



Reinventing the Micronutrients beyond Nutrition: Functions in Immune Modulation and Stress Mitigation of Fish

22

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Abstract

The vitamins and minerals are an essential part of fish nutrition, although their requirements are in low doses. Their functions, dosages, and toxicities are yet to be defined entirely for many important commercial species. However, in altered dosages, they have different functional significance than providing nutrition. The roles of these micronutrients are strongly implicated in enhancing innate and adaptive immune responses and alleviating stress responses. Stress and immunity are deeply associated, while both are significant aspects of fish welfare. Exposure to stress weakens the innate immunity of the aquatic species through diverse crosstalk between endocrine and paracrine pathways. The concept of complete diet in recent times are more intriguingly about the correct incorporation of micronutrients, the consumption of which protects the animal from any ailments due to weak immunity.

Keywords

Vitamins · Minerals · Micronutrients · Nutrition · Health

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