

Prawn Diagnosis Report

User Responses:

- 1) Is the growth rate good? => Yes
- 2) Is the food intake good? => Yes
- 3) Are the weather conditions good? => Yes
- 4) Is the pond affected by whitegutt previously? => Yes
- 5) Is the plankton growth more or optimal? => Yes
- 6) Are minerals provided 3-4 times every month? => Yes
- 7) Is the estimated count matched with manual count? => Yes
- 8) Are nearby ponds more affected by viruses? => Yes
- 9) Are prawns losing shell at the correct time? => Yes
- 10) Any shell loose cases in pond? => Yes

IoT Sensor Data:

pH: 8.1

TDS: 1200

Temperature: 28.5°C

Image Analysis:

Classification: Detected: Shrimp-disease

Confidence: 54.43%

Detected issues:

- Shrimp-disease: 2

AI Expert Analysis:

1. ANALYSIS OF PRAWN HEALTH:

* Overall Health Condition: The overall health condition is concerning. While many indicators (growth rate, food intake, weather, estimated vs. manual count, molting timing) are positive, the presence of "Shrimp-disease" detected in image analysis, coupled with a history of white gut disease (WGD) and loose shell cases, suggests a compromised health status and active disease pressure. The low confidence (54.4%) of the image analysis needs to be considered, but it cannot be ignored, especially with the corroborating questionnaire responses.

* Potential Disease Concerns: The primary concern is the generic "Shrimp-disease" identification. This is too broad to be actionable on its own. Given the history of WGD, the presence of loose shells, and nearby viral outbreaks, the following diseases are the *most likely* possibilities, and we must act as if they are present:

* **White Spot Syndrome Virus (WSSV):** This is a highly contagious and lethal viral disease. Loose shells can

be an early, subtle sign. The proximity of other affected ponds increases the risk significantly. WSSV often leads to rapid mortality.

* **White Gut Disease (WGD):** Although the questionnaire indicates a *previous* WGD issue, the current symptoms could indicate a recurrence. WGD is often associated with bacterial infections (e.g., *Vibrio* species) and can manifest as loose shells and digestive issues, even if food intake appears normal initially. The excessive plankton growth could be a contributing factor to poor water quality leading to stress, and to a resurgence of WGD.

* **Running Mortality Syndrome (RMS):** Loose shells can be associated with this condition and with heavy plankton blooms.

* **Early Mortality Syndrome (EMS) / Acute Hepatopancreatic Necrosis Disease (AHPND):** Although less likely given the good growth rate reported, EMS/AHPND should not be completely ruled out, especially if mortality begins to increase. It is caused by specific *Vibrio* strains.

* **Nutritional Status:** The nutritional status appears adequate based on reported good food intake and regular mineral supplementation. However, the disease state and potential stress could be impacting nutrient absorption and utilization.

* **Growth Assessment:** The reported good growth rate is a positive sign, but it doesn't preclude underlying disease. Early stages of some diseases might not immediately impact growth, or the impact may not yet be noticeable.

2. WATER QUALITY ASSESSMENT:

* **pH Status:** The pH of 8.1 is within the ideal range, but towards the higher end. This is acceptable, but monitoring for fluctuations is crucial.

* **TDS Evaluation:** The TDS of 1200 ppm is within the ideal range, indicating appropriate salinity.

* **Temperature Suitability:** The temperature of 28.5°C is within the ideal range and conducive to prawn growth.

* **Overall Water Quality Rating:** The water quality parameters, based solely on sensor readings, are *good*. However, the excessive plankton growth (Q5) is a significant concern. While plankton is essential, overgrowth can lead to oxygen depletion (especially at night), increased organic load, and an environment that favors pathogenic bacteria. This, coupled with the disease indicators, reduces the overall water quality rating to *fair but needing immediate improvement*.

3. DIAGNOSES & ISSUES:

1. **High Risk of Viral Infection (Most Severe):** Likely WSSV, given nearby outbreaks and loose shells. This requires immediate preventative and supportive measures.

2. **Probable Recurrence of White Gut Disease (WGD):** Likely bacterial (*Vibrio*) in nature, exacerbated by high plankton levels.

3. **Potential for RMS:** Loose shells and previous WGD can be associated with this condition.

4. **Stress and Immune Suppression:** Due to disease pressure, plankton bloom, and potential underlying infections.

5. **Excessive Plankton Growth:** Contributing to water quality deterioration and creating a favorable environment for pathogens.

4. DETAILED RECOMMENDATIONS:

Because we cannot definitively diagnose WSSV without lab testing (PCR), and because of the high risk and speed of its progression, we must act as if it *is* present, while simultaneously addressing the other likely issues. **Immediate action is critical.**

* **4.a. Medications and Treatments (prioritized):**

1. **VIRAL MANAGEMENT (Supportive - No Cure for WSSV):**

* **Immunostimulants:** Begin immediate administration of a high-quality, proven immunostimulant. Examples include:

* **?-glucan:** Administer via feed at a dosage of 2-5 g/kg of feed. This helps boost the prawns' non-specific immune response.

* **Levamisole:** Can be used, although its efficacy against viruses is debated. If using, administer via feed at 1-2g/Kg of feed, and only for a *short* period (3-5 days), followed by a withdrawal period. Monitor closely.

