



Efficacy of β -1,3-glucan and vitamin C supplementation on growth performance during nursery fingerling red tilapia (*Oreochromis* spp.)

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Abstract

Supplementary immune stimulant products during nursery fingerling tilapia have been found more often. However, fish at an early stage are still developing their immune system dramatically, hence, at this stage, fish have a poor ability to defend against diseases. To achieve their expected immune defensive results, farmers have to keep feed their fingerling tilapia with immune modulator products, which may result in overstimulation and an adverse effect on the tilapia's defense system. This research aims to study the efficacy of the optimum application of immune stimulants, β -1,3-glucan and vitamin C, during nursery fingerling red tilapia on growth performance and controlling bacteria in the digestive tract. The research was assigned in CRD with 3 different diets; (1) control without any supplementation, (2) 35% Ascorbyl Phosphate supplementation (VC35), and (3) a combination of Coated Vitamin C 19% and β -1,3-Glucan 9% from algae (BGVC). Both supplementary products were applied as powder feed at an inclusion rate of 0.5% on both treatments. Supplementary feed was applied as a pulse feeding program on days 2, 5, 8, 11, and 14. The initial fish size was 0.34 g and stocked at 1,000 individuals in a 2 x 1 x 0.4 m net cage. The feeding rate was recorded at 60 g per cage on days 1-7 then increased to 90 g per cage on days 8-14. The results showed that the average survival rate was significantly different ($p < 0.05$). The BGVC has the highest survival rate at $97.75 \pm 1.26\%$ ^c while VC35 and control have $86.13 \pm 2.38\%$ ^b and $82.78 \pm 1.59\%$ ^a, respectively. There was no significant difference ($p > 0.05$) in the feed conversion ratio and total biomass gain. The severe pathogenic bacteria of *Aeromonas* from the digestive tract were also not significantly different ($p > 0.05$). The total *Aeromonas* count was between $1.4 - 9.8 \times 10^5$ CFU·g⁻¹ in the intestine and $1.8 - 2.4 \times 10^4$ CFU·g⁻¹ in the liver. An economic analysis of these supplements also shows a return on investment (ROI) at a rate of 1:63.5 – 1:67.6. In conclusion, the pulse application of Vitamin C and β -1,3-Glucan can enhance immunity, which results in improving the survivability of tilapia fry and increasing the economic advantage of tilapia nursery farms.

Keywords: *Algae beta-glucan, immunomodulator, vitamin C*