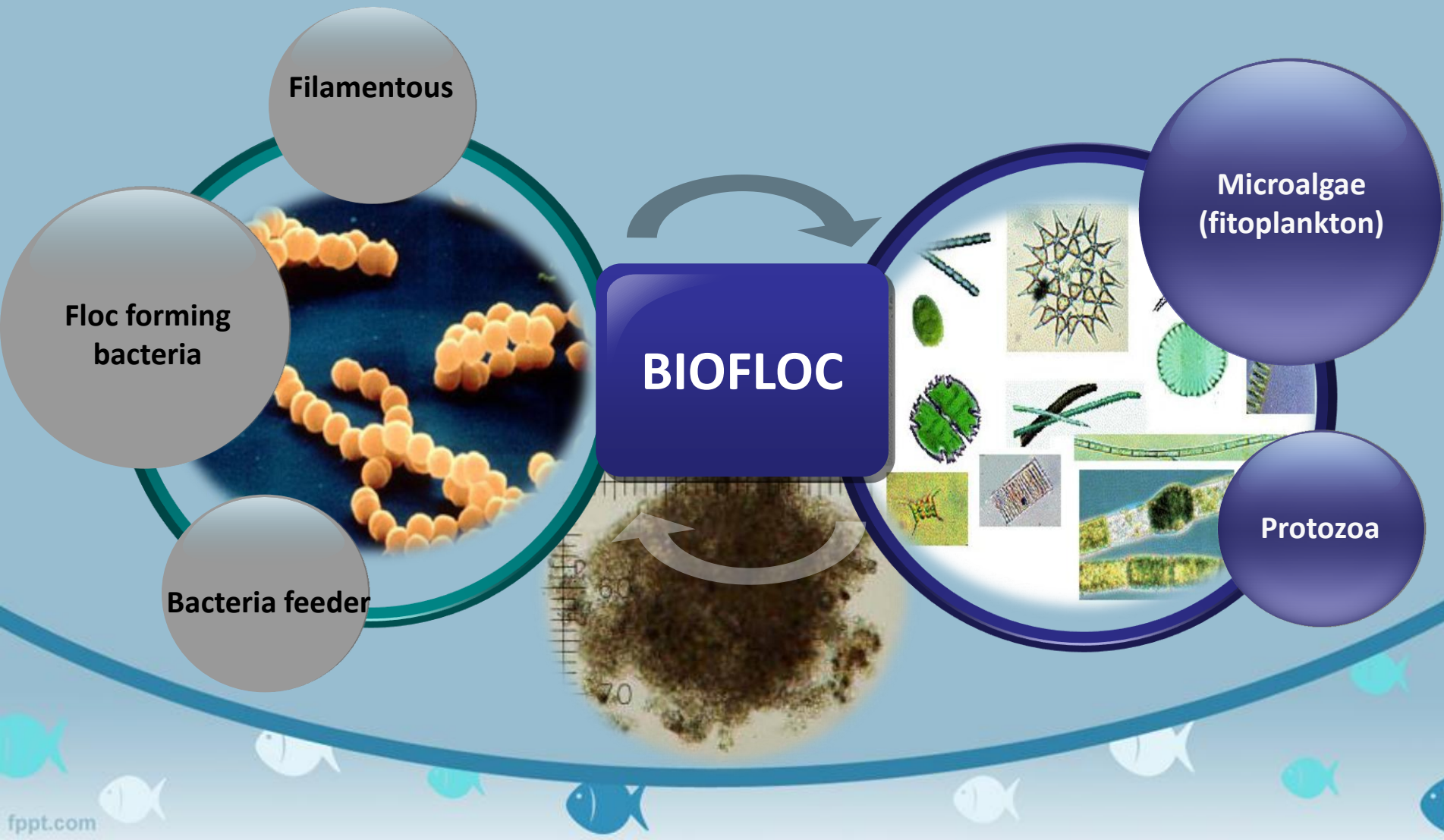
BIOFLOC-BASED REPRODUCTIVE PERFORMANCE OF NILE TILAPIA BROODSTOCK

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Introduction



Introduction

Biofloc

- Improve water quality
- Water supply Efficiency
- Biosecurity
- Feeding efficiency

Application of
BFT

*Litopenaeus
stylirostris*

- BFT improved reproductive performance

Emerenciano et al 2013



Materials and Methods

Period

13 weeks

Location

Department of Aquaculture
Bogor Agricultural University,
Indonesia

8 units of outdoor concrete tanks
(3m x 2 m x 0.7 m)



Materials and Methods

1. Control : without molasses
2. BFT : molasses at 15 C/N ratio

- No water exchange
- Water addition (evaporation)



