INTRODUCTION

The preventive use of antibiotics for the control of bacterioses in aquaculture has led to the development of resistant bacteria and, consequently, to the reduction in their effectiveness for the treatment of bacterial diseases (Defoirdt, Sorgeloos, & Bossier, 2011). The use of disease control additives, such as salts of organic acids and essential oils, has been extensively studied in recent years to reduce the prophylactic use of antibiotics in aquaculture (Koh et al., 2016). In addition, there is evidence indicating a possible transfer of antibiotic resistance genes from bacteria in the farming environment to human pathogens (Olson & Dinerstein, 2005; Poirel, Cattoir, & Nordmann, 2012; Watts, Schreier, Lanska, & Hale, 2017). Organic acids are compounds with one or more carboxylic groups (–COOH) in their structure (Koh et al., 2016). There are three classes of organic acids. The short chain organic acids, which act to reduce the pH of the diet and also as a source of energy, include...