Lessons Learned from the Emergence of AHPND, EHP and White Feces Disease

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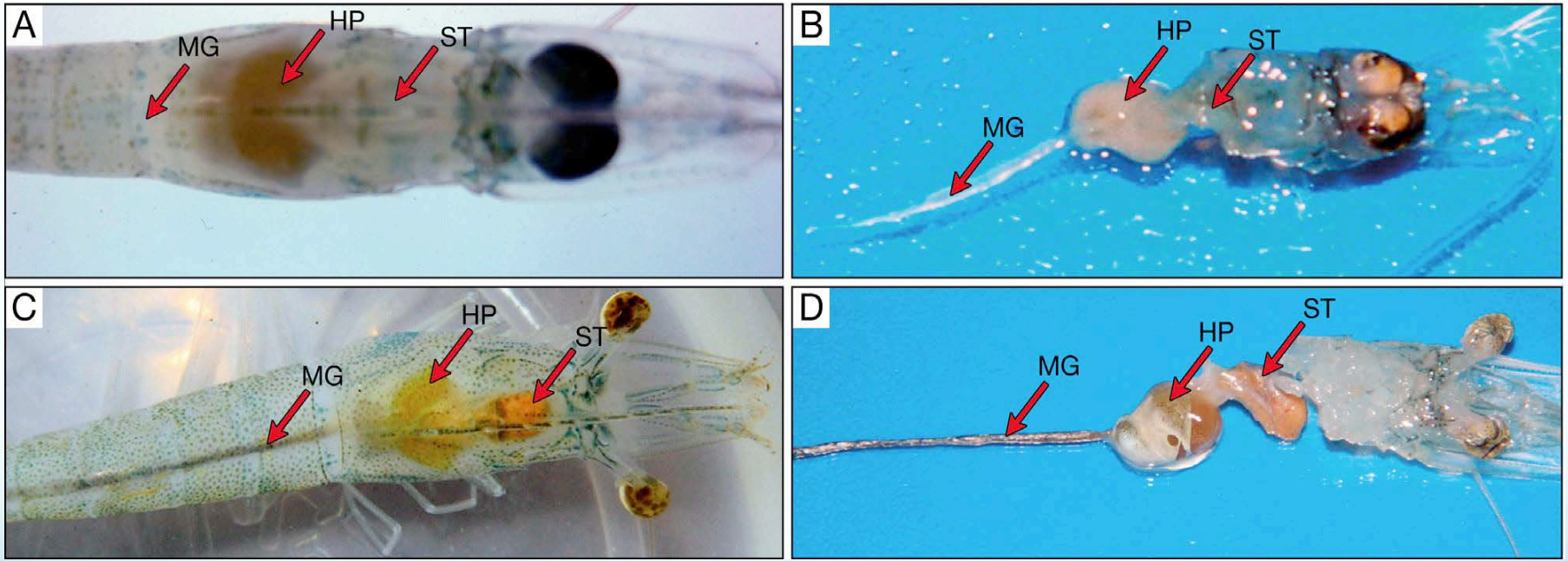
Some Updates

- Major challenges:
  - EMS/AHPND, WSSV, EHP, White Feces Disease, SHIV?
  - Antibiotics residue

EMS/AHPND



- Still a significant problem in Asia and some parts of LATAM
- Waste management, probiotics, microbiota management and prophylaxis seem to be the most common and effective measures