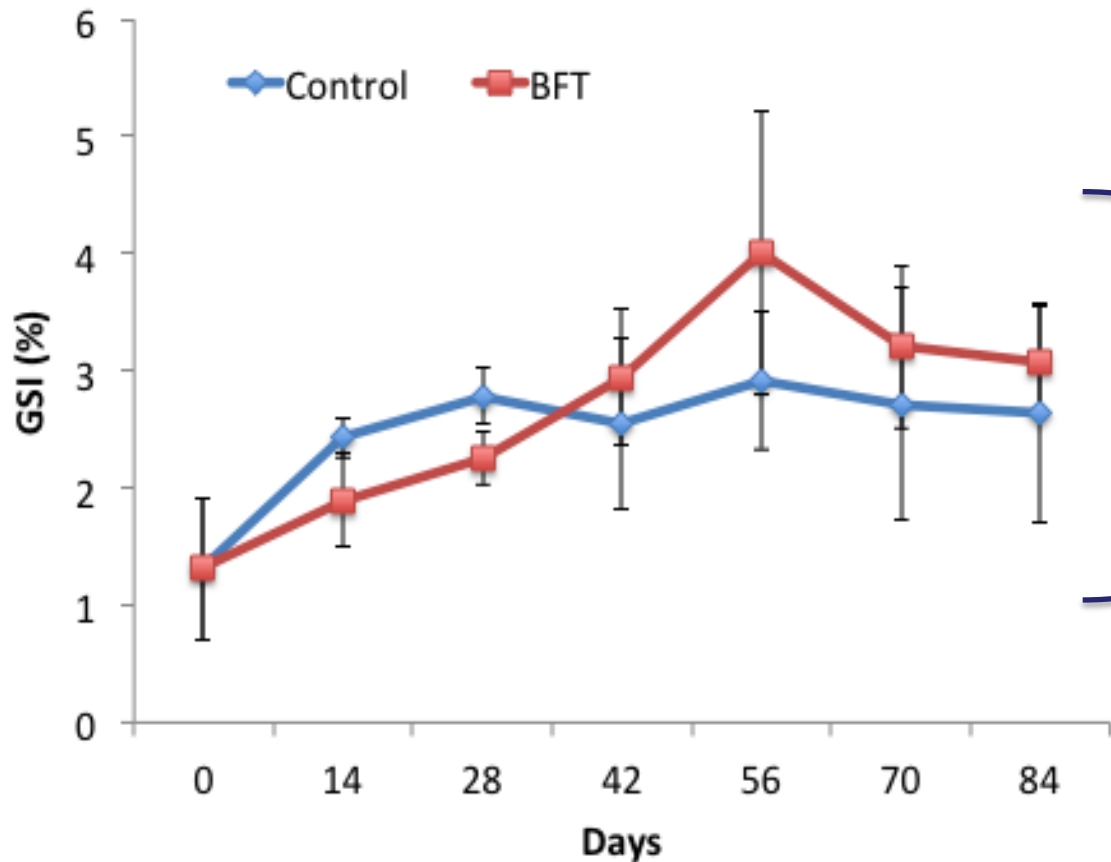
Average body length
 $16,59 \pm 0,48$ cm
Average body weight
 $84,56 \pm 4,81$ g

- Density: $20/\text{m}^3$
- Male:female= 1:4
- Feed to satiation (30% CP)



