Received: 18 November 2015 | Accepted: 19 April 2016

DOI: 10.1111/anu.12458

WILEY Aquaculture Nutrition

ORIGINAL ARTICLE

Autochthonous probiotic *Lactobacillus* sp. in the diet of bullfrog tadpoles *Lithobates catesbeianus* improves weight gain, feed conversion and gut microbiota

S.A. Pereira[1] | G.T. Jerônimo[2] | N. da Costa Marchiori[3] | H.M. de Oliveira[1] | M.S. Owatari[1] | G.F.A. Jesus[1] | P. Garcia[1] | F. do Nascimento Vieira[4] | M.L. Martins[1] | J.L.P. Mouriño[1]

[1]Aquaculture Department, AQUOS – Aquatic Organisms Health Laboratory, Federal University of Santa Catarina (UFSC), Florianópolis, Santa Catarina, Brazil

[2]Laboratory of Aquatic Organisms Health, Postgraduate Programme in Aquaculture, Nilton Lins University/National Institute of Amazon Research (INPA), Manaus, Amazônia, Brazil

[3]Empresa de Pesquisa Agropecuária e Extensão Rural (EPAGRI), Camboriú, Santa Catarina, Brazil

[4]Aquaculture Department, Marine Shrimp Laboratory, Federal University of Santa Catarina (UFSC), Florianópolis, Santa Catarina, Brazil

Correspondence
Scheila Anelise Pereira, Aquaculture Department, AQUOS – Aquatic Organisms Health Laboratory, Federal University of Santa Catarina (UFSC), Florianópolis, Santa Catarina, Brazil.
Email: schepereira@gmail.com

Abstract

Dietary supplementation with probiotics in animal production is an alternative to antibiotics. In frog culture, studies involving native strains of probiotic bacteria and their effects on the performance and intestinal histology of farmed animals are scarce. Therefore, this study aimed to evaluate a diet supplemented with *Lactobacillus* sp. in tadpoles of *Lithobates catesbeianus*. This randomized test was performed with two dietary treatments: non-supplemented control diet and diet supplemented with *Lactobacillus* sp., with nine replications. The growth performance of *Lactobacillus* sp., including its bacterial enzymatic activity and stability in feed, as well as colonization and histology of the intestinal tract, was evaluated after 42 days of experimentation. Animals fed with a supplemented diet showed higher weight gain and concentration of lactic acid bacteria in the gut and lower feed conversion. No significant difference was observed in survival, total heterotrophic bacterial count or histological change in the gut between the two treatments. The *Lactobacillus* sp. strain was able to colonize the intestinal tract and feed and remain at a high concentration of 10^7 and 10^6 CFU g^{-1}, respectively. It produced several enzymes, which might have contributed to the greater weight gain and lower feed conversion in the supplemented animals, thus demonstrating its probiotic potential for use as a dietary supplement in bullfrog tadpoles.

KEYWORDS

enzyme production, frog culture, intestinal histology, lactic acid bacteria, melanomacrophage, weight gain

1 | INTRODUCTION

Frog culture is an alternative for agro-industry which has developed over the last few decades as a result of improvements in technology, facilities and management (Cribb, Afonso, & Ferreira, 2013; Moreira, Henriques, & Ferreira, 2013). The American bullfrog *Lithobates catesbeianus* (Shaw 1802) (Anura: Ranidae) is an exotic species introduced in Brazil from North America. In Brazil, *L. catesbeianus* is predominantly cultured for its production performance and ability to adapt to a tropical climate (FAO 2014; Moreira et al., 2013).

However, as a result of increased mortality rate, researchers are pointing at ubiquitous and opportunistic bacteria as a major cause of economic losses in frog culture (Grenard, 2007; Mouriño, Martins, Yamashita, Batista, & Pereira, 2006; Pasteris, Guidoli, Otero, Bühler, & Nader-Macías, 2011). During the last few years, antibiotics have been widely employed in animal production as therapeutic agents against

