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Stress Management in
Aquaculture

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# Stress Management in Aquaculture

-Vijay Sundar Deva G
Assistant Product Manager - Blunova
Provet Pharma Pvt Ltd.

## Introduction

A significant component of the fish and shrimp-based protein that humans consume, especially in first world countries, is now provided by these activities. Fluctuating environmental factors and operational challenges can significantly stress shrimp, impacting their overall well-being, immune response and growth. By understanding the root causes and implementing effective mitigation techniques, we can pave the way for sustainable and successful shrimp farming practices.

Stress is **"a measurable alteration of a physiological steady state that is induced by an environmental change and that renders the individual more vulnerable to further environmental change."** Essentially anything, whether it is external or internal that disturbs the "normal" physiological balance can be stress.

## Stressors in aquaculture

1. Ammonia
2. Density
3. Dissolved oxygen
4. Heavy metals
5. Salinity fluctuations
6. Nitrate
7. pH fluctuations
8. Nutrition
9. Pesticide
10. Turbidity
11. Diseases
12. Temperature fluctuations
13. Handling

## How to control stress in shrimp farming

### 1. Immune Response

Managing stress effectively can have a significant positive impact on the shrimp's immune system. Stress often leads to the suppression of the immune system, making shrimp more vulnerable to diseases. When stress is minimized, the immune system can function at its best, allowing the shrimp to fight off diseases more efficiently.

### 2. Decreasing Susceptibility to Pathogens

Stressors like overcrowding, poor water quality, or insufficient oxygen levels can compromise the protective barriers of shrimp, making them more susceptible to pathogens. Effective stress management creates an environment where these barriers are strong, reducing the likelihood of pathogen entry and subsequent disease.

### 3. Nutrition

This is a complex issue as most dietary nutrient requirements are determined in the laboratory under stringent conditions that have nothing to do with the stressful world of the shrimp farm. Certainly, if deficiency symptoms are present below a certain level a nutrient, then the diet in the field must have at least these levels. Though higher levels may be required depending upon the cultural conditions. It is known that shrimp consume an average of around 60% of the feed that they are fed during their life cycles in a pond, with the amount likely varying with respect to the size of the animal, the size of the ponds, the densities of the animals in the ponds and the feeding strategy.

### 4. Optimal Energy Use

Under stress, shrimp tend to use more energy for survival responses (like rapid swimming or jumping), which takes away from the energy that could be used for growth. Effective stress management ensures that the energy is optimally distributed towards growth, moulting, and reproductive processes. This can be achieved by maintaining ideal water conditions, providing high-quality feed, and implementing proper aeration systems to ensure sufficient oxygen levels.

## Stress control solutions

- Maintaining water quality for shrimp
- Optimum stocking density
- Control Ammonia and Nitrate
- Maintain Biosecurity to reduce the Disease Outbreak

## Nutritional solutions for optimum shrimp health and manage stress

As diseases become prevalent and the culture become more susceptible to disease challenges like RMS and EMS the level of stress also increases significantly under disease conditions. Improves the conversion of Nauplii, Zoea, Mysis and Post larvae moulting and recovery. Health supplements like **Maxigro XL** that contains **Amino acids, minerals, immunostimulants, and antioxidants** are also designed to manage the various stress factors during culture.

## Conclusion

The key to the management of stress in farmed fish and shrimp is avoidance through the use of right animal husbandry techniques, optimization of animal genetic tolerances, appropriate nutritional and feeding strategies and the selective use of biologically active compounds to promote heightened immunity during times of stress.