Enterocytozoon hepatopenaei
A growing issue

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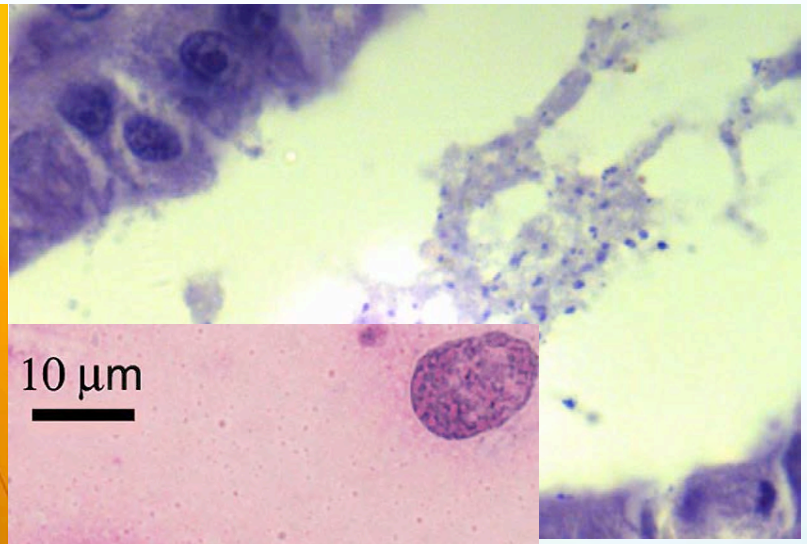
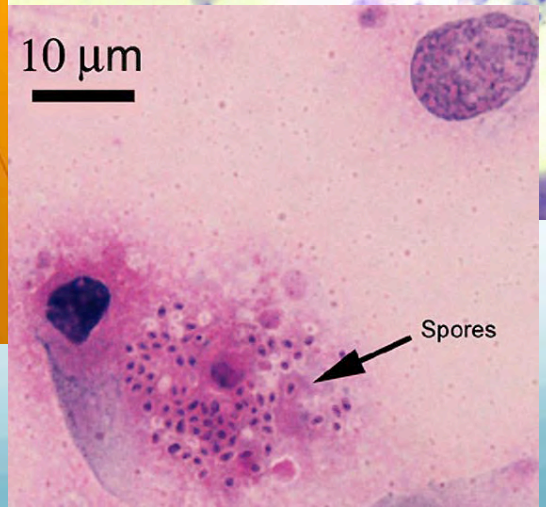




