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Growth and performance of the whiteleg shrimp *Penaeus vannamei* (Boone) cultured in low-salinity water with different stocking densities and acclimation times

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Abstract

We evaluated the performance of whiteleg shrimp *Penaeus vannamei* (Boone, 1931) in response to different stocking densities and acclimation periods. Shrimp postlarvae were acclimated from seawater (30 g L^{-1}) to low-salinity well water (< 1.0 g L^{-1}) at a constant hourly reduction rate of 40, 60, 80 and 100 h. After acclimation to low-salinity well water, postlarvae from each acclimation time treatment were stocked in three replicate tanks at densities of 50, 100, 150 or 200 shrimps m^{-2} for 12 weeks of growth. Salinity averaged < 1.0 g L^{-1} for each growth study. The different treatments resulted in significant differences in both the final body weight and the survival rate (SR). Shrimp acclimated for 100 h showed substantially improved survival (83%) relative to shrimp acclimated for shorter periods. Shrimp yields for all cultured periods ranged from 0.32 kg m^{-2} in tanks stocked at 50 m^{-2} to 1.14 kg m^{-2} in tanks stocked at 200 m^{-2}. We conclude that whiteleg shrimp can be successfully grown in low-salinity well water, and that the growth, production output and SRs are significantly higher when shrimp are acclimated for longer periods.

Keywords: growth, performance, *Penaeus vannamei* (Boone, 1931), acclimation, low-salinity water

Introduction

Efforts have been made recently to culture marine shrimp in low-salinity (< 5 g L^{-1}) and zero water exchange culture systems. Inland aquaculture using low-salinity well-derived water has been proposed as an advantageous and viable solution for the culture of several species. As an alternative to traditional coastal aquaculture, this system reduces the costs associated with pumping and water usage while simultaneously minimizing the introduction of pathogens into culture systems (González-Félix, Gomez-Jimenez, Perez-Velazquez, Davis & Velazco-Rameños 2007).

Shrimp farmers using inland low-salinity water (< 5 g L^{-1} or less) obtained excellent survival rates (SR) when shrimp postlarvae were acclimated to low-salinity water before transfer to production ponds (Samocha, Hamper, Emberson, Davis, McIntosh, Lawrence & Van Wyk 2002). Successful acclimation of postlarve whiteleg shrimp may be affected by age (Laramore, Laramore & Scarpa 2001; McGraw, Davis,Teichert-Coddington & Rouse 2002) and the ionic composition of the water (Davis, Saoud, McGraw & Rouse 2002), as well as genetic differences (Chim, Bouveret, Lemaire & Marti 2003). Survival rates of low-salinity-acclimated shrimp are increased when the acclimation time is increased from 48 to 72 h or when a habituation period of 2 days is provided after