THE USE OF BFT SYSTEM WITH PROBIOTIC TO LIMIT SHRIMP VIBRIOSIS

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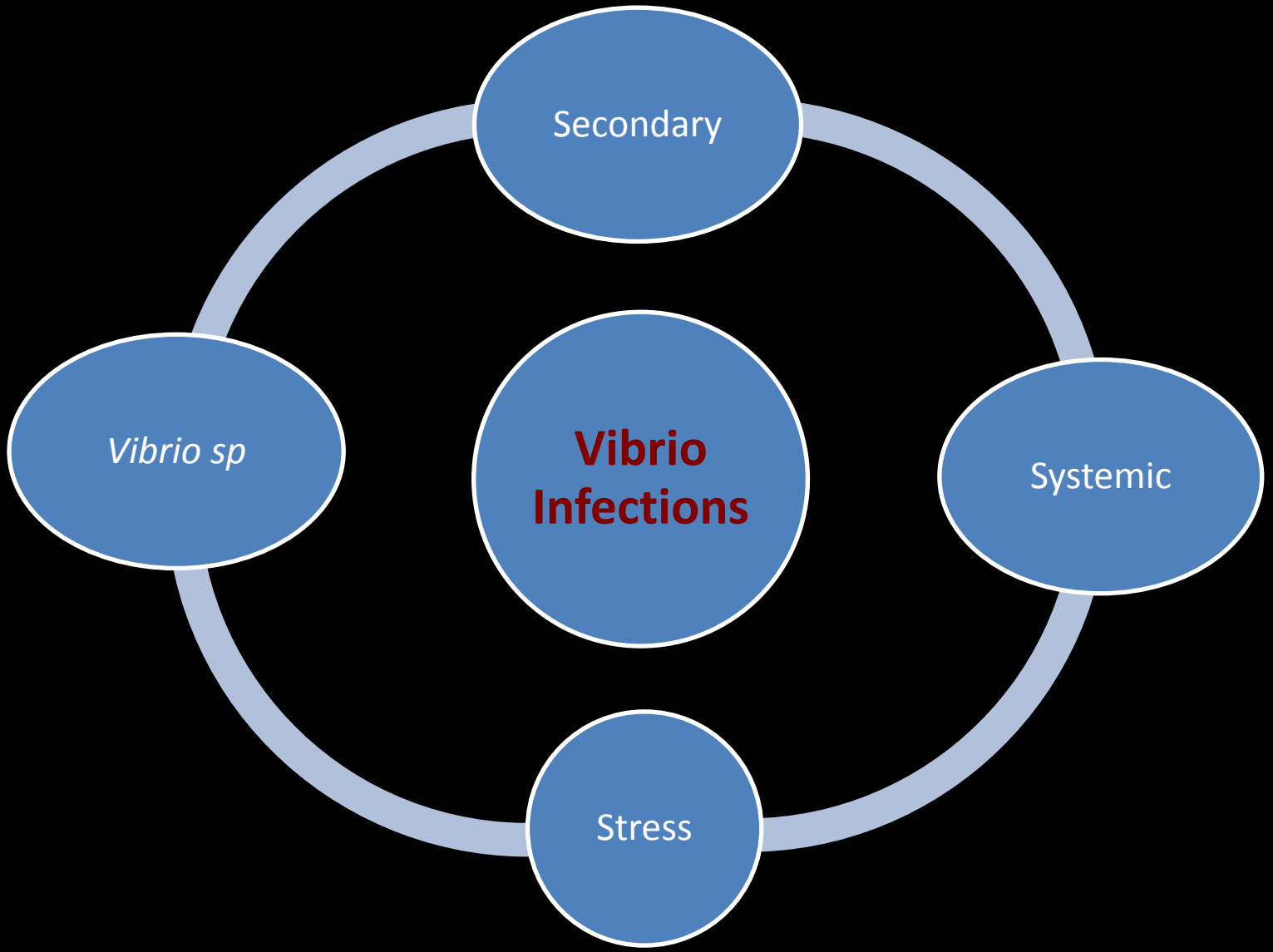
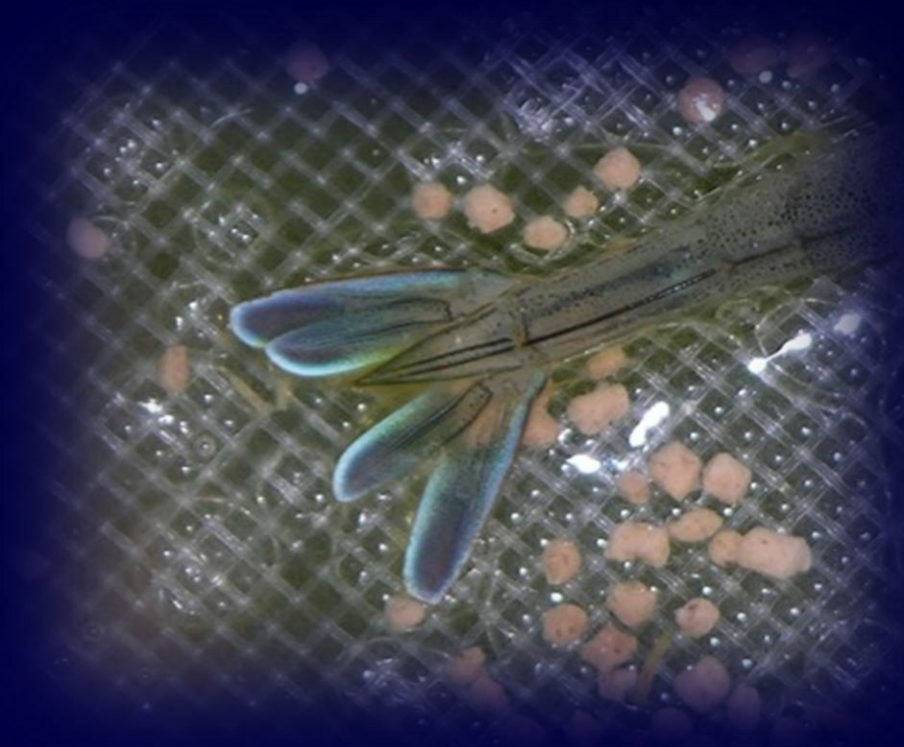
Rio Grande do Sul State
(32°S)

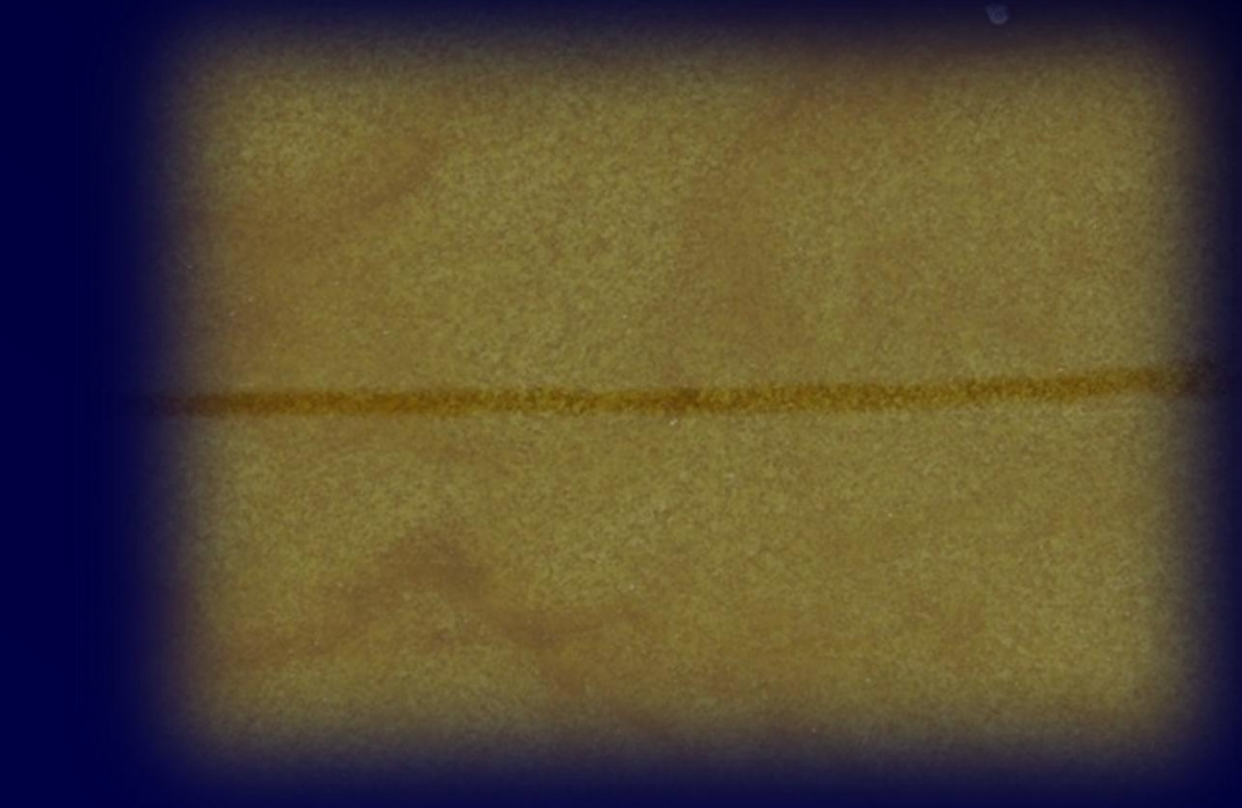
MARINE STATION AQUACULTURE


Secondary
Vibrio sp
Vibrio Infections
Systemic
Stress

- *Vibrio* affects growth or cause high mortalities during penaeid shrimp culture.