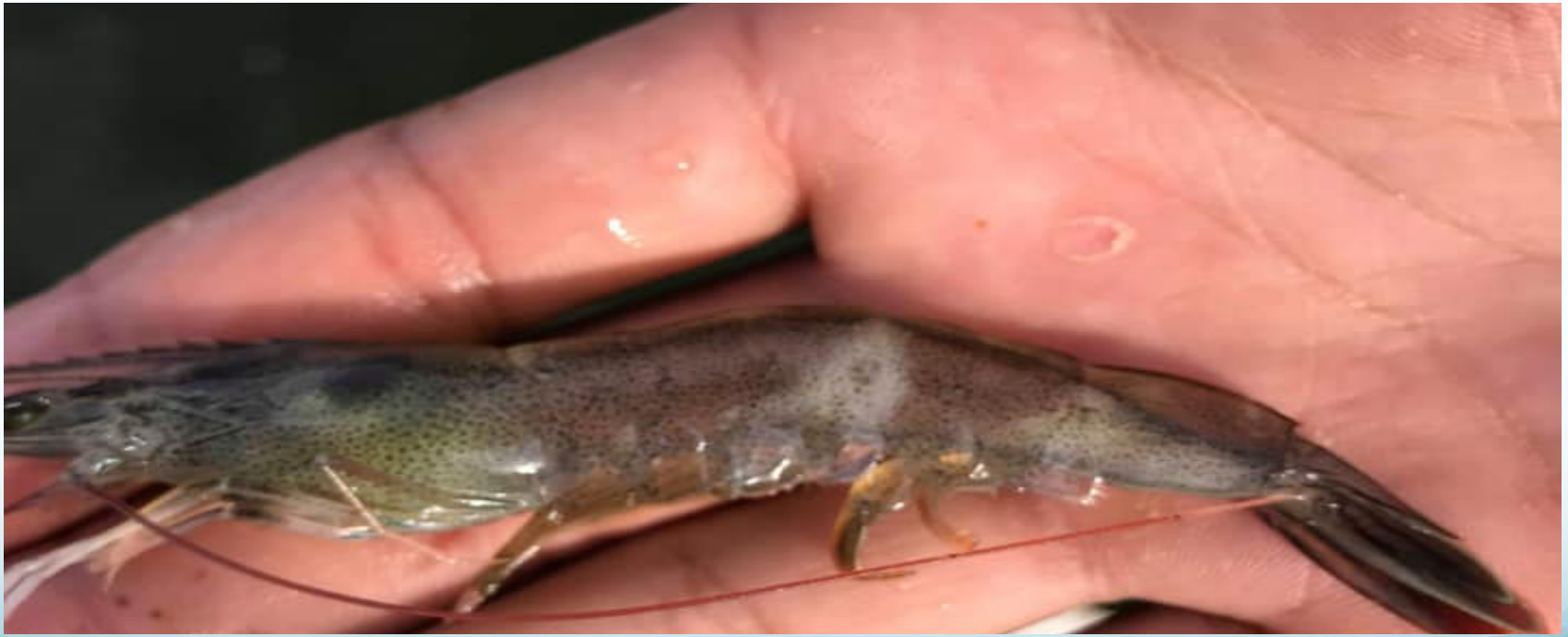
Transmission: In Hatcheries & Farms

- Negative control

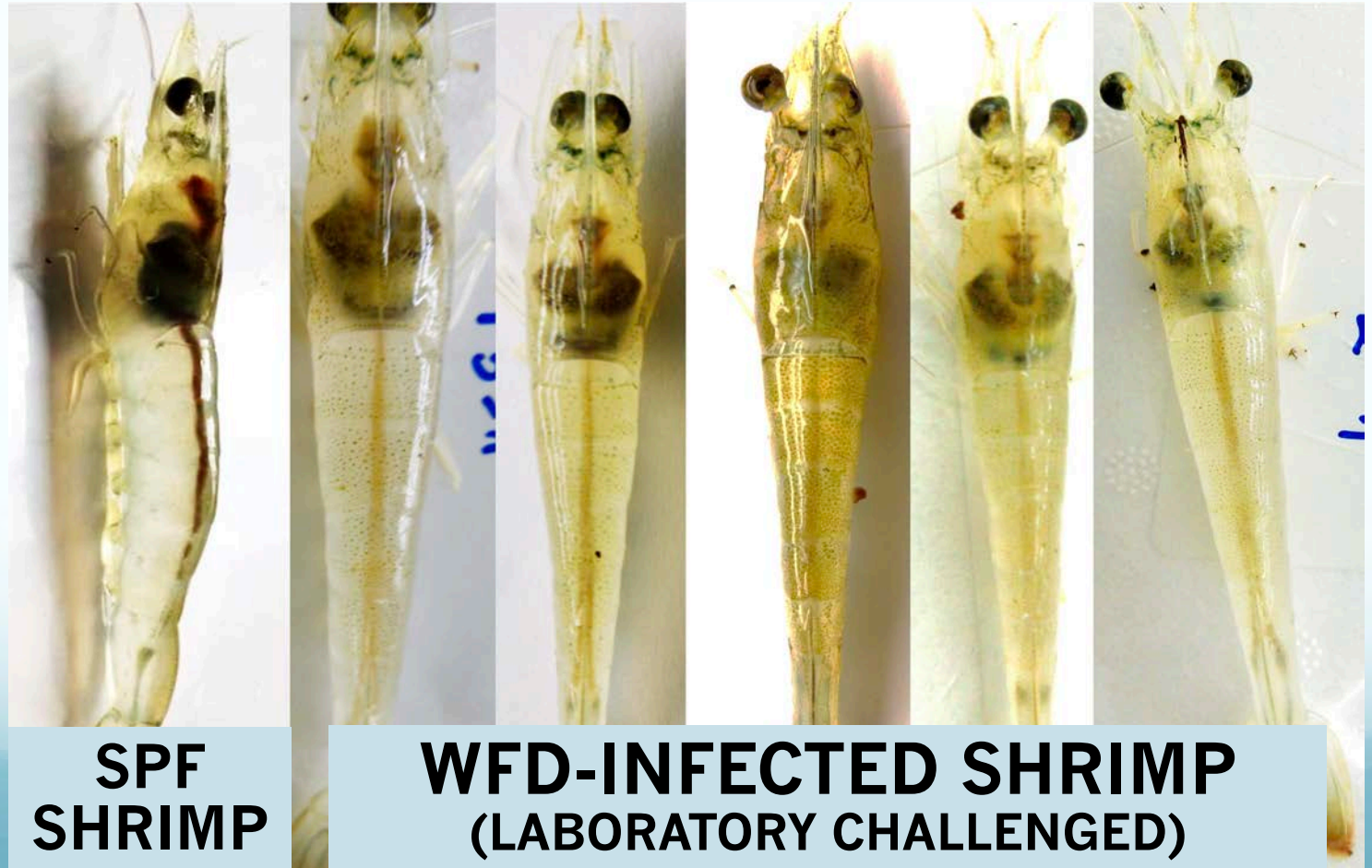
- EHP challenged

Bacterial infection

Vibrio harveyi infection



WFD: A Bacterial Issue



SPF SHRIMP

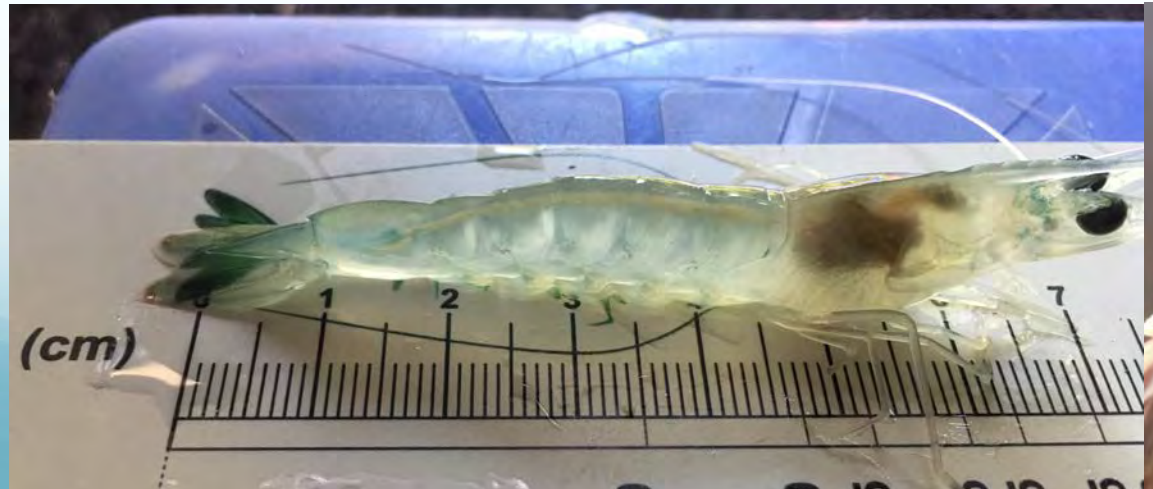
WFD-INFECTED SHRIMP