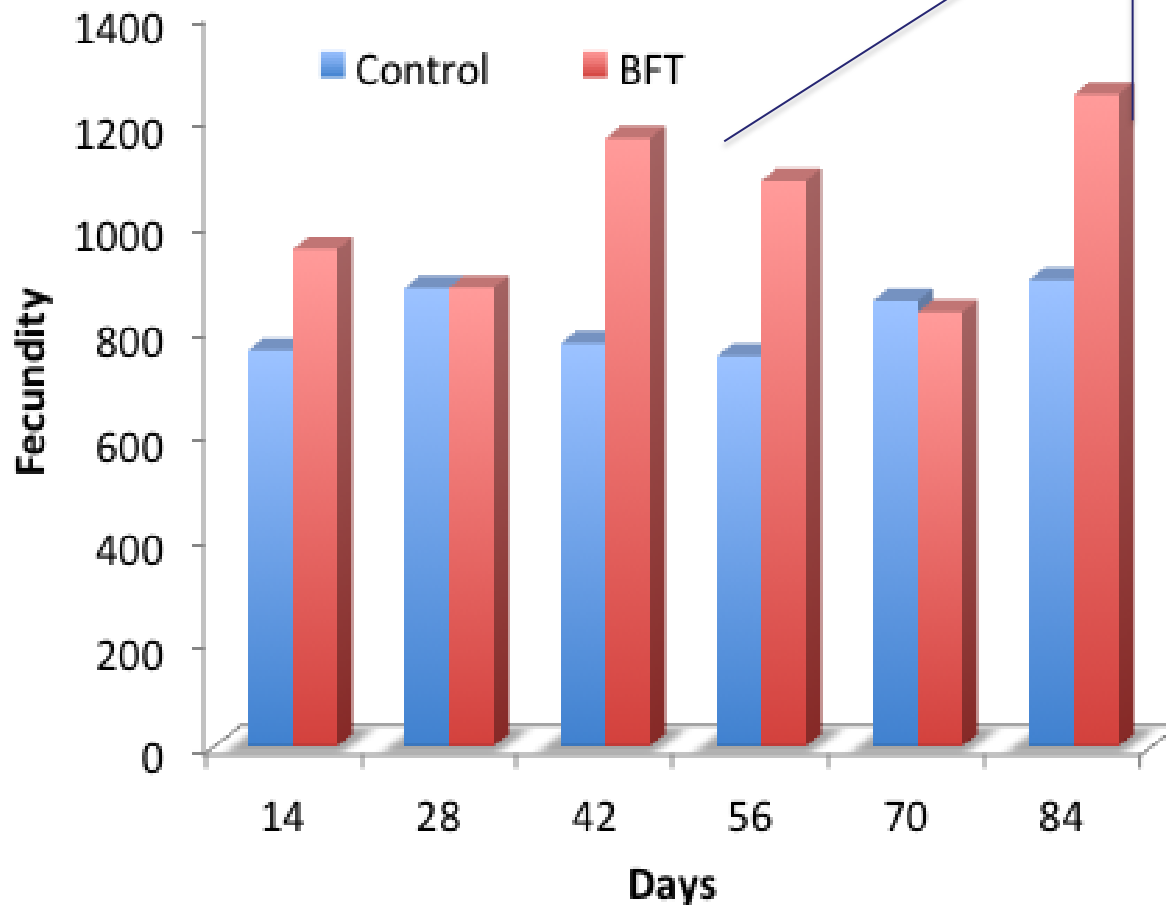
Results: Gonadosomatic index

GSI represent the proportion of gonad of the fish body weight (Rocha, 2008) → maturity stage, fecundity, egg size



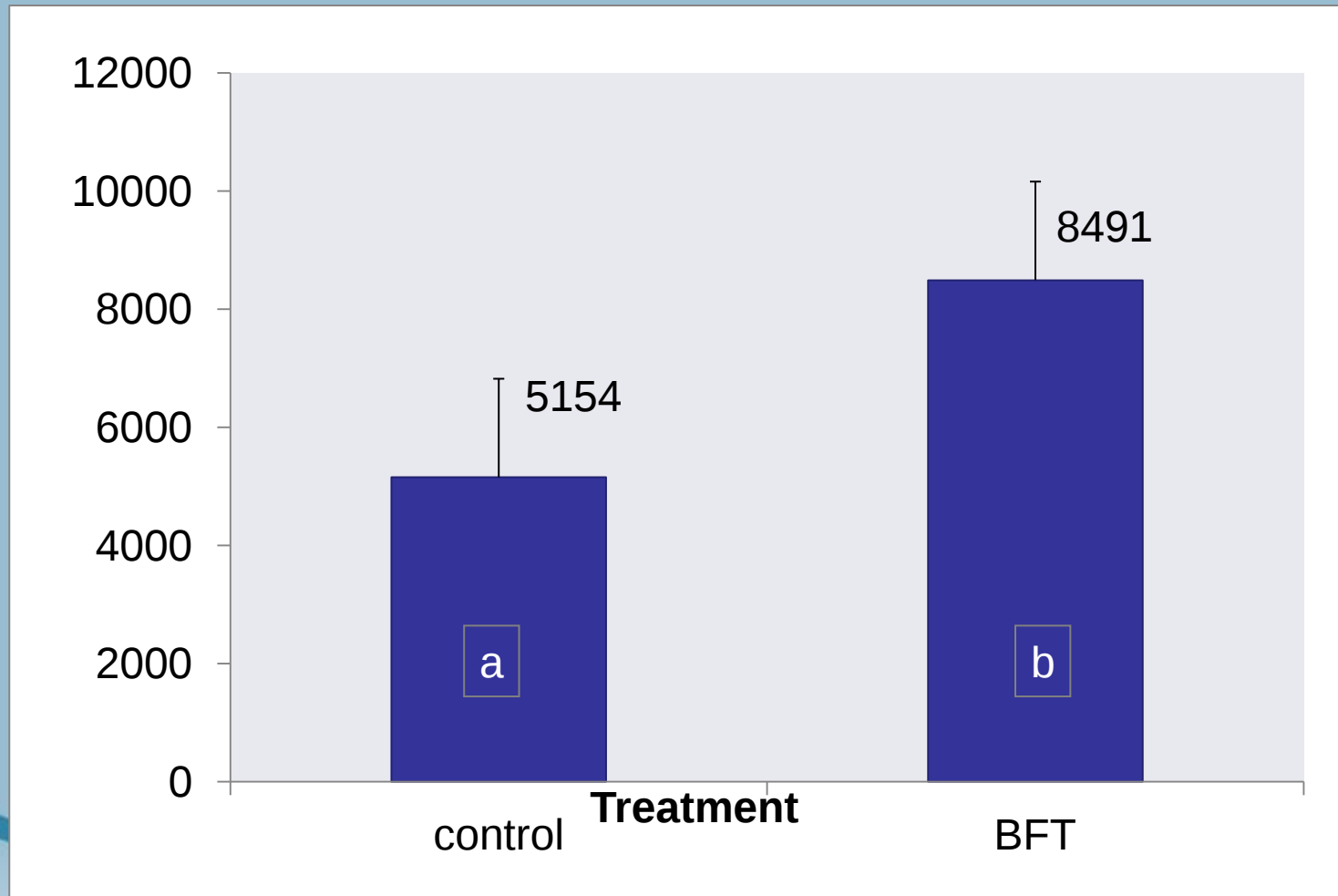
High variability GSI
→ asynchronous
spawning behavior
of tilapia

Results : Absolute Fecundity



More eggs were produced by the fish in BFT tanks

Results : Total fish fry production



What triggers the fish to spawn? (Rocha 2008)

1. The nutrition of broodstock
 - Food availability
 - Nutritional requirement
2. Physiological factors
 - Hormones
 - Morphological changes
 - Mobilization of energy reserves
3. Ecological factors
 - Food availability for larva
 - Water quality
 - Exposure to toxins

