

Effects of probiotics on growth and immune responses in olive flounder, *Paralichthys olivaceus* and on water quality parameters of recirculating rearing system

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Introduction

Recently, probiotics is applied for aquaculture management as an alternative method of antibiotics. Probiotics is defined as a live microbial feed supplement which a good effect to the host animal by improving its microbial condition of gastrointestinal tract (Fuller, 1989). Generally, probiotics affect growth and survival of cultured fish, water quality, immune system and so on (Rengpipat et al, 2000, Robertson et al, 2000).

This study was conducted to investigate the effects of probiotics on growth and immune response in olive flounder *paralichthys olivaceus* and the water quality paramerters in recirculating rearing system.

Materials and methods

Flounder was fed with control diet (without probiotics), diet 1 (with 1% probiotics) and diet 2 (with 1% probiotics and 7% linolenic acid) for 50 days.. Commercial product (알켄포세이돈) was used for this study as probiotics. Control diet group was divided to 2 groups and in one group, probiotics was supplied into rearing water feeding with control diet. After 50 days of rearing, flounders from each treatment were sampled and were challenged to pathogen challenge test and two stress tests (heat shock stress test and exposure to air, as called air dive test). Flounders were exposed into seawater of constant high water temperature (30°C) and 50 % lethal time (LT₅₀) was monitored and fish blood was analyzed.

Flounders were examined about tolerance against exposure to air. After exposure to air, flounders were immediately returned back to seawater and survival, occurrence of red spots on the ventral side and upright curvature or stiffness of fish body was recorded.

Flounders were exposed into seawater including pathogen (*Vibrio anguillarum*) of high concentration (10⁷/ml at CFU) for 60 min. After that, they are reared for 14 days and survival rate was monitored and the blood sample was analyzed.

Results and conclusions

Results showed that supply group was significant higher than another 3 treatments in growth rate and control group was significantly lower than another 3 groups in survival rate. Throughout rearing period, NH₄-N and NO₂-N concentrations were kept under 0.8 mg/L and 0.5 mg/L, respectively. pH of rearing water in a supply group was lower than another 3 groups. Red blood cell (RBC) and hematocrit (HTC) value of fish blood in a control group were higher than in another 3 groups. Lysozyme activity of fish plasma in a supply group was significantly higher than in a control group.

In a high temperature stress test, fish LT₅₀ of control group was lower than another 3 groups. In heat shock stress test, LT₅₀ of a control group was lower than those of probiotic treatment groups. Plasma lysozyme activity of a supply group was significantly greater than that of control group. In air dive test, probiotics treatment showed an enhancement of reduction in the stiffness and upright curvature of the fish body.

In pathogen challenge test, survival rate in a control group was lower than that in probiotic groups. Fish plasma Lysozyme activity in probiotic treatments was significantly greater than that in a control group. Plasma protein concentration in a supply group was significantly higher than those in another 3 groups just after immersion.

In this research, the results suggested that probiotics might enhance the nonspecific immune system of olive flounder, providing them a stronger resistance against some stress conditions and pathogen. Thus, it might be possible to produce stronger and healthier olive flounder by oral administration in a diet or supplementation in rearing water of probiotics.

References

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