(LABORATORY CHALLENGED)

WFD: A Bacterial Issue

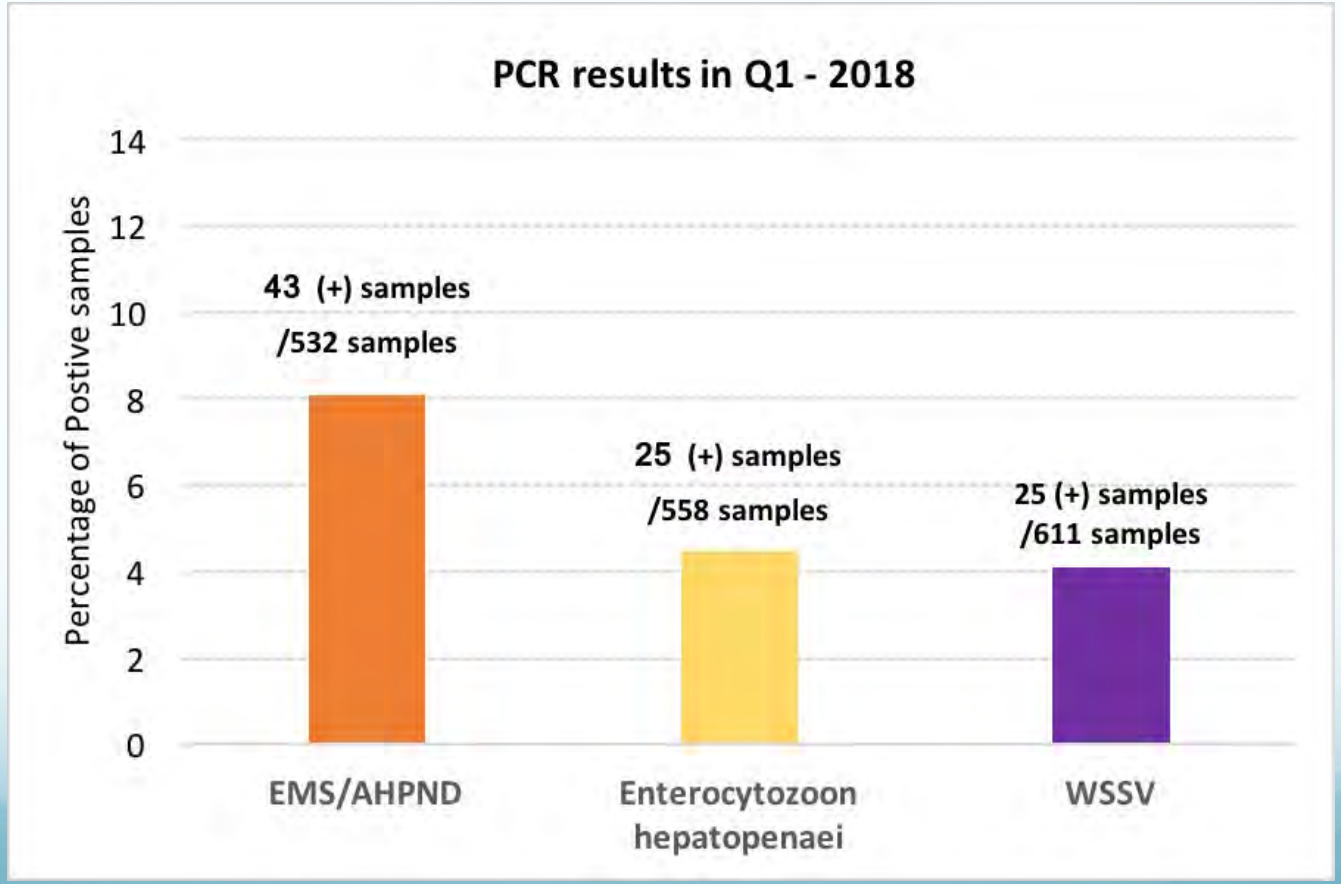
- White feces/white gut: Result of sloughing of HP microvili and cells
- Vibrio spp. were isolated from WFD infected animals
- Vibrio challenge using Vibrio isolates result in identical WFD observed in the field specimens