What triggers the fish to spawn? (Rocha 2008)

1. The nutrition of female

- Food availability
- Nutritional requirement

- Bioflocs is readily available for the fish anytime they need → “Native Proteins” (Emerenciano et al 2013)
- Nutritional requirement of broodstock:
 - High in protein and lipid
 - PUFA (Ekasari 2009; Tacon et al 2002)
 - Vitamin C (Crab et al 2012)

Summary of fatty acids analysis on the collected bioflocs

Fatty acids	% Total Fatty Acids
Total n-3	1.33
Total n-6	19.70
Total n-9	12.97
LA	13.43
ALA	0.36
EPA	0.56
DHA	0.32
AA	1.30

n-6 fatty acids is essential for tilapia and its reproduction (Watanabe 1982)

Protein : 37 – 46% DW
Lipid : 11.9 % DW

- Biofloc considerably high in AA
- AA is beneficial for fertilization rates → stimulates testicular testosterone in goldfish (Izquierdo et al 2001)

What triggers the fish to spawn? (Rocha 2008)

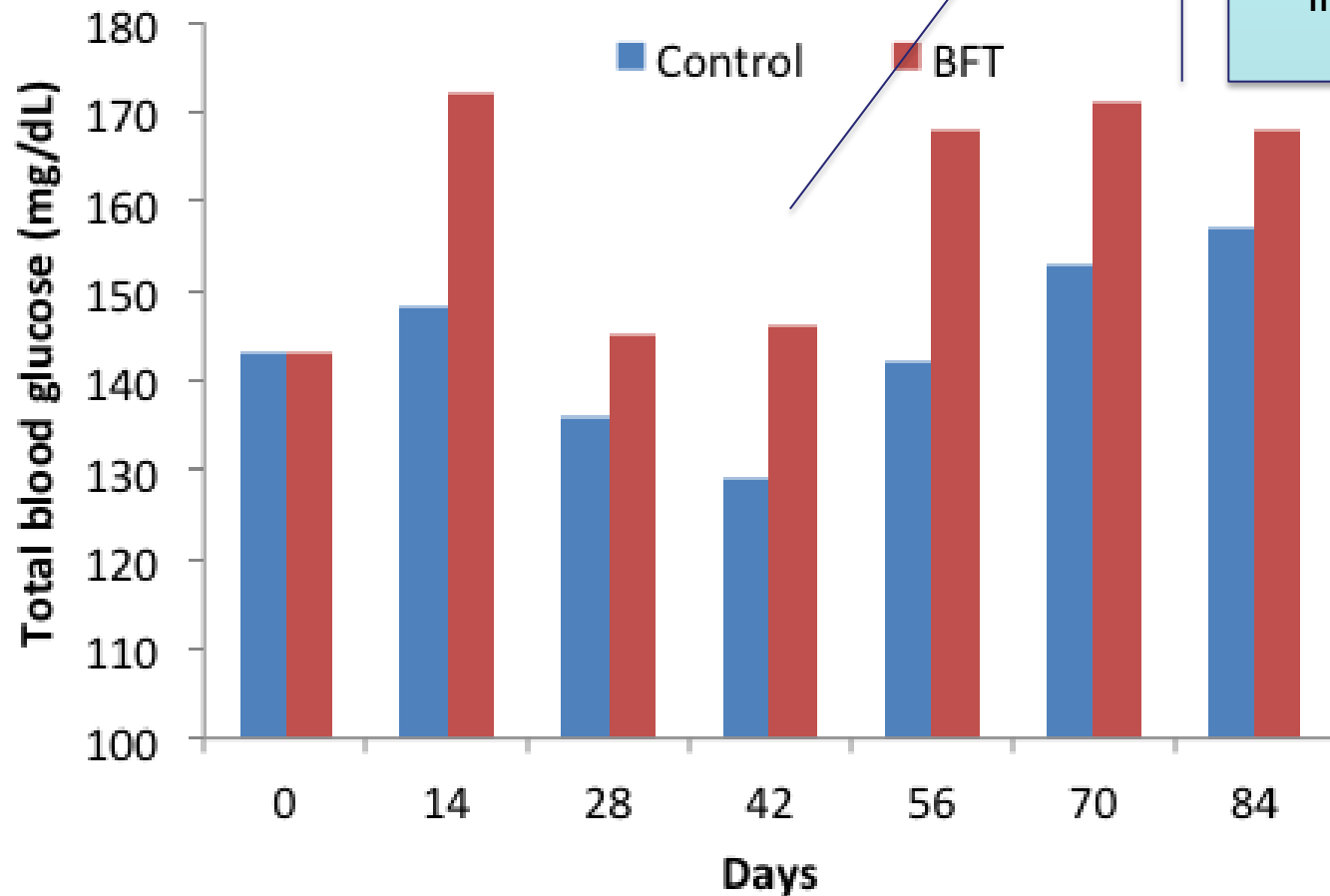
2. Physiological factors

- Hormones
 - Morphological changes
 - Mobilization of energy reserves
- Blood total cholesterol in fish in BFT tanks was higher
Cholesterol → precursor of steroids hormones
 - Blood glucose as an indicator of mobilization of energy reserves
 - Fish growth