- On the other hand, probiotics may change microbial communities in aquatic culture environments



OBJECTIVE

Analyze the effect of a probiotic in *Litopenaeus vannamei* cultured in a biofloc technology system contaminated with *Vibrio parahaemolyticus*.


Raceway infected with Vibrio
(1500 shrimps /m²)

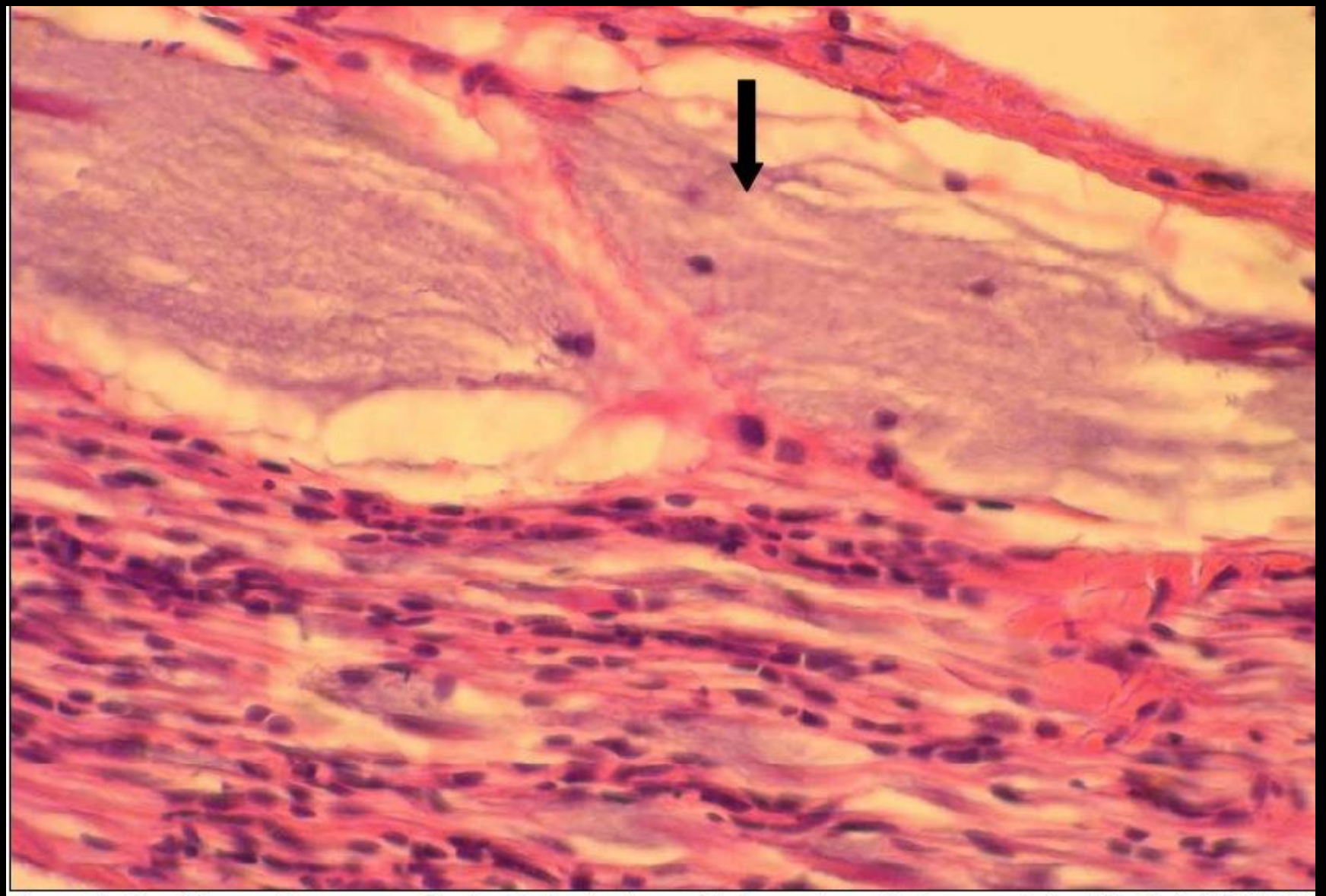


Figura 3: Cordón nervioso con colonias de bacterias azuladas pertenecientes a vobrios (flecha). H-E 20 X

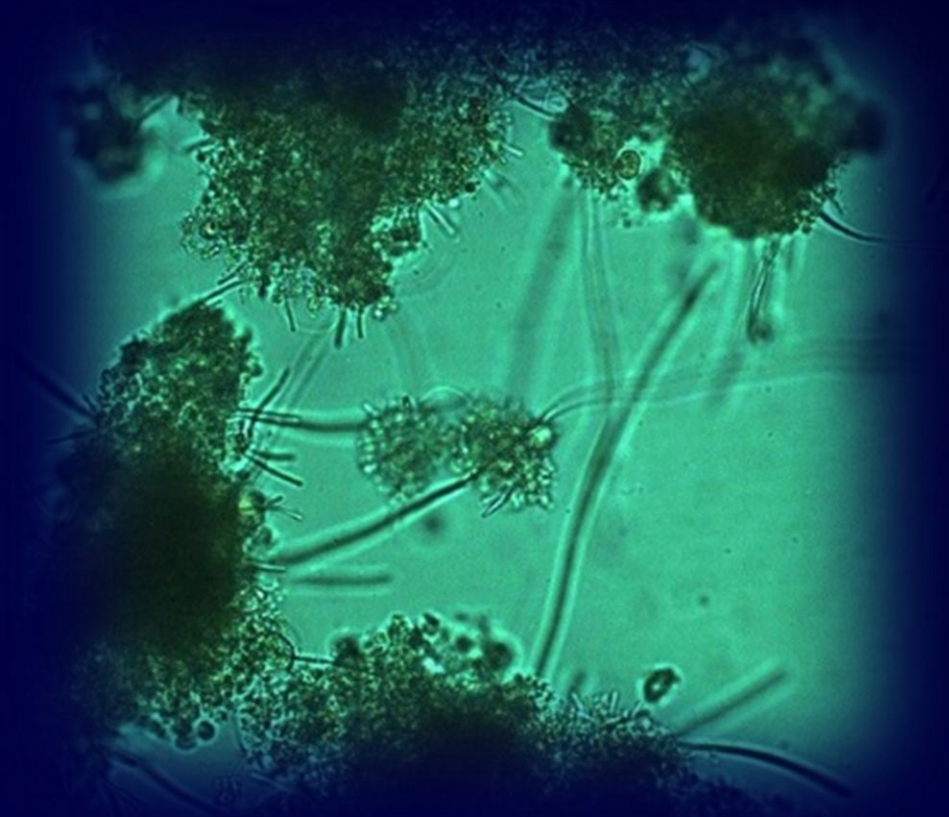
Necrosis was observed on the muscular fiber.
These are colonies of *V. parahaemolyticus*

The experiment compared two treatments (three replicates)

CONTROL
(Biofloc without probiotic)

X

COMMERCIAL PROBIOTIC



Multi-strain probiotic

- Added to the feed
  - *Bacillus sp., Enterococcus sp.* and *Lactobacillus sp*
- In the water
  - *Bacillus sp., Enterococcus sp., Thiobacillus sp and Paracoccus sp.*

Treatments were randomly assigned

- Greenhouse;
- Six tanks of 35 ton L lined raceways;
- 300 shrimps/m^2
- Each tank was stocked with *Vibrio parahaemolyticus* infected juveniles

