EFFECT OF PROBIOTICS IN WATER QUALITY AND DEVELOPMENT OF Pacú (*Piaractus mesopotamicus*) IN RAS INTENSIVE CULTURING

Patricia Martínez Cruz[1a], Ana L. Ibáñez[2b], Oscar Monroy Hermosillo[3b], Eduardo Maya Peña[4a] y Hugo C. Ramírez Saad[1a], [1]Departamento de Sistemas Biológicos, [2] Departamento de Hidrobiología, [3] Departamento de Biotecnología, [4]Departamento el Hombre y su Ambiente, [a]Universidad Autónoma Metropolitana-Xochimilco, México, D.F. 04960. [b]Universidad Autónoma Metropolitana-Iztapalapa, México, D.F. 09340. pmartine@correo.xoc.uam.mx

Key words: probiotics, water quality, Piaractus mesopotamicus

Introduction. Currently, aquaculture demands require to increase growth of aquatic organisms, disease resistance and feed efficiency, while reducing water use and contamination (1). A viable alternative to partially fulfill these demands is the use of probiotics (microbial cells exerting beneficial effects when administered viable at certain concentration) during culture (2).

The aim of this study was to evaluate the effect of commercial probiotic (Aqua BOOSTER®) in water quality and growth of *P. mesopotamicus* in Recirculating Aquaculture Systems (RAS).

Methods. Two RAS systems of 330 L each, containing 78 juvenile *P. mesopotamicus* (mean weight=0.467 g) were set up. One system was used as control feed and the other feed was supplemented with Aqua BOOSTER® probiotic, following manufacturer's instructions. Biofiltering systems for water recirculation contained 3 cm diameter plastic beads, as substrate to get microbial biofilm. The growth of biofilm was initiated 4 weeks previous to the start of the assay. In addition, activated carbon and zeolyte were set up in separated continuous-flow containers (3). Following variables were assessed weekly; ammonium concentration for water quality and fishes weight for development. Experiment lasted 109 days and water temperature was kept at 25±2°C.

Results. Both treatments presented an initial lag phase of 30 days (Fig. 1). After this period *P. mesopotamicus* reached exponential growth phase, with probiotic treatment showing differences in weight that were statistically significant (P< 0.05) at the end of the assay (Table 1). Final yields were 0.181 and 0.238 g fish/day

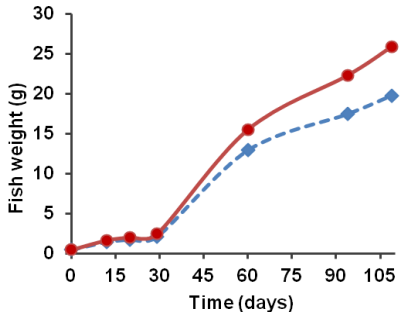

Fig.1 *P. mesopotamicus* growth during the 109-day assay
Control Probiotic.

Table 1. One way ANOVA (P<0.05) of water quality and growth values after 109-day assay

Treatment	Growth (g)		Ammonium concentration (mg/L)	
	Initial	*109 days*	*12 days*	*109 days*
Control	0.489	19.74	0.550	1.132
Probiotic	0.469	25.88	0.224	0.442

for the control and probiotic treatment respectively.The ammonium concentration in water tends to increase in both treatments as fishes grow, due to feces and food residues (Fig. 2), however, in the probiotic amended treatment, there is a decrease after 67 days up to 0.68 mg/L, achieving a final removal 60.93% over the control (Fig. 2). This removal efficiency difference was statistically significant (P<0.05) as shown in Table 1.

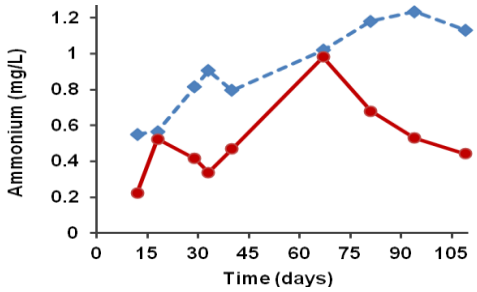

Fig.2 Ammonium concentration in the RASystems during the 109-day assay. Control, Probiotic.

Conclusions. Probiotics improve water quality and promote fish growth in RA intensive systems. These effects are probably due to the presence of nitrifying microorganisms in the biofilm, which exert oxidation of ammonium decreasing its concentration. Water quality benefits animal health resulting in weight increase. Molecular characterization of microbial communities in the biofilm and fish GI tract is under study.

References.

1. Kautsky N, Rönnbäck P, Tedengren M. y Troell M. (2000). *Aquaculture*.191:145-161.
2. Martínez C.P, Ibáñez A.L, Monroy H.O. and Ramírez S.H. (2012). *ISRN Microbiol*. 2012(2012), Article ID 278092, 9 pages.
3. Timmons, M., Ebeling J, Wheaton F, Summerfelt S. and Vinci B. (2002). Biofiltration. In: *Recirculating Aquaculture Systems*, Cayuga Aqua Ventures, USA, pp. 19-50.
4. APHA, AWWA, WPCF. 1992. *Métodos normalizados para el análisis de aguas potables y residuales*. Ediciones Díaz de Santos, S.A., México. pp. 18-24.