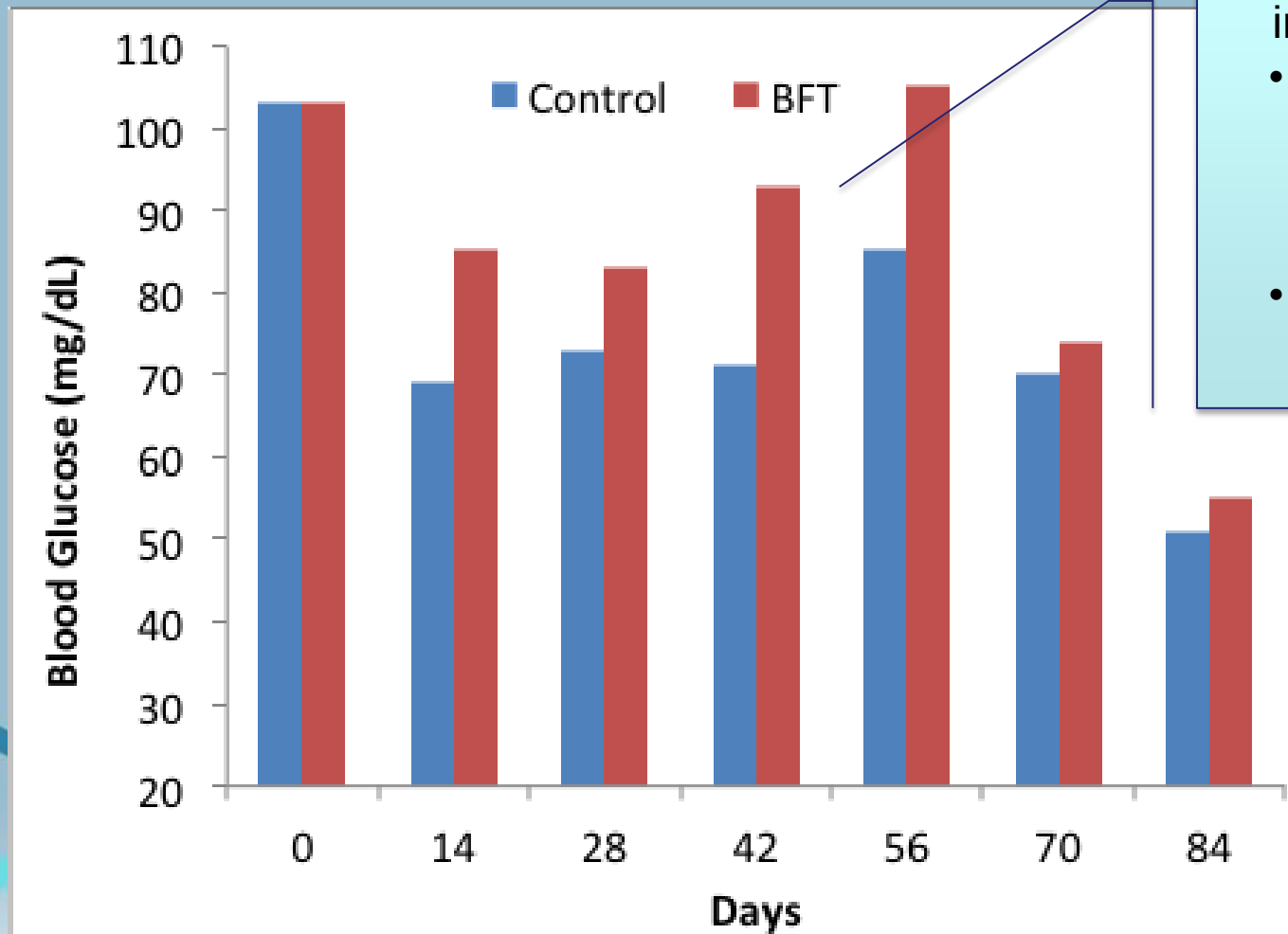
Results:

Blood total cholesterol

- Higher concentration in BFT → higher concentration of hormones were involved?



