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Effect of Lowering the Proportion of Chlorella vulgaris in Fish Feed on Tilapia's Immune System

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Abstract : Introduction: Tilapia is the second-highest harvested freshwater fish species in Malaysia, available in almost all fish farms and markets. Unfortunately, tilapia culture in Malaysia is highly affected by Aeromonas hydrophila and Streptococcus agalactiae, which affect the production rate and consequently pose a direct negative economic impact. Reliance on drugs to control or reduce bacterial infections has been led to contamination of water bodies and development of drug resistance, as well as gave rise to toxicity issues in downstream fish products. Resorting to vaccines have helped curb the problem to a certain extent, but a more effective solution is still required. Using microalgae-based feed to enhance the fish immunity against bacterial infection offers a promising alternative. Objectives: This study aims to evaluate the efficacy of Chlorella vulgaris at lower percentage incorporation in feeds for an immune boost of tilapia in a shorter time. Methods: The study was in two phases. The safety concentration studies at 500 mg/kg-1 and the administration of cultured C. vulgaris biomass via incorporation into fish feed for five different groups in three weeks. Group 1 was the control (0% incorporation), whereas group 2, 3, 4 and 5 received 0.625%, 1.25%, 2.5% and 5% incorporation respectively. The parameters evaluated were the blood profile, serum lysozyme activity (SLA), serum bactericidal activity (SBA), phagocytosis activity (PA), respiratory burst activity (RBA), and lymphoproliferation activity (LPA). The data were analyzed via ANOVA using SPSS (version 16). Further testing was done using Tukey's test. All tests were performed at the 95% confidence interval ($p < 0.05$). Results: There were no toxic signs in tilapia fish at 500 mg/kg-1. Treated groups showed significantly better immune parameters compared to the control group ($p < 0.05$). Conclusions: C. vulgaris crude biomass in a fish meal at a lower incorporation level of 5% can increase specific and non-specific immunity in tilapia fish in a shorter time duration.

Keywords : Chlorella vulgaris, hematology profile, immune boost, lymphoproliferation
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