Bioflocs

- Imhoff
- Secchi
- turbidity
- TSS
- Carbon source: molasses

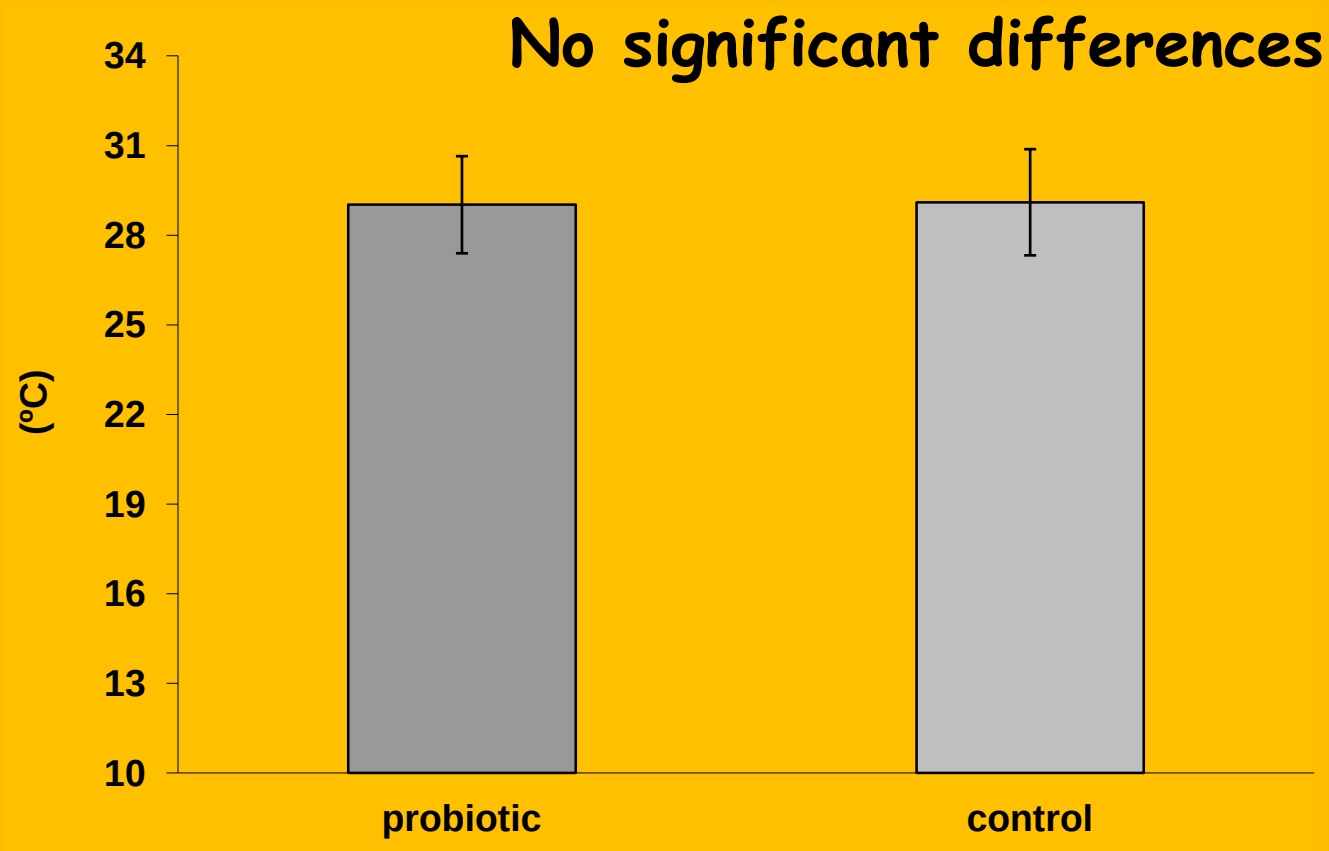
Water quality

- DO
- pH
- Alkalinity
- Nitrogen compounds

- Growth
- Weight gain
- FCR
- Survival

- Analysis of variance (ANOVA)
- Differences between means analyzed by Student's test ($\alpha = 0.05$).
- The experiment lasted for 70 days