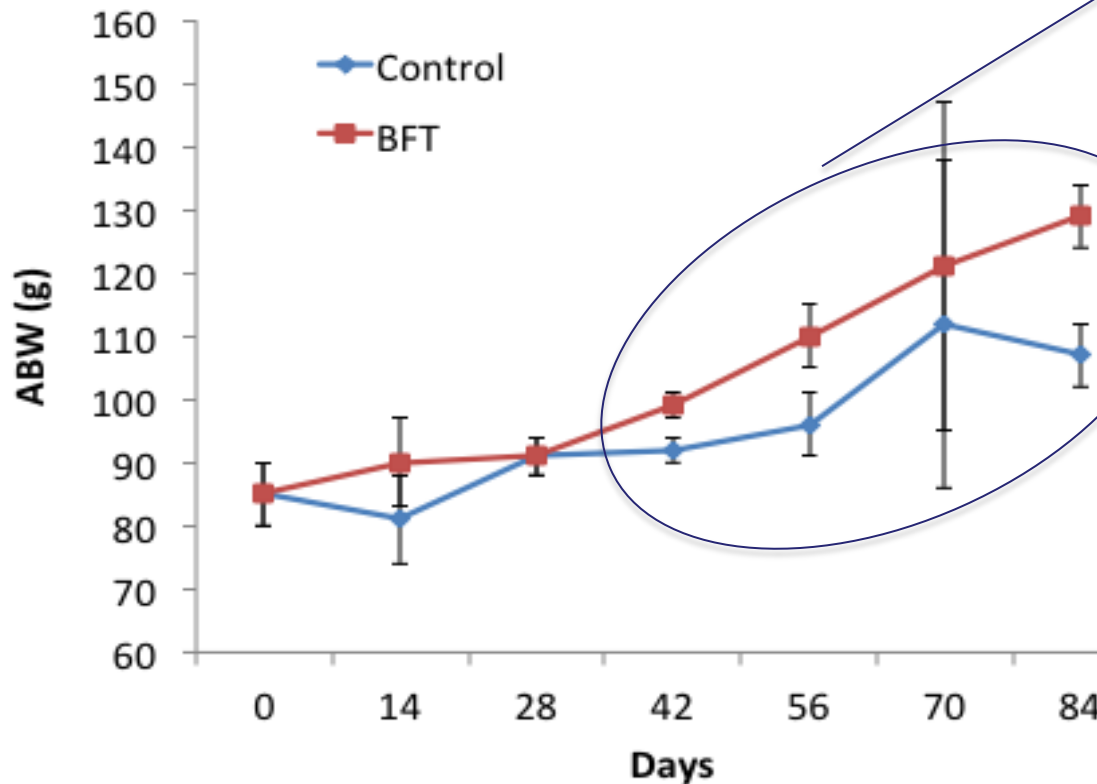
Results: Blood glucose



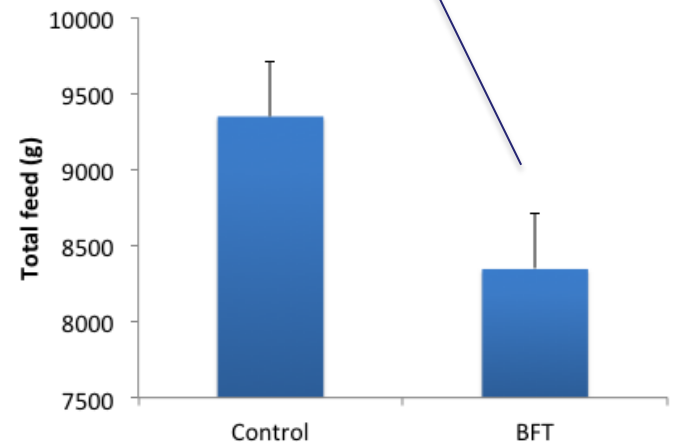
- Higher concentration in BFT →
- More energy was mobilized for reproductive activities
- More energy supply?

Results: Average body weight

Despite of more active reproductive performance the female in BFT tanks grew better



Yet, the fish in BFT required less feed (9.3 vs 8.3 kg/tank)



What triggers the fish to spawn? (Rocha 2008)

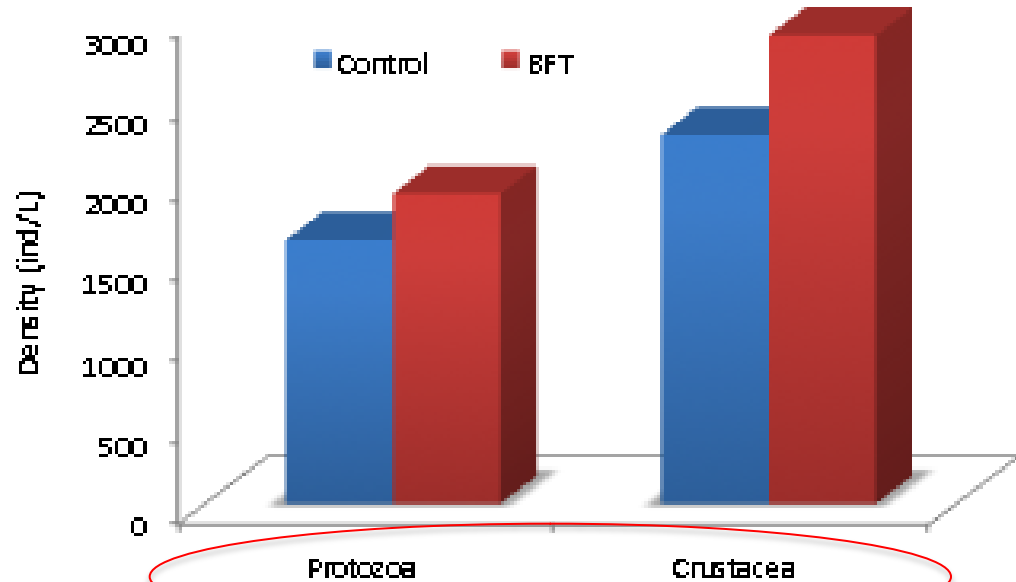
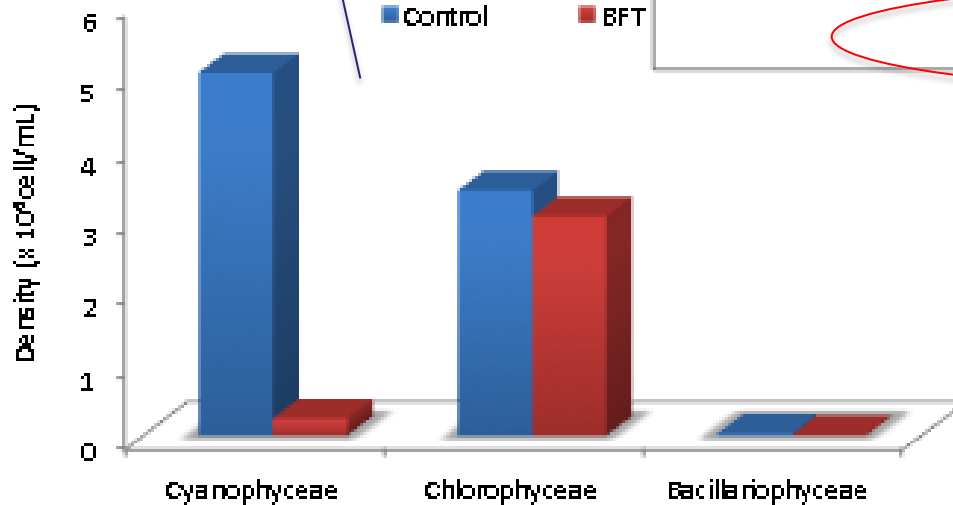
3. Ecological factors

