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Butyrate and propionate improve the growth performance of *Litopenaeus vannamei*

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ABSTRACT

Organic salts may improvement the animal performance, increasing the efficiency of nutrient utilization and modifying the intestinal microbiota. This study aimed to evaluate the effects of sodium butyrate and sodium propionate supplementation at different levels of dietary inclusions in the growth of *Litopenaeus vannamei*. In total, seven diets were evaluated: a control diet (without supplementation) and three diets from each sodium salt, propionate and butyrate, in concentrations of 0.5%, 1% and 2%. We used 21 tanks of 6000 L stocked with 150 shrimps (2.53 ± 0.03 g). The shrimps fed diets supplemented with propionate and butyrate, in all concentrations, increased their final weight. The feed efficiency, nitrogen retention, protein efficiency rate, survival and yield of shrimps fed the diet containing 2% butyrate were higher in comparison with control treatment. The shrimps supplemented with butyrate also showed lower counts of *Vibrio* sp. in the intestine. The shrimps fed the diet supplemented with butyrate and propionate also showed higher values of serum agglutination titre. Thus, it is possible to conclude that dietary supplementation with propionate and butyrate in different dietary concentrations modify the intestinal microbiota and improves the growth of *L. vannamei*.

Keywords: Pacific white shrimp, organic salts, zootechnical performance, intestinal microbiota, haemato-immunological parameters

Introduction

The need to increase global food production due to population growth and to greater aquaculture efficiency to produce protein results in the encouragement of aquaculture production (De Silva 2012). However, diseases are among the main problems in the development of aquaculture. The emergence of new diseases caused by enterobacteria, such as acute hepatopancreatic necrosis syndrome in Asia (Tran, Nunan, Redman, Mohney, Pantoja, Fitzsimmons & Lightner 2013) and Mexico (F. Magallon-Barajas, pers. comm.), is causing high mortalities in commercial crops and consequently large economic losses in carciniculture.

Furthermore, the inappropriate use of antibiotics in aquaculture, selecting more resistant pathogen strains, and the restrictions and bans of their use in production of animals have increased the search for feed additives. These additives are known as non-antibiotic growth promoters that improve the health and nutrition of aquatic organisms (Defoirdt, Sorgeloos & Bossier 2011). In this context, studies on organic acids and their salts have called the attention for their results (Ng & Koh 2011).

Organic acids and their salts affect the growth performance of aquatic animals through distinct mechanisms. In the diet, they act as preserving agents, inhibiting microbial growth and diminishing a possible intake of pathogenic organisms (Lückstädt 2008). In the intestinal tract, they inhibit the growth of pathogenic bacteria; they may modify intestinal microbiota (Defoirdt, Boon, Sorgeloos, Verstraete & Bossier 2009; Schryver, Sinha, Kunwar, Baruah, Verstraete, Boon, Boeck

