ABSTRACT

Annisa Wina Sabilla. 2402021130021**. Effects of Dietary *Bacillus subtilis* var. *natto* on Growth Performance and Lysozyme Gene Expression in Nile Tilapia (*Oreochromis niloticus)* Infected with *Flavobacterium (columnare) oreochromis***
(under the guidance of Anto Budiharjo & Chumporn Soowannayan)

The high demand for Nile tilapia worldwide has led to the development of intensive aquaculture systems, which can increase stress on the fish, especially if improper management is involved. These conditions can trigger outbreaks of columnaris disease, caused by *Flavobacterium oreochromis*. This study evaluated the effects of *Bacillus subtilis* var. natto (BSN1 and BSN2) supplementation (10^5 or 10^7 CFU/g feed) on growth, survival, and lysozyme gene expression in uninfected and *F. oreochromis*–infected Nile tilapia. Fish (n = 15, 5.24 ± 0.50 g) were fed unsupplemented or supplemented diets for 7 days before and 21 days after immersion-challenge (10^7 CFU/ml for the first and second infections; 10^8 CFU/ml for the third infection). BSN1 10^7–supplemented feed resulted in the highest weight gain (WG), average daily growth (ADG), specific growth rate (SGR), and the most favorable feed conversion ratio (FCR), followed by the negative control, BSN1 10^5, BSN2 10^7, BSN2 10^5, and the positive control. No growth inhibition was observed in any supplemented group, confirming feed safety. BSN1 10^7 and BSN1 10^5 significantly reduced mortality compared to the infected control, while the remaining supplemented groups still showed higher survival rates, indicating protective effects against *F. oreochromis.* Overall, BSN1 10^7 performed best numerically for improving growth performance and can significantly reduce mortality after infection. Lysozyme gene expression in BSN1 10^7–supplemented feed during the second infection did not differ significantly from infected or uninfected controls on days 1,2, and 3 post-infection. However, histopathology findings confirm that the BSN1 10^7 group showed less gill damage compared to the control group, suggesting the presence of immune protection during infection.

Keywords: *Bacillus subtilis* var. *natto*, columnaris disease, *Flavobacterium oreochromis,* growth performance, lysozyme, Nile tilapia, survival rate, qPCR.