Perspective

iMedPub Journals
www.imedpub.com

Insights in Aquaculture and Biotechnology

2023
Vol.7 No.2:52

Growth Performance and Mineral Composition of White Shrimp Key Factors for Sustainable Aquaculture

Mark Hamilton*

Department of Marine Biotechnology, Sultan Qaboos University , Al-khod, Oman

Corresponding author: Mark Hamilton, Department of Marine Biotechnology, Sultan Qaboos University , Al-khod, Oman, E-mail: markhamilton@gmail.com

Received date: May 02, 2023, Manuscript No. IPIAB-23-17312; **Editor assigned date:** May 04, 2023, PreQC No. IPIAB-23-17312 (PQ); **Reviewed date:** May 18, 2023, QC No. IPIAB-23-17312; **Revised date:** May 25, 2023, Manuscript No. IPIAB-23-17312 (R); **Published date:** June 01, 2023, DOI: 10.36648/Ipiab.7.2.52

Citation: Hamilton M (2023) Growth Performance and Mineral Composition of White Shrimp Key Factors for Sustainable Aquaculture. Insights Aquac Cult Biotechnol Vol.7 No. 2: 52.

Introduction

The white shrimp (Litopenaeus vannamei) is one of the most widely cultivated shrimp species globally, contributing significantly to the aquaculture industry. Understanding the growth performance and mineral composition of white shrimp is crucial for optimizing farming practices and ensuring the sustainability of shrimp production. This article explores the factors influencing growth performance, the importance of mineral composition, and the implications for sustainable aquaculture.

Integrated systems have been proposed as a sustainable solution to minimize the environmental impact of shrimp intensive aquaculture practices. The increasing demand for seafood is largely attributed to a growing need for healthy food recommended in a human balanced diet, but information on the nutritional quality of the resulting products is still scarce. In this study, a Co-culture System (CO) of white shrimp Penaeus vannamei and sea grape Caulerpa lentillifera were evaluated in 50-L tanks during 28-days. Water nutrients and mineral composition were measured every 4 days using spectrophotometry and ICP-AES, respectively. At the end of the experiment, growth performance of shrimp and seaweed, proximal composition of shrimp and mineral composition of shrimp and seaweed were evaluated. Shrimps in CO revealed a better final weight (15.4±0.02 g) and lower feed conversion rate (1.4) compared with monoculture system (13.5±0.4 g; 1.9). C. lentillifera, in the CO system, bioremediate 64.0% of ammonium, 62.5% of nitrite, 82.4% of nitrate and 53.3% of phosphate. Regarding minerals, there were less P, Ca, Mn, Fe and Zn in CO water than in shrimp monoculture water. Concerning products' compositions, in CO, sea grapes had higher protein content and shrimps revealed higher lipid content in muscle, lower whole-body cholesterol, higher concentrations in Fe (+70.2%), Zn (+14.8%), Co (+62.7%), Mn (+49.9%) and lower concentrations in Na (−13.7%). Thus, cultivating P. vannamei and C. lentillifera in a co-culture system led to an increase the nutritional value of aquaculture products and to improve their interest in a human healthy diet.

Feed Quality and Nutrition

The growth performance of white shrimp is closely tied to the quality of their feed and nutrition. A balanced diet containing essential nutrients, such as protein, lipids, vitamins, and minerals, is crucial for optimal growth and development. The formulation of shrimp feed must consider the specific nutritional requirements of white shrimp at different life stages, promoting healthy growth and minimizing the risk of nutritional deficiencies or imbalances.

Water quality parameters, including temperature, salinity, dissolved oxygen levels, and pH, significantly impact the growth performance of white shrimp. Maintaining suitable environmental conditions is essential for maximizing growth rates and ensuring overall well-being. Proper water management practices, such as regular monitoring and appropriate aeration, filtration, and water exchange, are crucial for maintaining optimal growth conditions for white shrimp.

Essential Minerals for Shrimp Growth

Minerals play a vital role in the growth, development, and physiological functions of white shrimp. Essential minerals, such as calcium, phosphorus, magnesium, potassium, and trace elements like zinc, iron, and copper, are required in appropriate quantities for proper skeletal formation, osmoregulation, enzyme activation, and other critical biological processes. Adequate mineral supplementation in the diet or water is essential to support the growth and overall health of white shrimp.

Mineral composition significantly influences the quality and integrity of the shrimp's exoskeleton. Calcium and phosphorus, in particular, are essential for proper shell formation and molting processes. Insufficient mineral intake can lead to weak shells, poor molting, and increased susceptibility to diseases and predation. Ensuring the availability of these minerals through the diet or water sources is crucial for maintaining the structural integrity and overall health of white shrimp.

Understanding the growth performance and mineral composition of white shrimp is essential for sustainable

aquaculture practices. By optimizing feed quality, nutrition, and water management, shrimp farmers can promote healthy growth rates and minimize the risk of nutritional deficiencies or imbalances. Adequate supplementation of essential minerals, particularly calcium and phosphorus, ensures proper shell formation and supports the molting process, contributing to the overall well-being of white shrimp.

To promote sustainable shrimp farming, continuous research efforts are necessary to refine feeding strategies, assess mineral requirements, and explore alternative feed sources. Furthermore, adopting environmentally friendly practices, such as efficient water management and responsible waste management, contributes to the long-term sustainability of white shrimp aquaculture. By prioritizing growth performance and maintaining the proper mineral composition, white shrimp farmers can enhance productivity, reduce environmental impacts, and contribute to the overall sustainability of the aquaculture industry. Through a holistic approach that combines sound management practices, scientific knowledge, and technological advancements, sustainable white shrimp farming can be achieved, ensuring a reliable and environmentally responsible source of this valuable seafood.

Yinchenhao decoction (YCHD) is a famous traditional Chinese medicine for improving hepatic metabolism disorder. The aim of this study was to investigate the effects of YCHD on lipid metabolism of juvenile largemouth bass fed on high-carbohydrate diet. Triplicate groups of fish (5.6±0.2 g) were fed six experimental diets (one low-carbohydrate diet and five high-carbohydrate diets with gradients YCHD) for 10 weeks. The results showed that appropriate YCHD administration reversed the adverse effects of high-carbohydrate diet on the growth performance. Meanwhile, YCHD decreased the depositions of hepatic T-CHO, TG and NEFA, and alleviated lipids deposition in a dose-dependent manner. Importantly, as the key energy regulating element, AMPK was significantly increased by YCHD, coupled with high expression of β-oxidation (PPARα and CPT1) and lipids transport (APoB100, MTP, PNPLA7 CD36, CETP and FABP1) genes. Furthermore, PI3K-AKT pathway was prominently suppressed by YCHD, and the expression of lipids synthesis-related genes (ACCA, FAS and SCD1) was notably down-regulated. Additionally, YCHD up-regulated the expression of glycogen metabolism-related genes (GSK3β, PGY and GSY). In summary, our results demonstrated that YCHD promoted lipids β-oxidation and transport, enhanced glucose metabolism and reduced lipids deposition, indicating its beneficial effects on juvenile largemouth bass fed on high-carbohydrate diet.