- Food availability for larva
- Water quality
- Exposure to toxins

1. Bioflocs is readily consumed in situ and nutritious for the larva
2. Plankton in BFT tanks → food source for the larvae
3. Water quality in BFT relatively more stable
4. The possibility of toxin produced by blue green algae (microcystin)

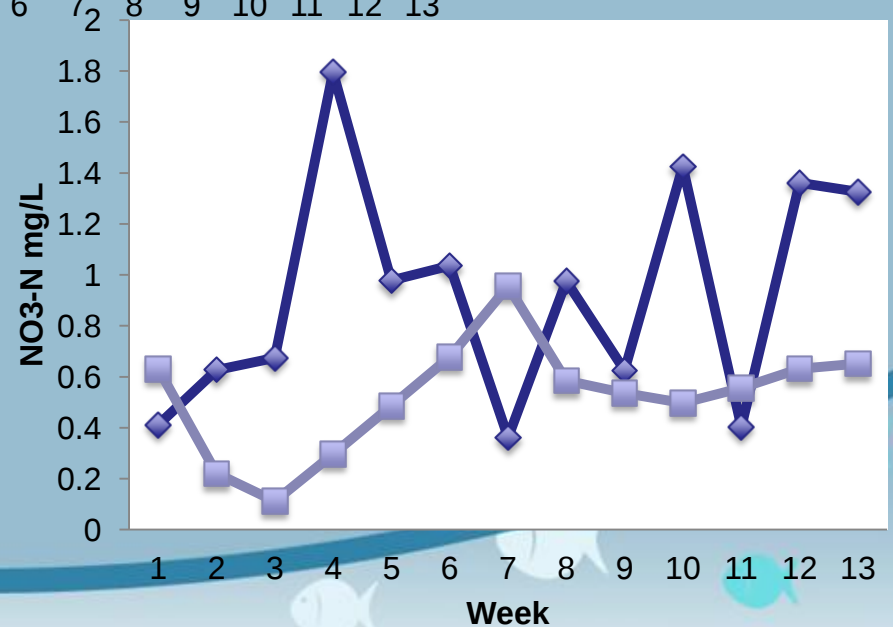
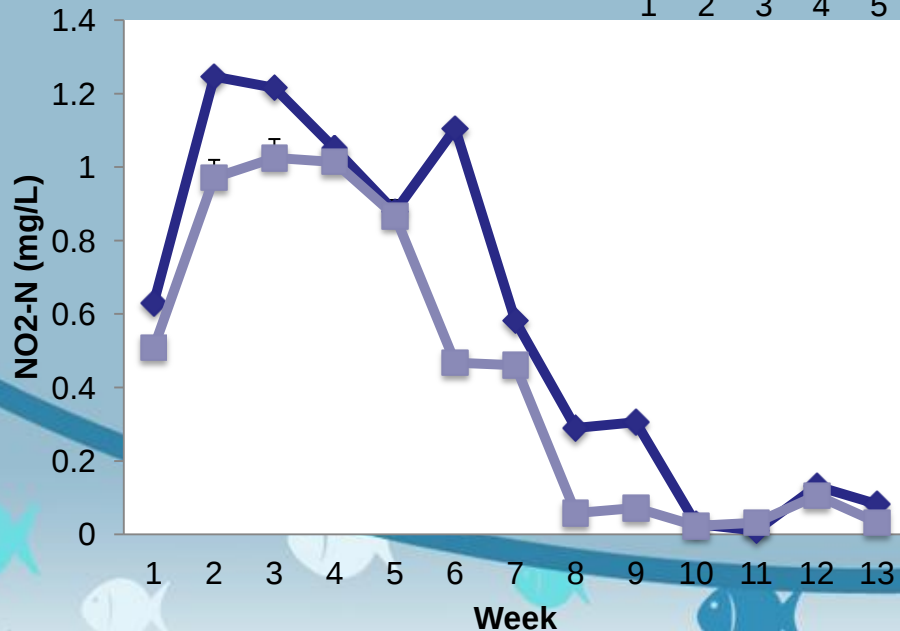
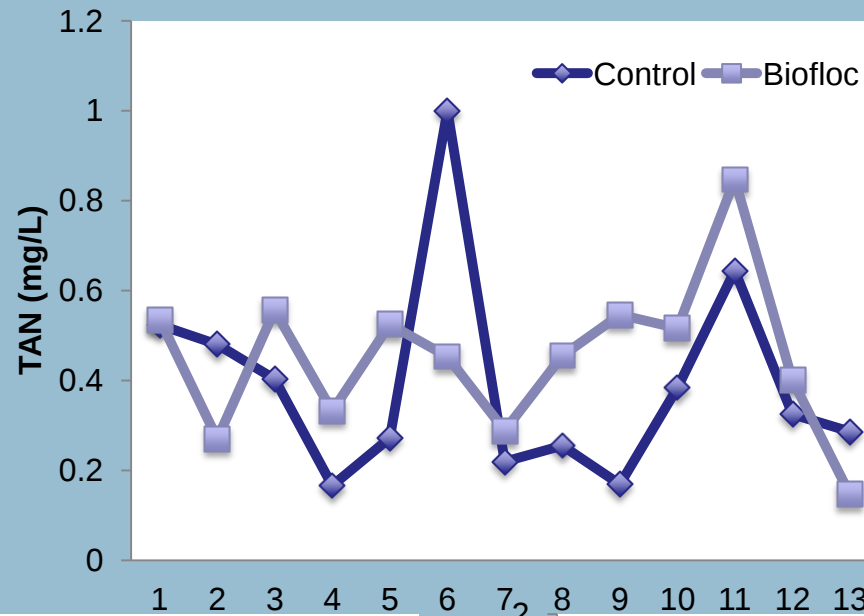
Results: Plankton abundance