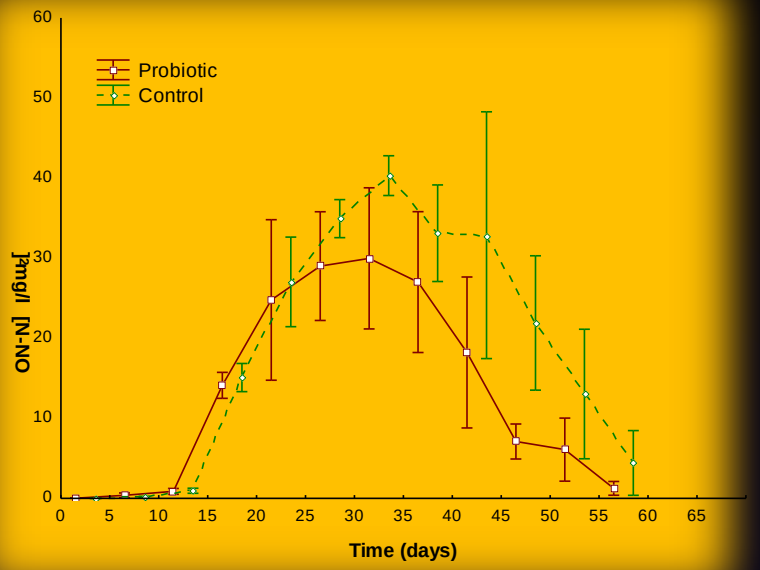
Temperature



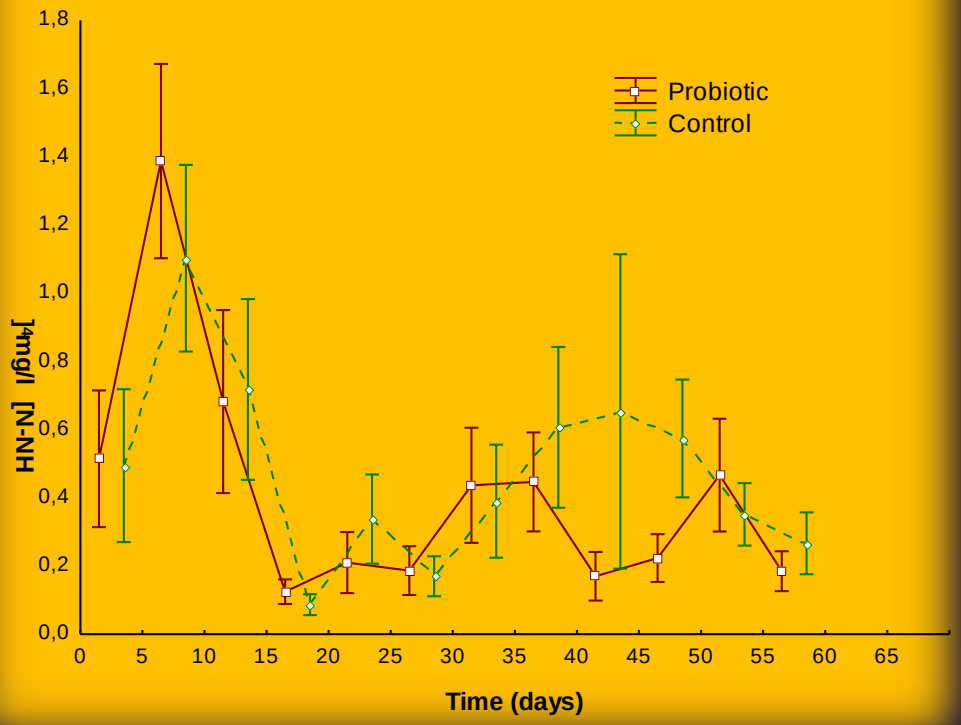
➢Nitrogen compounds

no significant differences

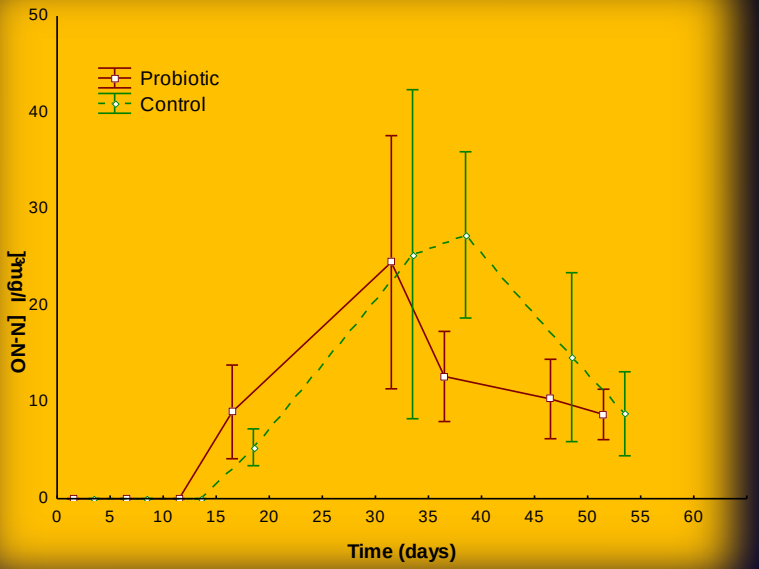
Nitrite



Ammonia



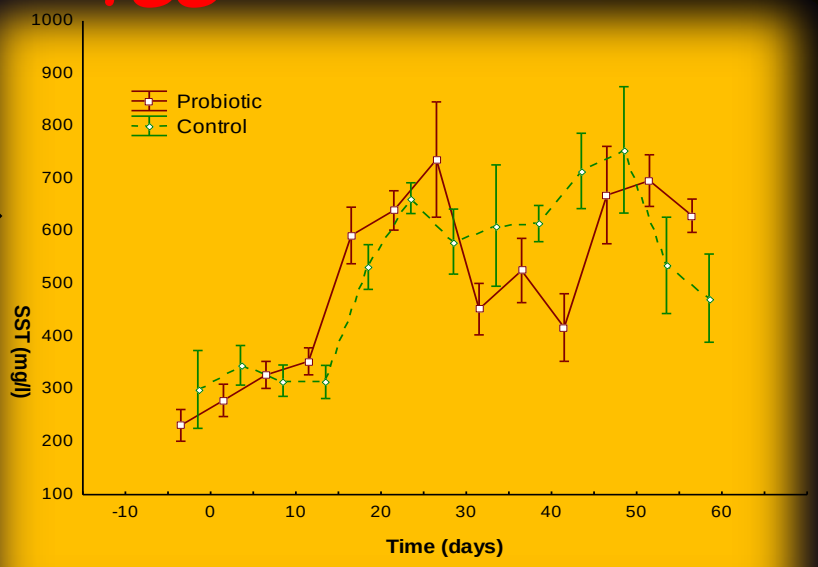
Nitrate



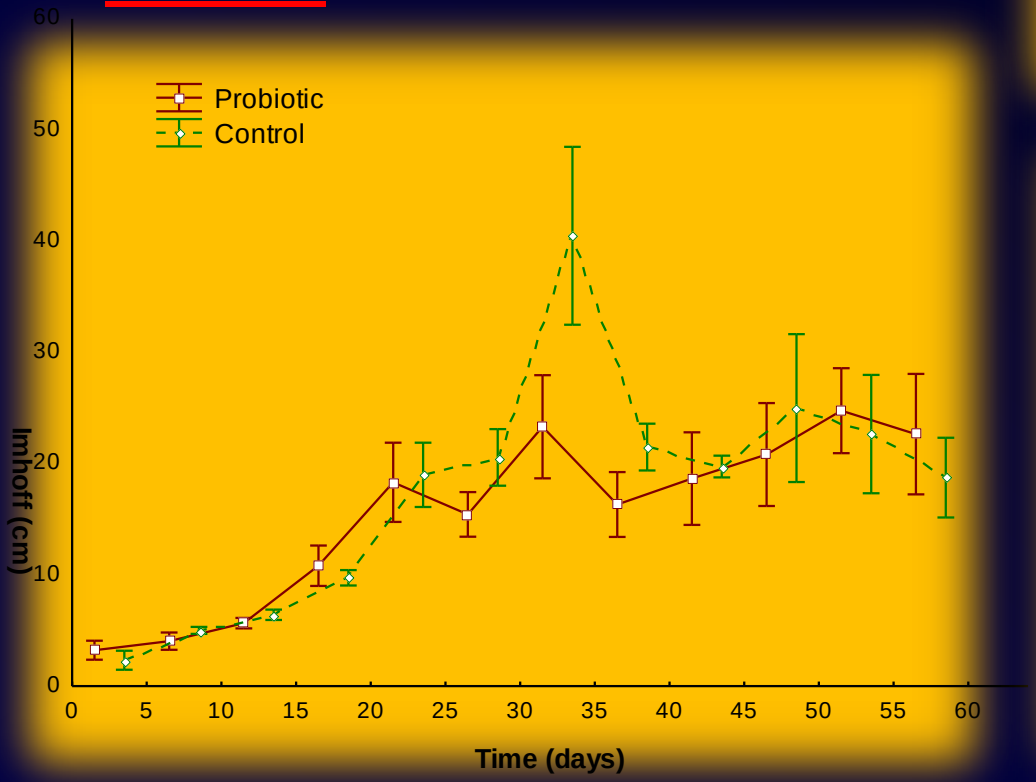
Bioflocs Analysis

There were no significant differences

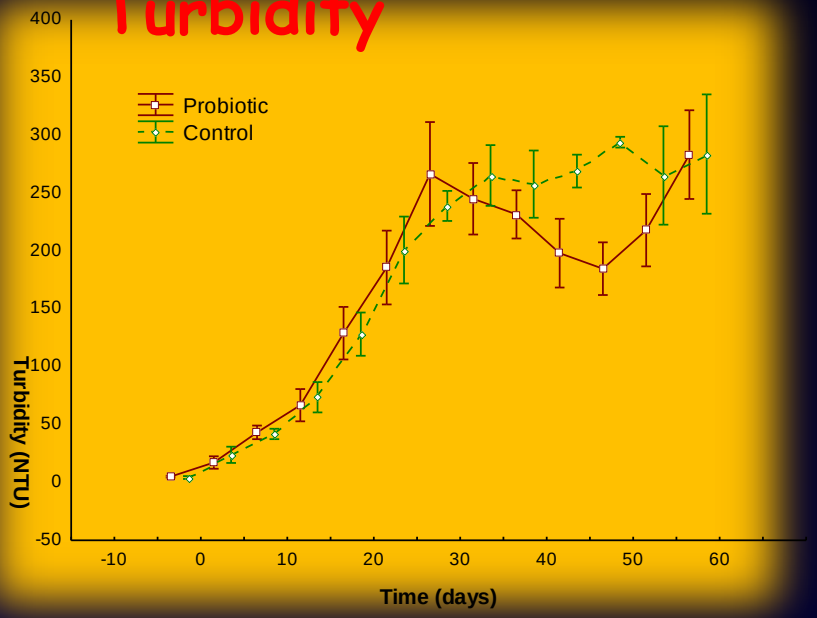
TSS



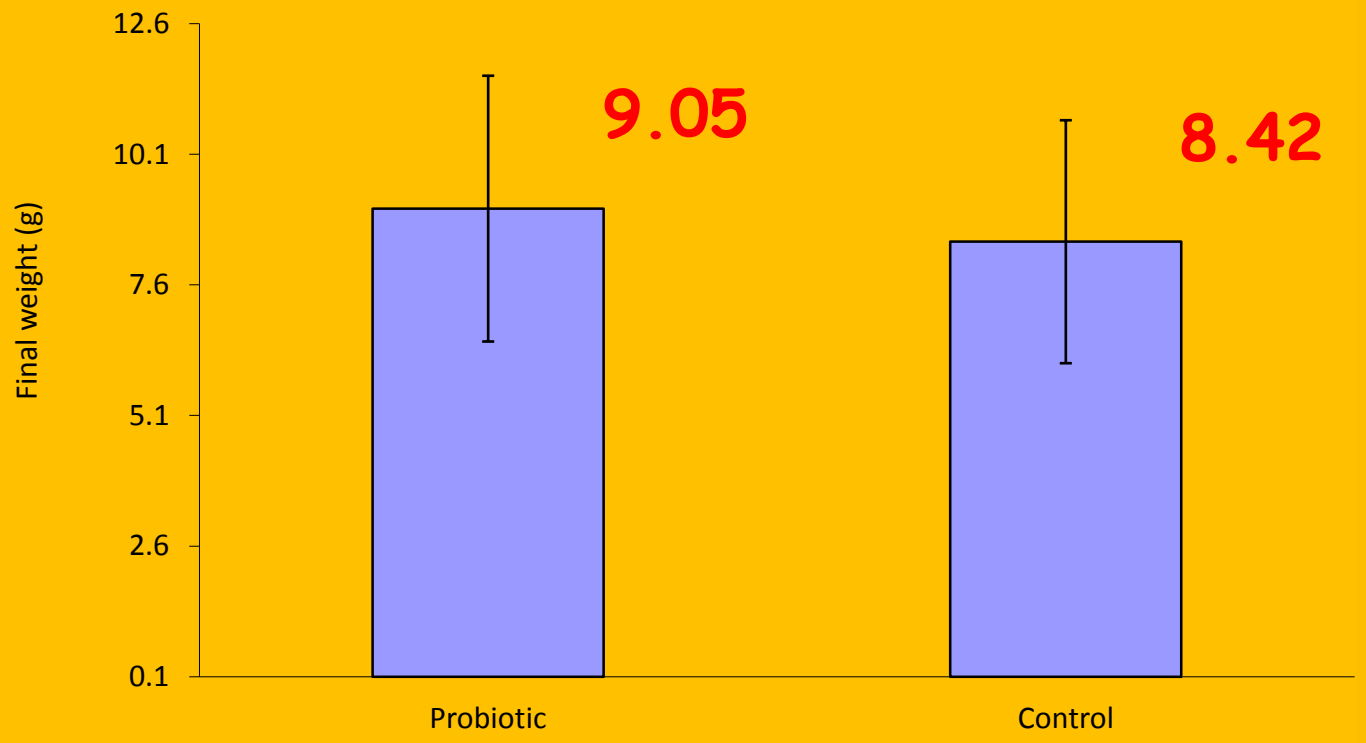
Imhoff



Turbidity

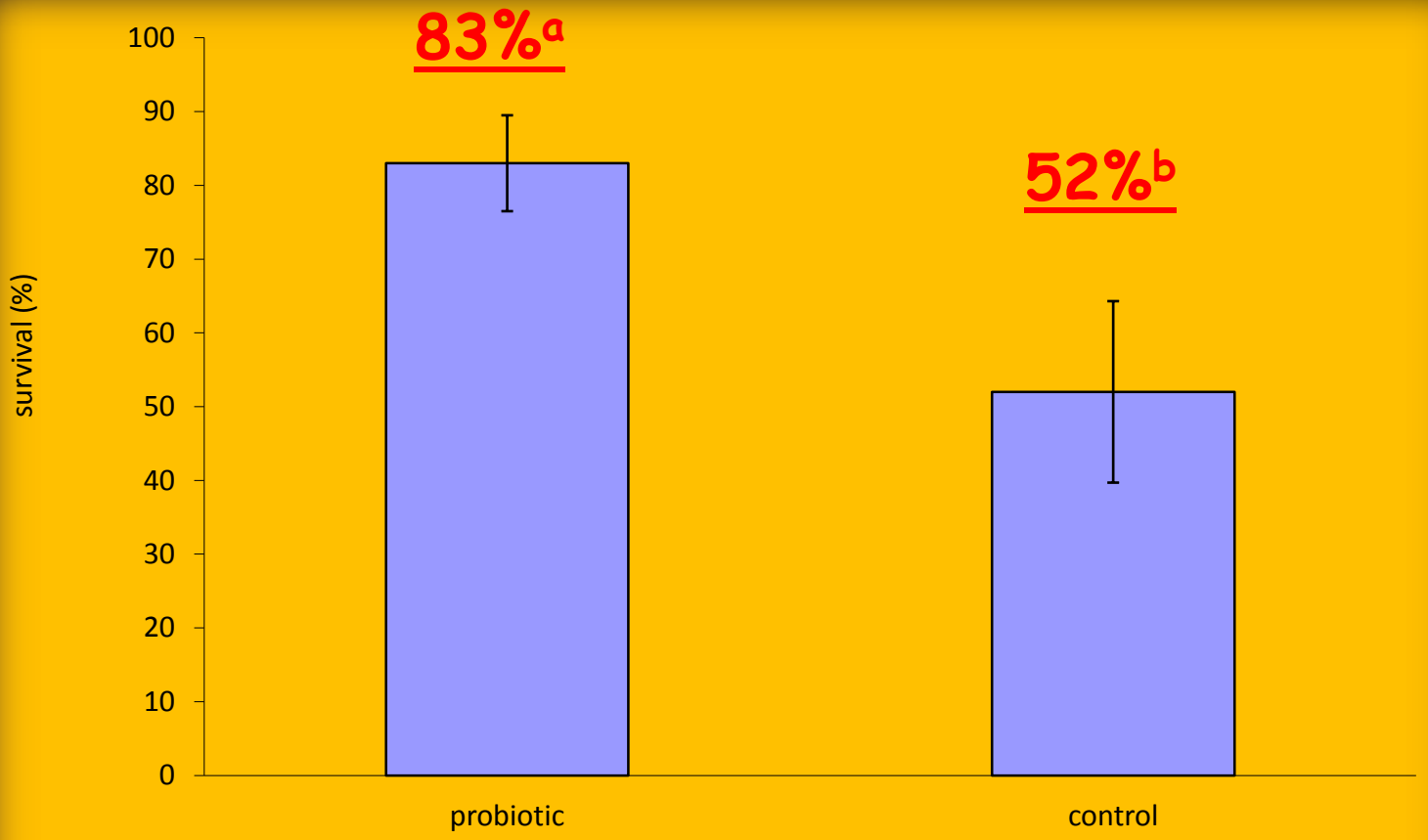


Final weight



no significant differences

Survival



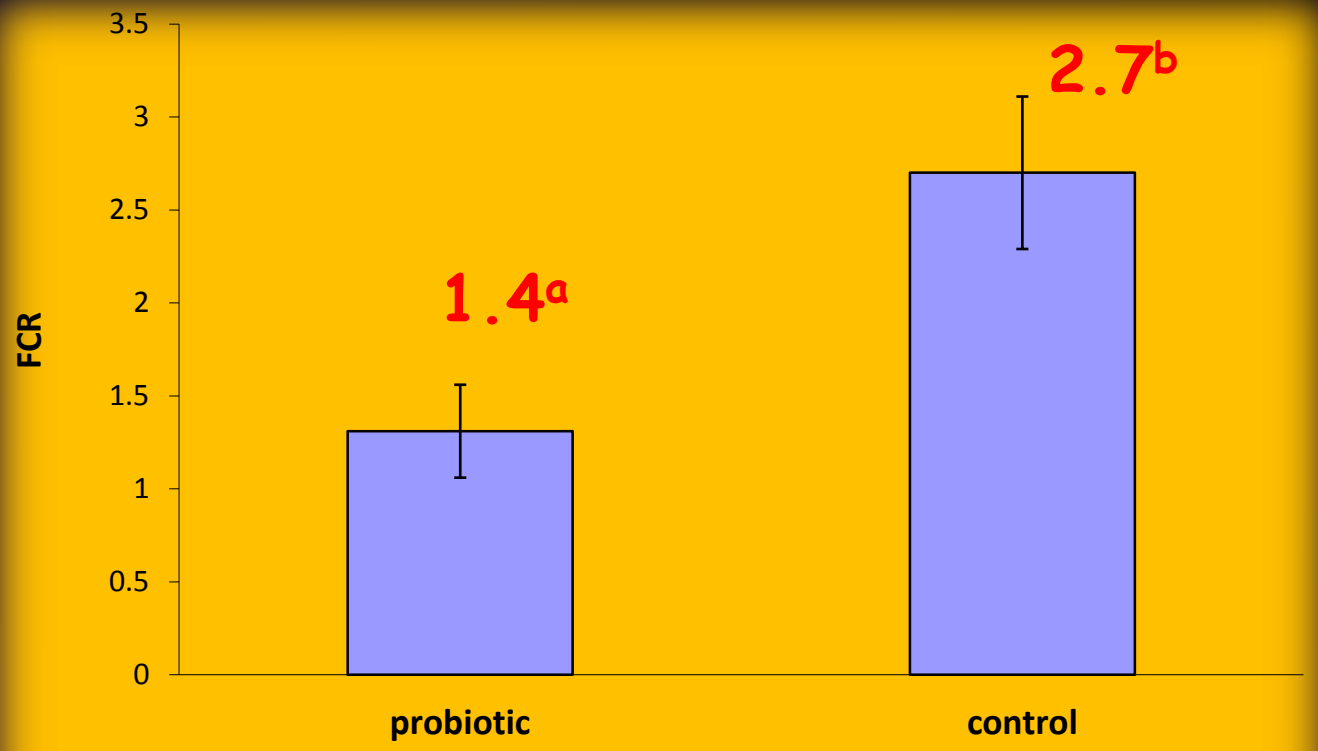
Survival was significantly higher in the probiotic treatment ($P<0.05$).

