HEALTH AND REPRODUCTIVE QUALITY ANALYSIS OF TILAPIA *Oreochromis niloticus* (L., 1758) USING SHRIMP HEAD fIOUR ADDITIVE

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INTRODUCTION

- Reproductive quality is a crucial factor for ensuring sustainable tilapia production.
- The nutrition of broodstock, especially females, directly influences gonadal development and the transfer of biochemical reserves to oocytes, which determines the viability of eggs and larvae.
- The availability of proteins, lipids, and essential nutrients in the diet of broodstock influences larval quality.



Table 1. Shrimp Head Flour (SHF)

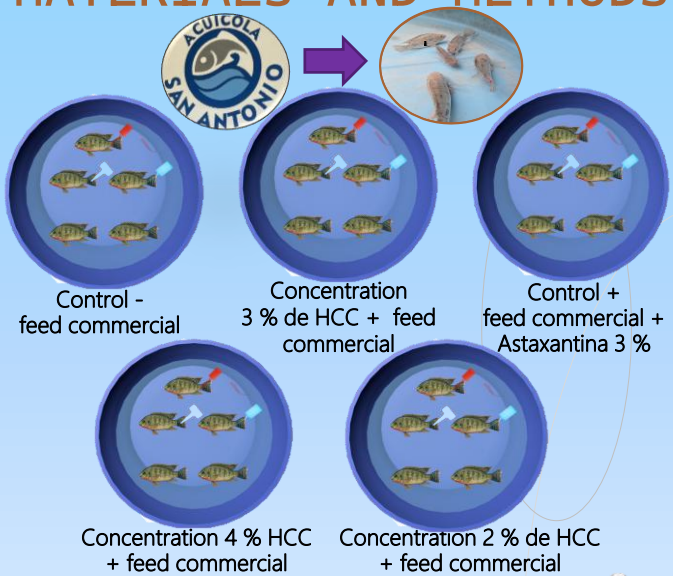


Components	Shrimp head by-product
Humedity	7.70 ± 0.03
Ash (%)	16.83 ± 0.29
Protein (%)	52.70 ± 2.05
Lipids (%)	11.88 ± 0.53
Total dietary fiber (%)	10.97 ± 0.07
Nitrogen free extract (NFE) (%)	7.61 ± 0.05

OBJETIVE

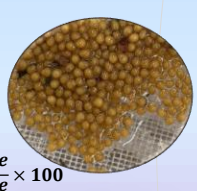
- Evaluate the health, reproductive and larval quality of tilapia (*O. niloticus*) in culture by adding shrimp head meal to the feed

MATERIALS AND METHODS





Incubate for 5 days (hatching and survival rate)





$$\%\ Survival = \frac{no.larvae\ live}{no.larvae\ live + dead\ larvae} \times 100$$

$$\%\ Hatching = \frac{Number\ of\ hatched\ eggs}{(total\ number\ of\ eggs - eggs\ without\ embryo)} \times 100$$

RESULTS AND DISCUSSION

Table 2 of physicochemical parameters, control (-): commercial feed, control (+): commercial feed + astaxanthin, SHF: shrimp head flour

PARAMETERS	TREATMENTS					
	Control (-)	Control (+)	SHF 2 %	SHF 3 %	SHF 4 %	
Temperature °C	25.25 ± 0.95	25.22 ± 0.99	25.16 ± 0.93	25.39 ± 0.89	24.82 ± 0.97	$P > 0.05$
pH	8.75 ± 0.09	8.63 ± 0.04	8.63 ± 0.05	8.74 ± 0.03	8.75 ± 0.04	$P > 0.05$
Oxigen (mg/L)	5.8 ± O.68	5.6 ± 0.82	5.8 ± 0.80	5.8 ± 0.68	5.8 ± 0.71	$P > 0.05$

Optimal temperature : 26°C
Tolerance range between 20.2°C y 31.7°C.