- Microalgae → a potential live food for larvae
- Control : Microcystis sp. → toxin microcystin



More zooplankton in BFT tanks → live food for the larvae

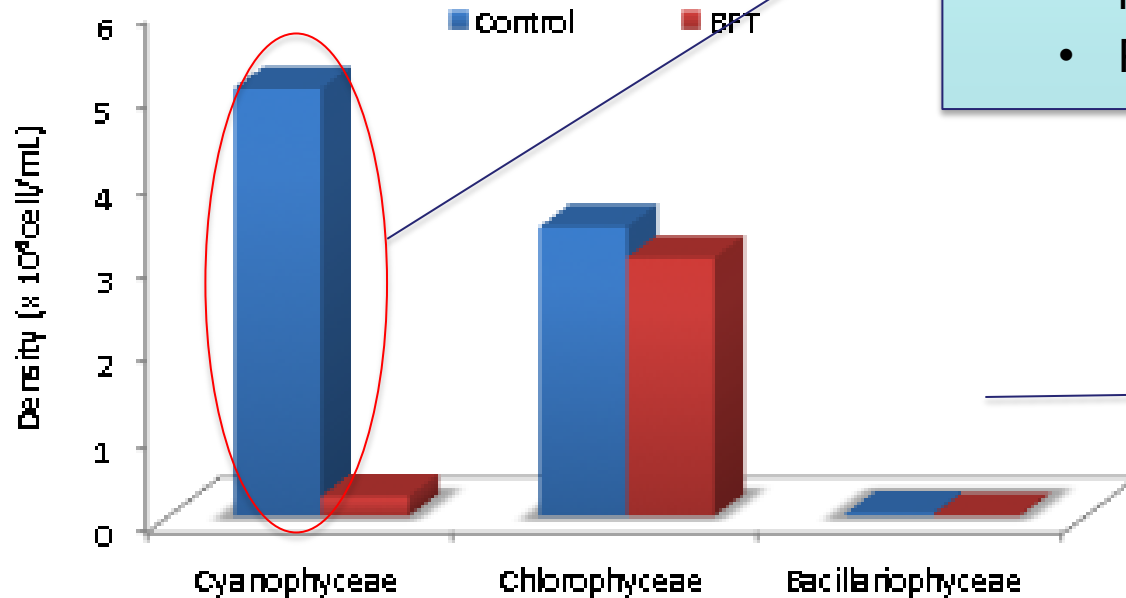
Water Quality: Inorganic N



Microcystis abundance



- *Microcystis* sp. density at the end of experiment: 4.69×10^6 cell/mL
- Microcystin → (Semyalo et al 2011)
 - internal haemorrhage,
 - low growth rate
 - Reduce reproduction success



Different microbial communities → light quantity and quality ? → Light affect recruitment capacity (El-Sayed 2006)

Conclusion

The application of BFT effectively enhanced tilapia reproductive performance:

1. Nutritional contribution for the broodstock & the larvae
2. A favorable environment for the fish to do recruitment



In situ biofloc production can be suggested as a way to increase tilapia seed production

Acknowledgement

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- We also thank Prof. Avnimelech for presenting this work in this WAS meeting 2013



An aerial photograph of a university campus. On the right side, a large, multi-story building with a red-tiled roof and a white facade is visible. The building has a series of balconies and a prominent staircase on its side. In the center-left, there is a large, rectangular pond or reservoir. The water in the pond is dark, and there are some small structures or boats on the surface. The pond is surrounded by lush green trees and vegetation. In the background, more trees and a clear blue sky are visible. The overall scene is a peaceful and scenic view of a university campus.

Thank you