Final weight: 9.05 X 8.42

Survival: 83% X 52%

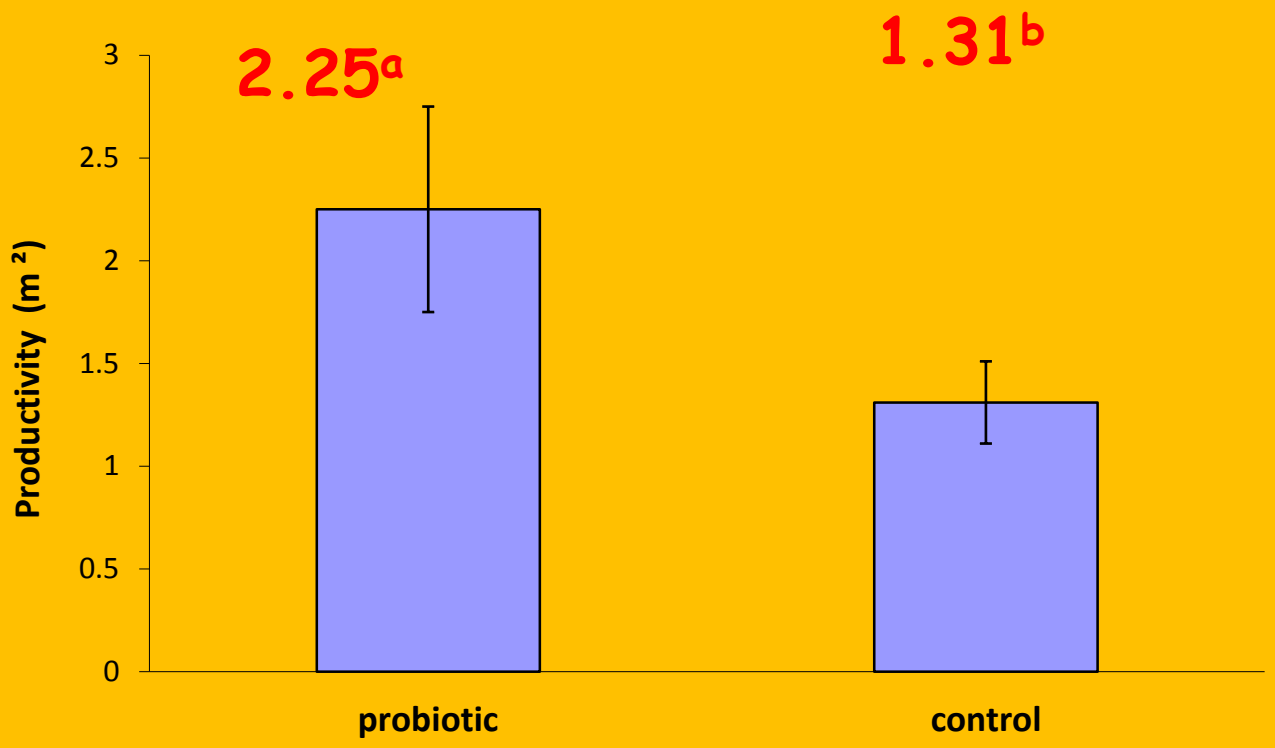
Even with a lower survival, which represents a lower density, shrimp treated with the probiotic had higher final weight

FCR



The FCR was significantly lower in the probiotic treatment ($P<0.05$).

Productivity (kg/m ^{2})



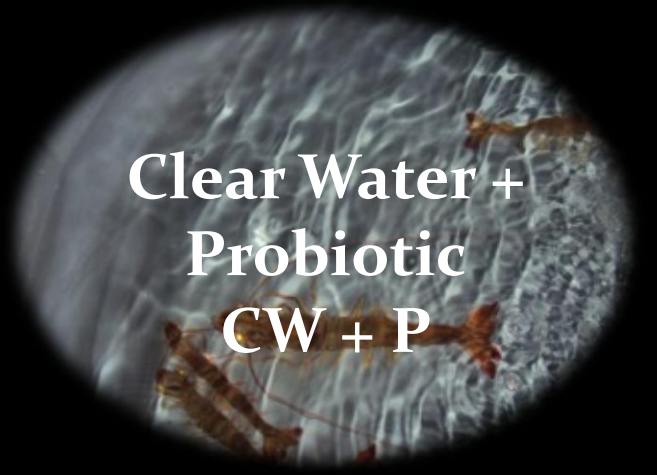
Productivity was significantly higher in the probiotic treatment ($P<0.05$).

Results show that the commercial probiotic used here controlled the *Vibrio parahaemolyticus* in a biofloc culture system and improved the overall productivity of the system.

