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Dietary supplementation with nerolidol improves the antioxidant capacity and muscle fatty acid profile of *Brycon amazonicus* exposed to acute heat stress

Leandro P. Bolzan [a], Danilo C. Barroso [b, 1], Carine F. Souza [a], Fernanda C. Oliveira [c], Roger Wagner [c], Bernardo Baldisserotto [a], Adalberto L. Val [b], Matheus D. Baldissera [a]

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Highlights

- Heat stress-induced impairment on plasma and muscle oxidant/antioxidant status.
- Fillet fatty acid profile is altered in fish exposed to heat stress.
- Diet containing 1.0 mL nerolidol/kg feed improved antioxidant defense system.
- Diet containing 1.0 mL nerolidol/kg feed prevented the impairment of fillet fatty acid profile.

Abstract

An increase in water temperature in the Amazon River has elicited concerns about commercially important fish species associated with food security, such as matrinxã (*Brycon amazonicus*). Studies have demonstrated the positive effects of diets supplemented with plant-based products that combat heat stress-induced oxidative damage. The aim of this study was to determine whether dietary supplementation with nerolidol prevents or reduces muscle oxidative damage and impairment of the fillet fatty acid profile of matrinxã

exposed to heat stress. Plasma and muscle reactive oxygen species (ROS) and lipid peroxidation (LPO) levels were significantly higher in fish exposed to heat stress compared to fish not exposed to heat stress, while plasma superoxide dismutase (SOD) and glutathione peroxidase (GPx) activity was significantly lower. The total content of saturated fatty acids (SFA) in fillets was significantly higher in fish exposed to heat stress compared to fish not exposed to heat stress, while he total content of polyunsaturated fatty acids (PUFA) was significantly lower. Nerolidol prevented the increase of muscle LPO and plasma ROS and LPO levels in fish exposed to heat stress, and partially prevented the increase in muscle ROS levels. Diets containing nerolidol prevented the inhibition of muscle GPx activity in fish exposed to heat stress, and partially prevented the decrease of plasma GPx activity. The nerolidol-supplemented diet prevented the increase of fillet SFA in fish exposed to heat stress, while partially preventing the decrease of PUFA. We conclude that acute heat stress at 34 °C for 72 h causes plasma and muscular oxidative damage, and that homeoviscous adaptation to maintain membrane fluidity can represent a negative impact for fish consumers. A nerolidol diet can be considered a strategy to prevent heat stress-induced oxidative damage and impairment of muscle fatty acid profiles.

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Keywords

matrinxã; Climate changes; Water temperature; Food security; Oxidative damage; Fish physiology

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