* **A commercially available immunostimulant blend**, specifically designed for shrimp, that includes ?-glucan, nucleotides, and vitamins. Follow the manufacturer's dosage instructions precisely.

2. **BACTERIAL INFECTION MANAGEMENT (WGD/Potential EMS):**

- Probiotics:** Administer high-quality, multi-strain probiotics containing *Bacillus* spp., *Lactobacillus* spp., and *Nitrosomonas* spp. and *Nitrobacter* spp. This helps restore gut health, outcompete pathogenic bacteria, and improve water quality. Dose: 5-10 g/kg of feed, continuously. Also, apply directly to the pond water according to the manufacturer's instructions (usually a separate dosage for water application).

- Oxytetracycline (OTC):** This is a broad-spectrum antibiotic, but it must be used with extreme caution due to the risk of antibiotic resistance. ONLY use if bacterial infection becomes severe and confirmed by a diagnostic lab. If required, administer via medicated feed at a dosage of 50-75 mg/kg of prawn body weight per day, for 7-10 days. Strictly adhere to withdrawal periods before harvest. This is a last resort. Focus on probiotics first.

- Herbal Extracts:** Certain herbal extracts, like those from garlic, turmeric, and neem, have shown antibacterial and immunostimulant properties. Consider adding a commercially available, shrimp-specific herbal supplement to the feed (follow manufacturer's instructions).

4.b. Water Quality Adjustments:

1. **Plankton Control:** This is crucial.

- Partial Water Exchange:** Conduct a 20-30% water exchange immediately, and then 10-15% daily for the next 5-7 days, to dilute the plankton bloom and remove excess organic matter. Ensure the incoming water is clean and disease-free (ideally treated).

- Reduce Feeding (Temporarily):** Reduce the feeding rate by 25-50% for 3-5 days to decrease nutrient input fueling the plankton. Gradually increase back to normal as the plankton bloom subsides.

- Apply Zeolite:** Zeolite is a mineral that helps absorb excess nutrients (ammonia, nitrates) and improve water clarity. Apply at a rate of 50-100 kg/hectare, depending on the severity of the bloom.

- Avoid using chemical algacides.** These can harm the prawns and disrupt the pond ecosystem.

2. **Oxygenation:**

- Increase Aeration:** Ensure aerators are functioning optimally and increase aeration time, especially during the night and early morning when oxygen levels are lowest.

- Emergency Aeration:** Have backup aeration systems (e.g., paddlewheel aerators) readily available in case of oxygen depletion.

4.c. Feeding Regime Modifications:

- As mentioned above, temporarily reduce feed to control plankton.

- Once the plankton bloom is under control, and if the prawns are actively feeding, switch to a high-quality feed formulated for disease resistance and immune support. This feed should contain higher levels of vitamins (especially Vitamin C), minerals, and immunostimulants.

4.d. Mineral/Supplement Recommendations:

- Continue the current mineral supplementation regime (3-4 times per month).

- Add Vitamin C supplementation to the feed (500-1000 mg/kg of feed) to support immune function.

4.e. Preventive Measures:

1. **Biosecurity:** Implement strict biosecurity protocols to prevent further disease introduction:

- Footbaths:** Disinfectant footbaths at all pond entrances.

- Equipment Disinfection:** Regularly disinfect all equipment (nets, buckets, etc.) used in the pond.

- Bird Control:** Implement measures to deter birds, which can carry pathogens.

- Water Source Control:** Ensure the water source is free from contamination. If possible, treat incoming water with chlorine (followed by dechlorination) or ozone.

- Quarantine:** Quarantine any new stock before introducing them to the main pond.

2. **Reduce Stress:** Minimize handling and other stressors.

5. **TIMELINE:**

- Expected Recovery Timeframe:** This is highly dependent on the specific disease(s) present and the severity. If WSSV is present and progresses rapidly, significant mortality can occur within days. If the interventions are successful in preventing WSSV and managing the bacterial infection, improvement in overall health could be seen within 1-2

weeks, but full recovery and return to optimal growth may take several weeks to months.

- * **Follow-up Steps and Monitoring:**

- * **Daily Monitoring:** Closely monitor prawns for any signs of disease (mortality, lethargy, abnormal behavior, lesions, loose shells). Record mortality rates daily.

- * **Water Quality Testing:** Test water parameters (pH, TDS, temperature, dissolved oxygen, ammonia, nitrite, nitrate) at least once daily, and more frequently if issues are detected.

- * **Plankton Monitoring:** Visually assess plankton levels daily.

- * **Microscopic Examination:** If possible, regularly collect prawn samples for microscopic examination of the hepatopancreas and gut to assess for signs of disease and monitor the effectiveness of treatments.

- * **PCR Testing:** If mortality increases or symptoms worsen, send samples to a diagnostic laboratory for PCR testing to confirm the presence of specific pathogens (especially WSSV).

- * **Adjust Treatments:** Be prepared to adjust treatments based on monitoring results and lab findings.

- * **Record Keeping:** Maintain detailed records of all observations, treatments, and water quality parameters.

This comprehensive plan prioritizes addressing the most immediate threat (potential WSSV) while simultaneously managing other likely issues. The success of this plan depends heavily on early intervention, diligent monitoring, and strict adherence to biosecurity protocols. Consulting with a local veterinarian or aquaculture pathologist is strongly recommended for ongoing support and guidance.