Effect of probiotic in Vibrio infections in the culture of Litopenaeus vannamei (BFT system x Clear water)

Hostins et al, 2013

12 tanks 400 L
L. Vannamei juveniles 13,9 g
300 shrimps / m²
30 days

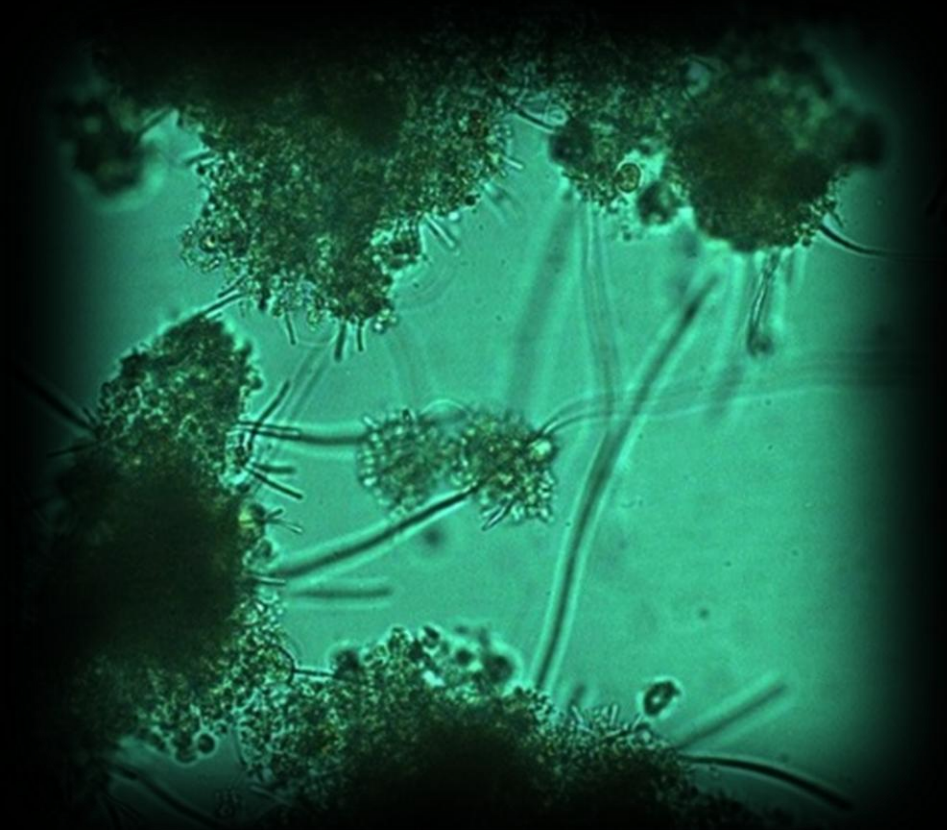


CONTROL

(Biofloc without probiotic)

X

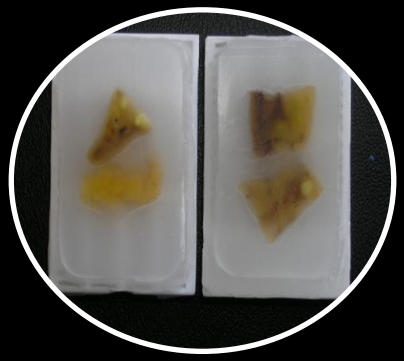
COMMERCIAL PROBIOTIC

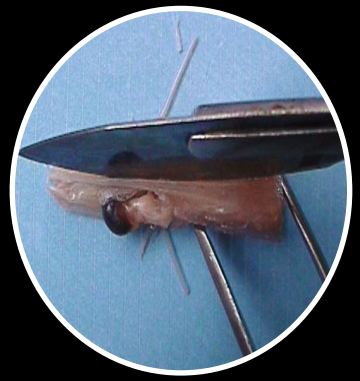


Multi-strain probiotic

- Added to the feed
- In the water

Histopathological Analysis





Results

Physical and chemical parameters

	BFT+P	BFT	CW + P	WC
T (°C)	26.08 ± 1.53	26.73 ± 1.35	25.94 ± 1.62	25.96 ± 1.39
DO (mg L^{-1})	6.01 ± 0.47	5.90 ± 0.41	6.17 ± 0.39	6.15 ± 0.34
pH	7.81 ± 0.28	7.87 ± 0.23	8.14 ± 0.15	8.14 ± 0.16
Salinity	32.4 ± 2.06	32.1 ± 2.03	31.2 ± 1.38	31.3 ± 1.35

No significant differences

Water Exchange

Physical and chemical parameters

	BFT+P	BFT	CW + P	CW
N-AT (mg L^{-1})	**0.19 ± 0.64^{a}**	**0.13 ± 0.47^{a}**	**1.67 ± 1.05^{b}**	**1.69 ± 0.98^{b}**
N- NO_2 (mg L^{-1})	**2.28 ± 3.37^{a}**	**1.87 ± 3.27^{a}**	**0.10 ± 0.05^{b}**	**0.16 ± 0.09^{b}**
N- NO_3 (mg L^{-1})	**53.80 ± 20.5^{a}**	**54.00 ±17.38^{a}**	**0.78 ± 1.42^{b}**	**0.50 ± 0.94^{b}**

