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Fish in a recirculating aquaculture system (RAS) live with abundant microorganisms. These can become a health threat when the fish immune system cannot counterbalance the pathogenic microbial colonization. Therefore, microbial control in a RAS can potentially reduce the risk of infections and hence improve fish health. In the present study, a periodic microbial control was performed in a RAS with 16 tanks stocked with mirror carp (Cyprinus carpio) for 3 months. Half of the fish culture tanks were treated with 1mgL⁻¹ peracetic acid (PAA) twice per week, while the other half remained untreated. The water circulation was interrupted immediately before each PAA-treatment, and resumed after 3h. The total aerobic bacterial density was similar in all culture tanks, except during the PAA-treatments and the concurrent circulation interruptions. During these periods, the bacterial density decreased up to 90% in PAA-treated water, while a 6-fold bacterial increase was observed in untreated water. In the first 2 months of treatment, PAA-exposed fish showed lower plasma cortisol concentration than the unexposed fish. Subsequently, the trunk kidney leukocytes of PAA-exposed fish showed stronger respiratory burst than the unexposed fish. By the end of the experiment, the PAA-exposed fish had better gill morphology, compared to the unexposed fish. The present study indicates that periodic disinfection of culture water in a RAS with PAA could transiently reduce the suspended bacteria density, modulate the fish stress response, and have an overall beneficial effect on fish health in the long term.

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