**Challenging shrimp bacterial diseases with phytobiotics**

Whiteleg shrimp (Litopenaeus vannamei) is a highly valuable species in aquaculture, facing severe threats from emerging bacterial diseases, particularly acute hepatopancreatic necrosis (AHPND) posing a significant risk. Traditional reliance on antibiotics to combat this disease, although effective, raises concerns about antibiotic resistance. Dr Carla Hernández-Cabanyero and Dr Belén Fouz from the University of Valencia, Spain, have pioneered a One Health approach, introducing two cutting-edge phytobiotic-supplemented diets. This innovative approach not only holds promise for sustainably mitigating the impact of AHPND but also stands as a compelling step toward reducing antibiotic use.

**CURRENT CHALLENGES FOR SHRIMP BACTERIAL DISEASE**

The prevention and management of shrimp bacterial diseases, such as AHPND, is highly important in aquaculture. Typically, the current treatment practice for controlling them is based on antibiotic therapy, as vaccines are not a suitable option due to invertebrates having a primitive immune system. However, because of increasing resistance from *Vibrio parahaemolyticus*, emergence of antibiotic-resistant bacteria, alternative strategies that stimulate the shrimp’s innate immune response are critically needed. Moreover, regulations regarding the use of antibiotics are becoming more restrictive to address this growing public health concern.

In addition, climate change presents a real challenge to aquaculture, including rising ocean temperatures, ocean acidification, and changes in precipitation. These factors impact marine ecosystems, affecting shrimp farming, causing stress to the shrimp and disrupting their health. Ultimately, this contributes to an increase in their vulnerability.

**Immuno-stimulants into the diet to support the shrimp’s gut health and improve their resistance to bacterial diseases** (such as AHPND).

**PHYTOBIOTICS AS AN ALTERNATIVE FOR ANTIBIOTICS**

Phytobiotics are plant extracts that contain bioactive molecules, which are highly biodegradable, environmentally friendly, and cost-effective. They are a good candidate for addressing the impacts of AHPND in shrimp aquaculture, with added value in reducing the use of antibiotics and contributing to an environmentally sustainable shrimp farming. The researchers evaluated two phytobiotic additives in the form of essential oils from thyme and cinnamon, with promising results. These phytobiotics, when supplemented with essential oils, led to a lower percentage of animals carrying the bacteria. Once introduced, the diets supplemented with essential oils from thyme and cinnamon showed the best results, with the lowest percentage of carriers.

**THE ONE HEALTH APPROACH**

In an effort to manage AHPND sustainably, Dr Carla Hernández-Cabanyero and Dr Belén Fouz from the University of Valencia (Spain) and colleagues, formulated novel shrimp diets, supplemented with phytobiotics. The researchers evaluated two phytobiotics: thyme and cinnamon, with promising results. These phytobiotics, when supplemented with essential oils, led to a lower percentage of animals carrying the bacteria. Once introduced, the diets supplemented with essential oils from thyme and cinnamon showed the best results, with the lowest percentage of carriers.

**The prevention and management of shrimp bacterial diseases like AHPND is highly important in aquaculture.**

**FIGURE IMPLICATIONS**

The implementation of phytobiotic-supplemented feeds in shrimp aquaculture offers a promising solution for combating bacterial shrimp diseases without relying on antibiotic treatments. As AHPND and other bacterial diseases continue to pose a threat to shrimp aquaculture, functional
Phytobiotic-supplemented feeds in shrimp aquaculture offer a promising solution for controlling bacterial shrimp diseases without relying on antibiotic treatments.

The researchers’ strategy is also in line with current principles regarding sustainable, environmentally friendly, and economically viable aquaculture practices. Strategic implementation of diets supplemented with phytobiotics, during critical periods, such as after shrimp mortalities associated with stressful events, times at which the animals are more susceptible to disease. This would minimise the impacts of AHPPD and other diseases and reduce mortalities associated with these periods, thus reducing the economic losses to the shrimp farming industry caused by bacterial diseases.

In future applications in aquaculture, the administration of functional diets supplemented with phytobiotics presents a cost-effective and easily manageable strategy for minimising the impacts of these diseases, while also addressing increasing concerns regarding the emergence of antibiotic-resistant bacteria.

Moreover, by considering both animal and public health, the researchers have contributed to the One Health approach, seeking to minimise human, animal, and the environment.

Research Objectives

- **Bio**
  - Associate professor Belén Fouz is a microbiologist and expert in fish pathogen-vibrio vulnificus.
  - Dr Carla Hernández-Cabanyero obtained her PhD in biomedicine and biotechnology from the University of Valencia since 2004.
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  - Her research focuses on antibiotic-resistant bacteria.

- **Goal**
  - The researchers’ strategy is also in line with current principles regarding sustainable, environmentally friendly, and economically viable aquaculture practices.

- **Funding**
  - IDI-20200081 from Programa de Cooperación Tecnológica e Innovación (PCTI).

- **Collaborators**
  - Silvia Jiménez
  - Dr Anabel Forte
  - Dr Miguel Jover

- **References**

- **Personal Response**
  - How would you like to see your research applied in practice?
  - "We envision our research as a transformative, sustainable solution for controlling bacterial diseases, particularly AHPPD, in shrimp culture, addressing the urgent need for sustainable disease control strategies."

United Nations Sustainable Development Goals:

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  -zjNLQJDDhHIDQWSKSSuRDFK-HUQZQGDHJSDEQ7QHRoQJfvQ5QVXRQWRQQRQUHGFQOJQDQWLERLWFWHDQWQVW

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