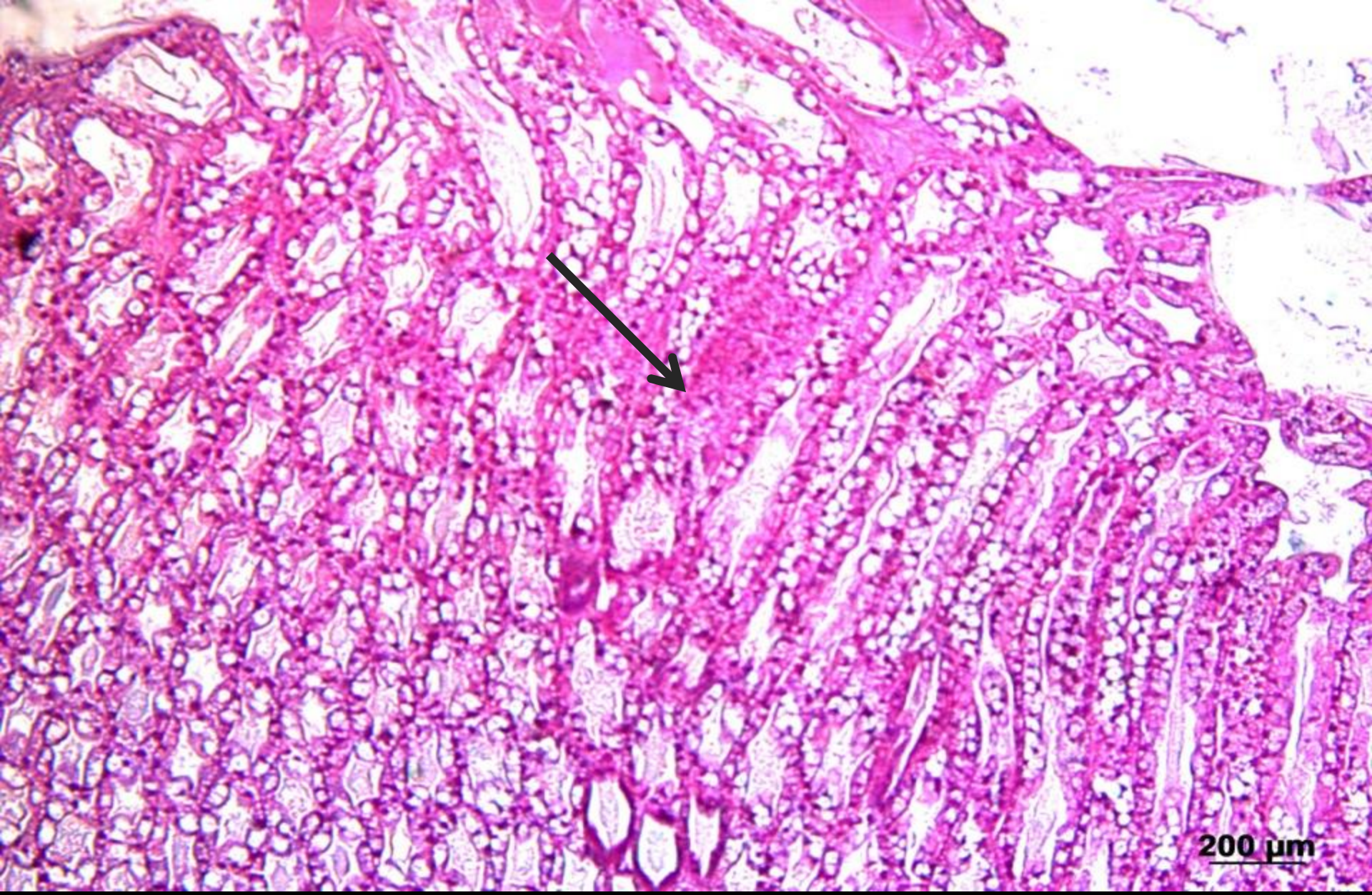
Old Biofloc

No significant differences

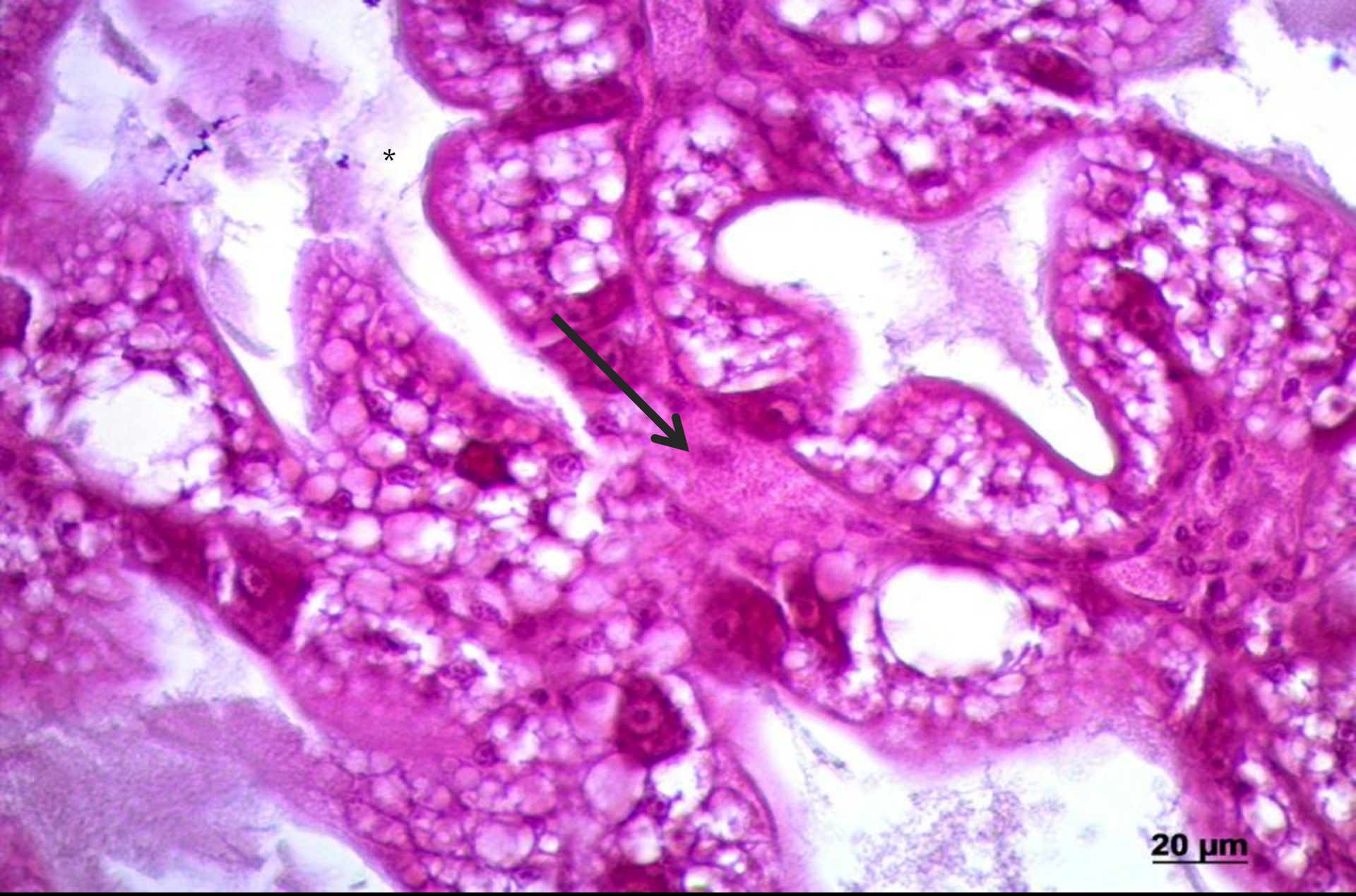
zootechnical parameters

	BFT + P	BFT	CW + P	CW
Initial weight	**13.90 ± 3.60**	**13.90 ± 3.60**	**13.90 ± 3.60**	**13.90 ± 3.60**
Final weight (g)	**17.75 ± 3.83^{a}**	**16.17 ± 3.73^{b}**	**16.71±3.59^{b}**	**16.23±3.68^{b}**
Weight Gain (g)	**5.24±0.53^{a}**	**3.67±0.18^{bc}**	**4.35±0.97^{ab}**	**2.80±0.44^{c}**
Biomass (g)	**1947.9±89.2^{a}**	**1479.7±101.8^{b}**	**1827.4±140.4^{a}**	**1444.5±44.2^{b}**
Survival (%)	**88 ± 4.19^{a}**	**73 ± 4.27^{b}**	**86±2.2^{a}**	**75 ± 3.93^{b}**

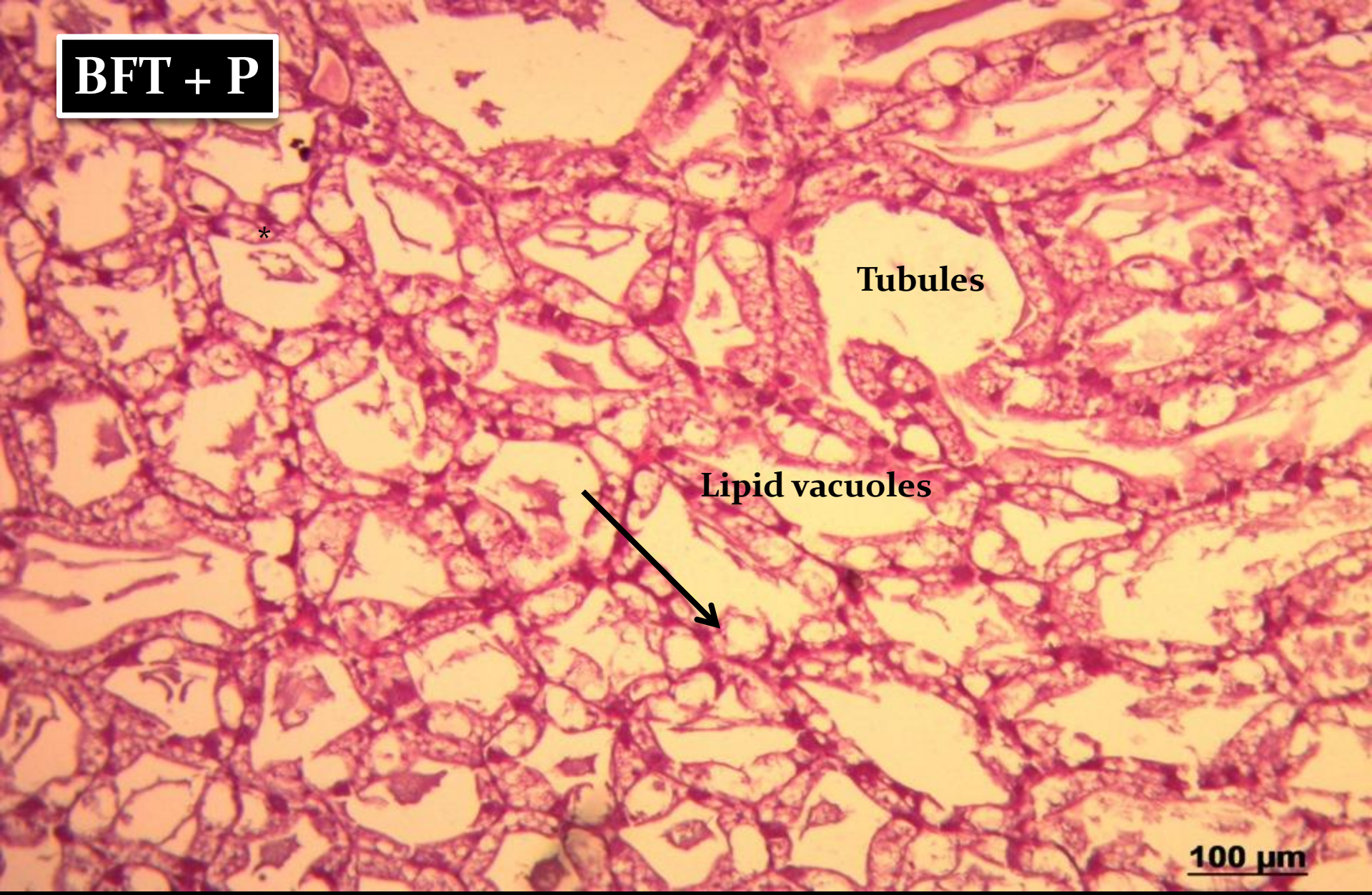
Better results in the treatments with probiotic



Initial sampling, Arrow indicates the hepatopancreas necrosis, evidence of vibrio infection (4x)

