JOURNAL OF THE
WORLD AQUACULTURE SOCIETY

doi: 10.1111/jwas.12284

Dietary Supplementation with Butyrate and Polyhydroxybutyrate on the Performance of Pacific White Shrimp in Biofloc Systems

Bruno Corrêa da Silva[1]

Centro de Desenvolvimento em Aquicultura e Pesca, Empresa de Pesquisa Agropecuária e Extensão Rural de Santa Catarina (EPAGRI), Florianópolis, Santa Catarina 88010970, Brazil

Adolfo Jatobá and Delano Dias Schleder

Instituto Federal Catarinense (IFC), Campus Araquari, Araquari, Santa Catarina 89245-000, Brazil

Felipe do Nascimento Vieira, José Luiz Pedreira Mouriño, and Walter Quadros Seiffert

Departamento de Aquicultura, Laboratório de Camarões Marinhos, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina 88061600, Brazil

Abstract

This study aimed to evaluate the effects of dietary supplementation with sodium butyrate or polyhydroxybutyrate (PHB) on growth performance, as well as changes in intestinal microbiota and hemato-immunological parameters, of *Litopenaeus vannamei* reared under a superintensive biofloc system. Twelve 800-L tanks were each stocked with 250 shrimp/m^3 (3.96 ± 0.04 g mean initial weight) and reared over a 6-wk period. The basal diet and two test diets supplemented with 2% of each feed additive. At the conclusion of the growth trial shrimp fed with the butyrate-supplemented diet, as compared with the control shrimp, showed higher survival and productivity and lower total bacterial and Thiosulfate-citrate-bile salts-sucrose Agar (TCBS) counts in the intestine. However, no differences were observed in other performance parameters analyzed. Shrimp fed with both supplementation regimens also showed an increase in total and granular hemocytes, as well as an increase in serum agglutination titer. Shrimp offered diets supplemented with sodium butyrate had higher counts of hyaline cells. Thus, for *L. vannamei* reared in a superintensive biofloc system, it can be concluded that dietary supplementation of sodium butyrate, more so than PHB, acted as an immune system modulator by reducing the concentration of pathogenic bacteria in shrimp gut, thereby increasing survival and productivity.

Among the obstacles encountered by the shrimp farming industry, disease is the greatest. Particularly problematic are diseases of viral origin, such as white spot syndrome virus (WSSV), Taura syndrome virus (TSV), yellow head virus (YHV), and infectious myonecrosis virus (IMNV) (Lightner 2005). However, as first reported in 2009, acute hepatopancreatic necrosis syndrome caused by *Vibrio parahaemolyticus* is now responsible for major losses in marine shrimp production (Tran et al. 2013).

A common strategy to control bacterial diseases in shrimp farming is the prophylactic use of antibiotics. However, this approach tends to select resistant bacterial strains. Furthermore, antibiotic residues in shrimp muscle can be harmful to consumers; therefore, the marketing of such products is prohibited in many countries (Holmström et al. 2003; Cabello 2006). In this context, studies are essential to assess better biosafe growing systems for shrimp, such as the biofloc system (Wasielesky et al. 2006), and alternative disease prevention methods, such as dietary inclusion of organic acids and their salts (Lückstädt 2008; Defoirdt et al. 2011).

[1] Correspondence to: bcs85@hotmail.com