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Probiotics influences in gene expression that control muscle growth in Nile tilapia *Oreochromis niloticus*

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Statement of the Problem: Probiotic additives in aquaculture are in consolidation due to the large number of contradictory results. These are associated with the type of microorganism strains, fish species, and management conditions, among others. Most studies have focused on health aspects indirectly associated with improved weight gain, but do not describe aspects related to fish growth. Thus it was evaluated the effect of probiotic additive in muscular gene expression of tilapia.

Methodology & Theoretical Orientation: Tilapia fingerlings of approximately 1.5 g were cultivated in recirculation systems containing 15 water tanks of 0.25 m^3 each at 28°C, with biological filter and UV system at 80 fish/m^3. The fish are fed three times a day, with the same feed, using the mixed probiotic additive supplied by Biomart Animal Nutrition (0.0, 0.1 and 0.2% of inclusion). The probiotic was homogenized in 2% soy oil and sprinkled over the feed. The gene expression in dorsal muscle was evaluated at day 30th (n=10). The expression of myogenic regulatory factors (MyoD, myogenin), myostatin and IGF-1was performed by real-time polymerase chain reaction after reverse transcription (RT-qPCR), following the guidelines of the MIQE: Minimum Information for Publication of the Quantitative Real-Time PCR Experiment. Relative expression mRNA were analyzed by Kruskal-Wallis Test followed by Dunn's multiple comparisons test (α=0.05).

Findings: Final fish weight at day 90th were 165.62 (14.16), 186.73 (12.58) and 183.66 (16.39) to control and 0.1 and 0.2 probiotic level, respectively, and they were different (P<0.05). Probiotic did not alter myogenin and IGF expression in white muscle fibers; however, it provided a decrease in MyoD and myostatin expression. In our previews studies the probiotic stimulate the muscle hypertrophy and somatic growth.

Conclusion & Significance: The fish growth fed diets containing probiotics occurred more by inhibition of myostatin expression than by stimulation of IGF expression.

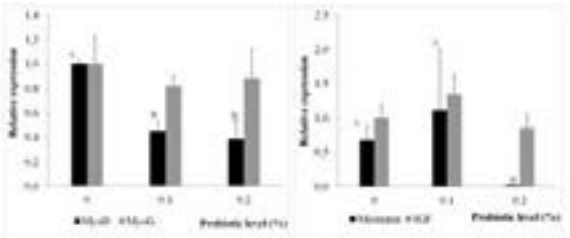

Figure 1: Relative expression of MyoD, myogenin, myostatin and IGF in the dorsal muscle of tilapia fed with feed containing probiotics. Different letters indicate significant differences (P<0.05).

Recent Publications:

1. Avella M A, Place A, Du S-J, Williams E, Silvi S, et al (2012) Lactobacillus rhamnosus accelerates Zebrafish backbone calcification and gonadal differentiation through effects on the GnRH and IGF systems. PLoS ONE 7(9): e45572.
2. Balcázar J L, De BlasI, Ruiz-ZarzuelaI, Cunningham D, Vendrel l D and Múzquiz J L (2006) The role of probiotics in aquaculture. Veterinary Microbiology 114:173-186.

3. Johnston I A, Bower N I and Macqueen D J (2010) Growth and the regulation of myotomal muscle mass in teleost fish. The Journal of Experimental Biology 214:1617-1628.
4. Mohapatra S, Chakraborty T, Prusty A K, Paniprasad K and MohantaK N (2014) Beneficial effects of dietary probiotics mixture on hemato-immunology and cell apoptosis of Labeo rohita fingerlings reared at higher water temperatures. PLoS One 9 (6): e100929.
5. Verschuere L, Rombaut G, Sorgeloos P and Verstraete W (2000) Probiotic bacteria as biological control agents in aquaculture. Microbiology and Molecular Biology Reviews 64:655-671.

Biography

Vander Bruno dos Santos has completed his PhD from Federal University of Lavras in Animal Production field in 2007. He holds a specialization in Environmental Matters from UNESP of Presidente Prudente (2009). In 2010 he completed Postdoctoral studies in Cellular and Structural Biology at UNESP. He has experience in the area of animal science, with emphasis on fish farming, acting mainly on the following subjects: agricultural residue, animal growth, compensatory growth, tissue growth, muscle fibers, adipocytes, tilapia, PACU, Piracanjuba, morphometry, allometry, chemical composition and expression of regulatory myogenic factors.

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