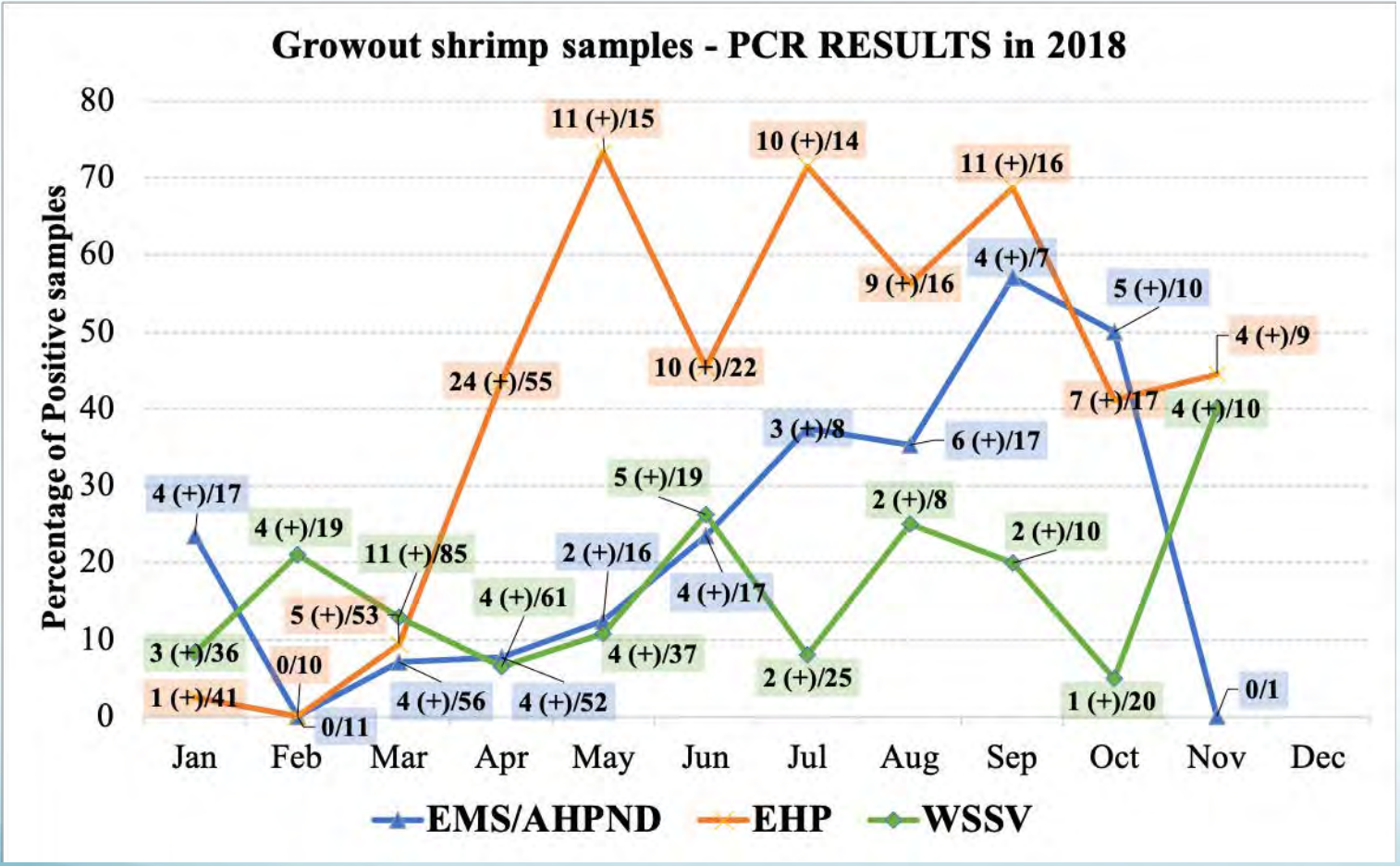
WFD–EHP: A Perfect Combo?

