

10. Novel shrimp feeds to mitigate negative impacts of challenging conditions

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Global warming can potentially create challenging environmental conditions for shrimp farming, which may lead to production losses. Nevertheless, a good understanding of the stress responses of shrimp to challenging conditions is lacking. This project focuses on understanding the stress responses of shrimp to challenging conditions and looks for nutritional interventions that can influence antioxidant capacity (enzymatic and non-enzymatic) to maintain homeostasis under both acute and chronic challenging conditions (e.g., salinity stress). The central hypothesis in this project is that nutritional interventions can influence the antioxidant capacity of shrimp and help to maintain homeostasis under stress conditions. The project is conducted in four different phases. The first phase consists of developing a stress test and determining read-out stress parameters of shrimp (*Litopenaeus vannamei*) exposed to challenging conditions to understand how shrimp maintain homeostasis under stress conditions. The second phase aims to test dietary factor(s) that can influence the enzymatic antioxidant system of shrimp under both acute and chronic stress conditions (supplementation of antioxidant enzyme cofactor, e.g., dietary Zn). The third phase looks for dietary factor(s) that can influence the non-enzymatic antioxidant system (supplementation of non-enzymatic antioxidants e.g., carotenoids). Finally, the fourth phase investigates whether there is any interaction effect or synergism between enzymatic and non-enzymatic activity (supplementation of both enzyme cofactor and non-enzymatic antioxidants). The outcome of this project will provide fundamental knowledge on stress regulation of shrimp and the potential of nutritional interventions, which additionally could help farmers and feed companies to sustain the shrimp sector and satisfy future protein demand.