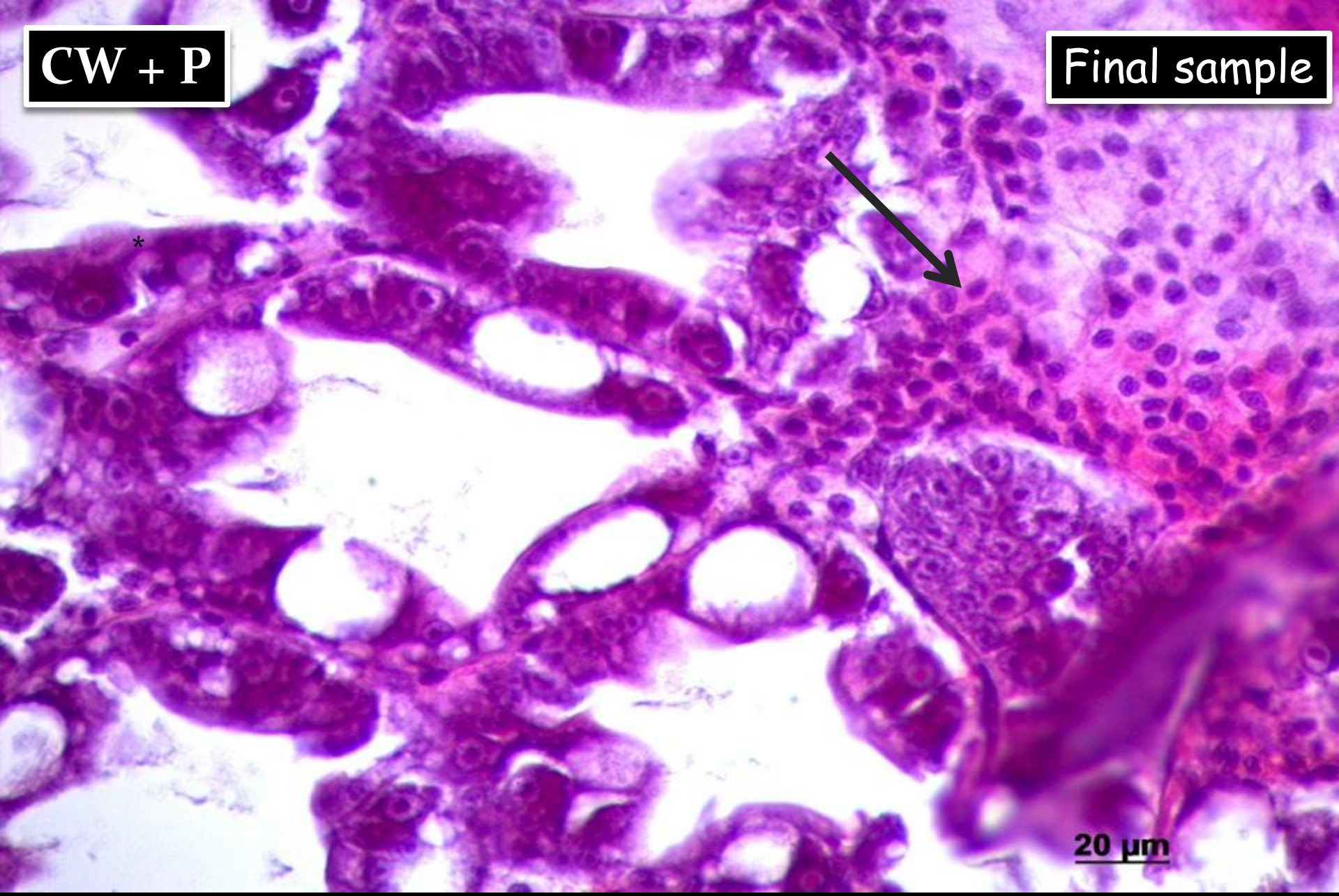


Arrow shows a colony of bacteria

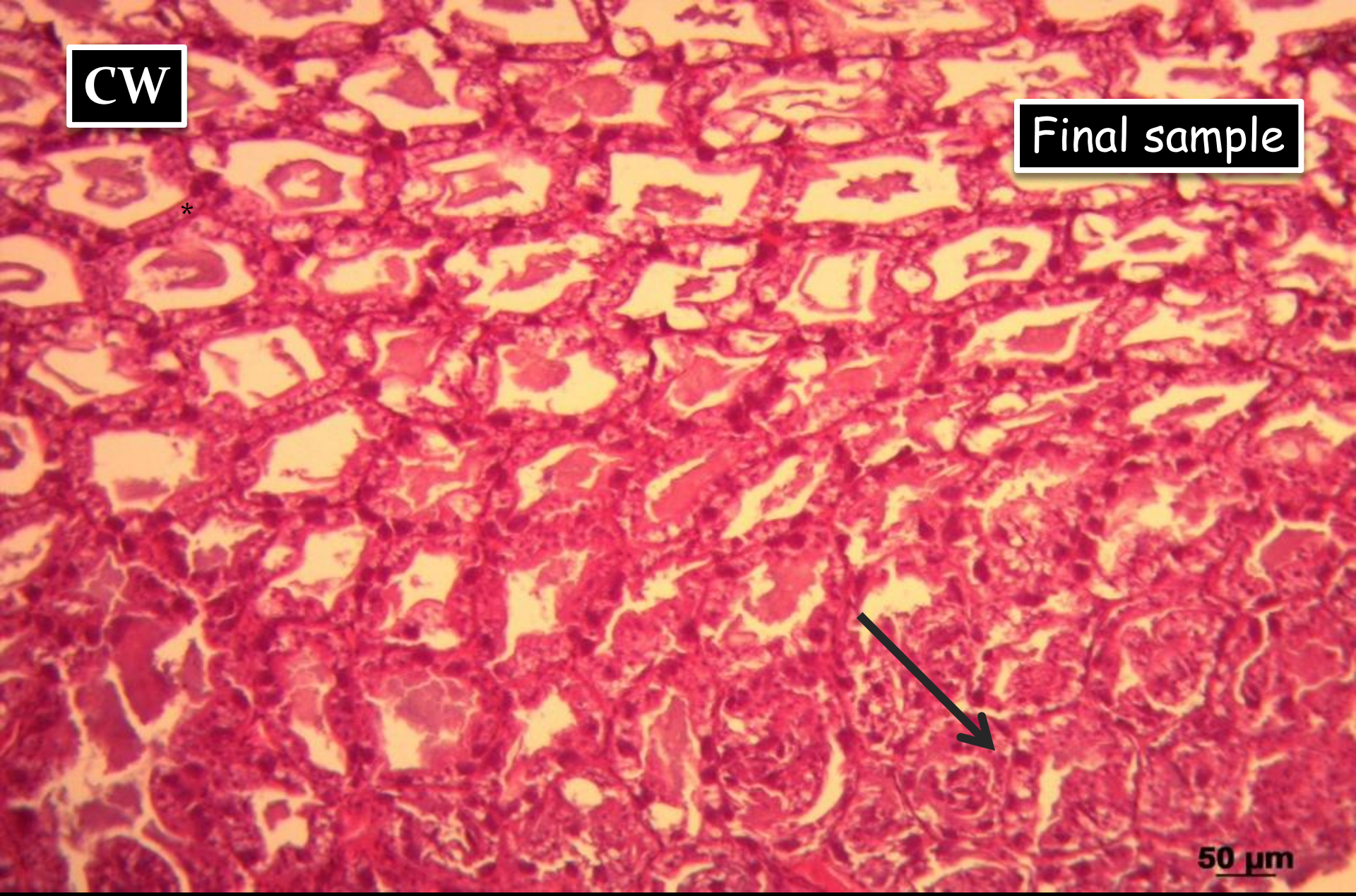


Final sample. Hepatopancreas healthy, with well formed tubules and lipid vacuoles (arrow) in good condition (10x).

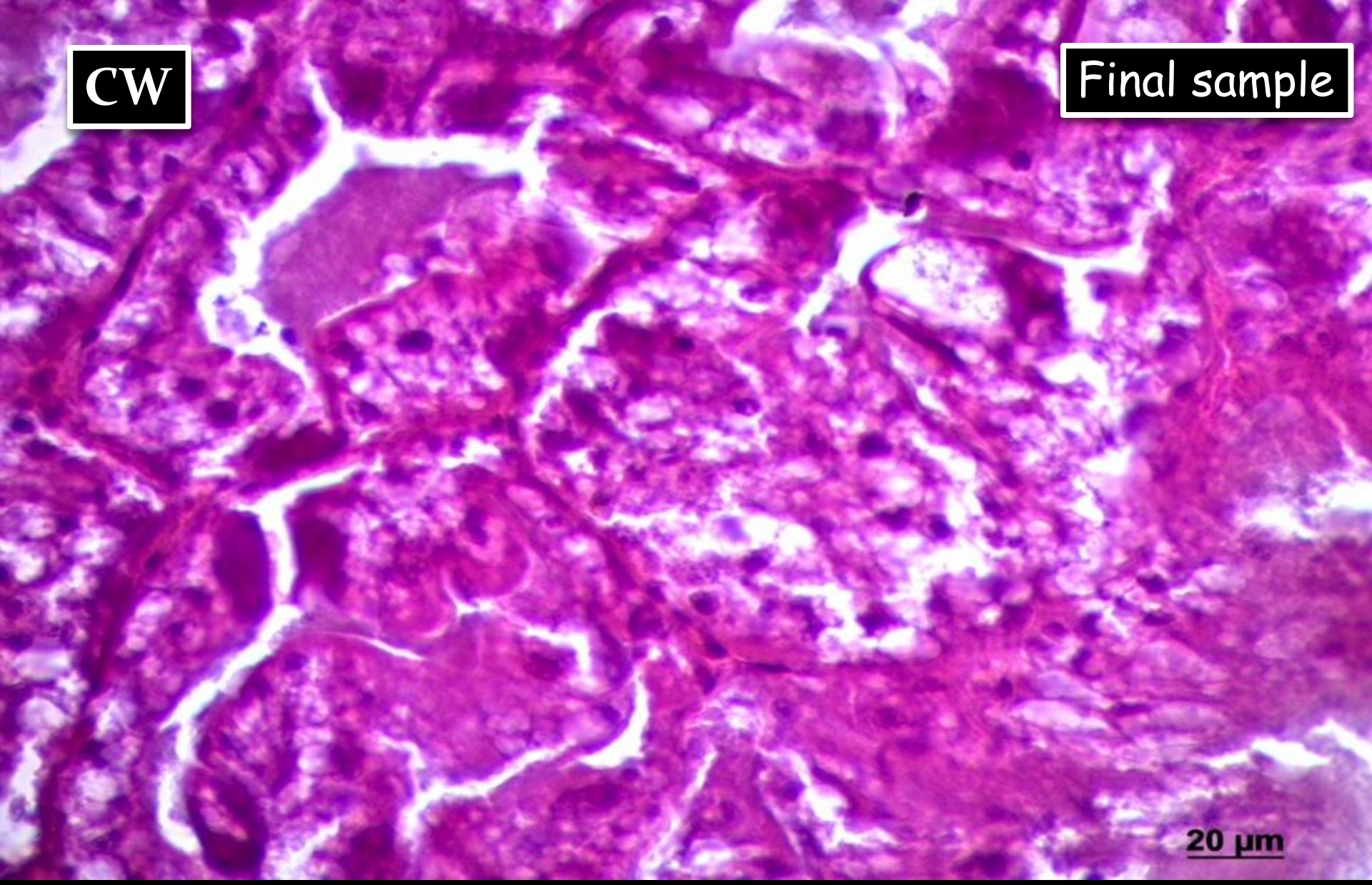

Final sample
200 µm



Region infiltrated hemocytes (arrow). This is indicative that there is a reaction of defense against infection. However necrosis is not observed (40x).



There lipids and observes a large amount of dead cells (arrow). The tubule wall is already collapsed. Indicates an advanced degree of infection (10x).



Same structure in larger increase. Tubules of the hepatopancreas collapsed and dead cells (40x).

CONCLUSIONS

- ✓ The use of probiotic contributes to the performance and survival of *L. Vannamei*
- ✓ Lesions caused by vibriosis in the hepatopancreas decreased
- ✓ The use of probiotic in BFT system provide the maintenance of the water quality, improved performance and increased disease resistance

ACKNOWLEDGMENTS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Thank you!