EFFECTS OF PROBIOTICS ON ANTIOXIDANT DEFENSE IN FARMED FISH: RECENT ADVANCES

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Abstract

The intensification of aquaculture exposes farmed fish to environmental and chemical stressors that can disrupt redox homeostasis. This narrative review synthesizes recent studies, primarily published from 2020 onward, on probiotic-mediated antioxidant protection in cultured fish. Evidence was assessed across environmental and chemical challenges, with emphasis on antioxidant enzymes, oxidative damage markers and molecular pathways. Probiotics generally reduced oxidative damage and supported redox homeostasis, either by restoring suppressed antioxidant defenses or by normalizing compensatory enzyme overactivation. Effects depended on strain, dose, host species and stressor. Collectively, current evidence suggests that probiotics can strengthen antioxidant defense and improve fish resilience to stress, with efficacy depending on strain, dose and challenge conditions.

Key words: *probiotics; aquaculture; oxidative stress; antioxidant defense; redox homeostasis*