- Vibriosis is the primary agent of WFD (lab challenge)
- A pre-infection with EHP may increase the severity of WFD in a Vibrio challenge
- Similar phenomenon is observed in the field leading to two types of WFD: 1. Treatable (Vibriosis only), and un-treatable (Vibriosis + EHP)



Warning?


PCR results in Q1 - 2018
Percentage of Postive samples
14
12
10
8
6
4
2
0
43 (+) samples
/532 samples
25 (+) samples
/558 samples
25 (+) samples
/611 samples
EMS/AHPND
Enterocytozoon hepatopenaei
WSSV



Grow-out shrimp

EMS/AHPND: Early Mortality Syndrome/Acute Hepatopancreatic Necrosis Disease
EHP: *Enterocytozoon hepatopenaei* **WSSV:** *White Spot Syndrome Virus*

EHP Control in Practice

- EHP Control in hatcheries
  - Check all inputs (brood stock, brood stock feed) using PCR)
  - Sanitation, disinfection protocols: using NaOH, bleach, KMnO4
  - Treat brood stock live feed: freeze all live feed before feeding
  - **Test PLs using PCR**

EHP Control in Practice

- EHP Control in Shrimp Farm
  - Check all inputs (PL, pond sediments) using PCR).
  - Sanitation, disinfection protocols: bottom disinfection using CaO, bleach, KMnO4. Remove as much sediments between crops.
  - Growth monitoring every week. If ADG is below 0.2 must consider doing PCR test.

How to Manage EMS/AHPND & WFD

1. Clean PLs (checked for EMS/AHPND, EHP, WSSV)
2. Clean pond — clean water — clean PL
3. “Microbiota maturation”
4. Waste management: siphoning, probiotics, RAS, biofloc
5. Probiotics-fermented feed, prophylaxis/functional feed

EMS, WFD intervention

1. Reduce feeding (50%, 3-5 days)
2. Flush bottom waste, water exchange
3. Reduce algae density
4. Double probiotics/prophylaxis
5. Fermented feed

Soybean/corn protein concentrate fermentation

Fermentation of feed ingredients?

Feeding shrimp with fermented corn/soybean?

- Disrupt nutrients needed for Vibrio
- “Flush out” Vibrios in shrimp gut
- Provide an abundance of probiotics community and acidifiers

Anything wrong?

Potential threat of emerging pathogens?

- SHIV and CMNV?
- SHIV has been detected in cultured shrimp and imported unsafe polychaetes
- Mortalities in SHIV infected ponds usually happen in association with bad water quality and environmental conditions
- Challenge studies using SHIV infected tissues did not cause significant mortality

Take Home Messages

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⇒ **Antibiotics-free** shrimp farming is doable through out the culture cycle

⇒ **Functional diets, prophylaxis and fermented feed** have pretty good potentials in disease management

⇒ Shrimp farming will be more science-based, controlled, sustainable, more predictable, and more **cost effective**.

Thank you!

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