Dissolved oxygen optimum range between 4.86 mg/L y 10.53 mg/L

pH optimum range between 5.5 y 9.0

(Riche y Garling 2003; Martínez 2006; INAPESCA 2018; Emma *et al.*, 2025)

Table 3. Water quality control (-): commercial feed, control (+): commercial feed + astaxanthin, SHF: shrimp head flour

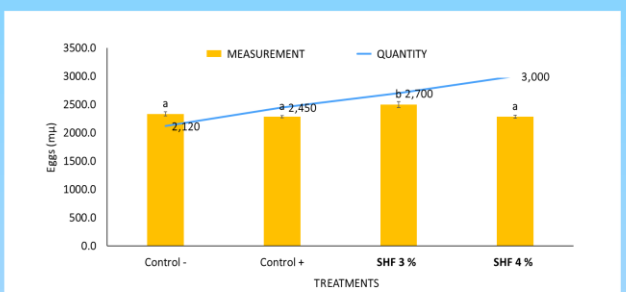
NUTRIENTS mg L^{-1}	TREATMENTS				
	CONTROL-	CONTROL+	SHF 2%	SHF 3%	SHF 4%
Nitrites	0.19 ± 0.01	0.28 ± 0.05	0.17 ± 0.00	0.32 ±0.03	0.29 ± 0.05
Nitrates	3.28 ± 0.06 ^{a}	3.426 ± 0.07 ^{a}	2.56 ± 0.19 ^{b}	2.10 ± 0.035 ^{b}	3.48 ± 0.29 ^{a}
Ammonium	0.4 ± 0.05	0.452 ± 0.06	0.33 ± 0.04	0.36 ± 0.043	0.42 ± 0.07

Tolerance 2.1 mg L^{-1} Ballarin y Haller, 1982

lower 10 mg L^{-1} Wicki,1997

Critic 0.6 a 2 mg L^{-1} Shelton y Popma, 2006

Production in tilapia (*O. niloticus*) eggs fed with control diets (control - and control +) and diets supplemented with shrimp head flour (3% SHF and 4% SHF)



Biochemical content (mean ± standard error mg g-1) in *O. niloticus* egg under different dietary treatments

BIOCHEMISTRY (mg g^{-1})	TREATMENTS			$P > 0.05$
	CONTROL-	CONTROL+	SHF2%	SHF4%
Protein	627 ± 8.27	653.8 ± 0.64	633.1 ± 0.00	657.18 ± 11.46
Lipids	82.61 ± 29.45	55.74 ± 0.92	54.14 ± 0.00	61.49 ± 4.39
Cholesterol	21.79 ± 0.14	22.33 ± 0.16	20.57 ± 0.00	22.56 ± 1.34
Triglycerides	59.52 ± 10.85	50.11 ± 7.35	57.67 ± 0.00	58.52 ± 0.50

Cuevas *et al.* (2017)
Protein: 721 ± 20.4 mg g^{-1}
Lipids: 165 .3 ± 7 mg g^{-1}

Lu y Takeuchi (2004)
Lipids: 30.1 mg g^{-1}

Larval survival percentage (%) of tilapia during five days in females under control conditions and different concentrations of shrimp head flour (SHF)

LARVAL SURVIVAL PERCENTAGE			
CONTROL-	CONTROL+	SHF 3%	SHF 4%
68.8	82.9	85.0	90.6
0.5 cm	0.8 cm	0.8 cm	1 cm



Cuevas *et al.* (2017)
Survival: 62%

CONCLUSIONS

- SHF in tilapia diets did not affect the physicochemical parameters of the water or the metabolic state of the broodstock, indicating that it is a safe additive.
- At the hematological level, changes in cell and nuclear size were observed, suggesting a physiological response to the protein and lipid content of SHF.
- Supplementation with 4% SHF promoted reproductive activity (more spawning), improved larval survival, demonstrating a positive effect on the transfer of biochemical reserves to the egg.
- This contributes to sustainability by repurposing shrimp byproducts and improving the reproductive efficiency of Nile tilapia (*O. niloticus*).