

Comparison of Hematological Characteristics and Oxygen Consumption in Olive Flounder, *Paralichthys olivaceus* by Sudden Changes of Water Temperature

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Introduction

Water temperature (WT), dissolved oxygen concentration (DO), and photoperiod are potent influences on feed consumption, metabolic rate and energy expenditure, and thus, on growth of poikilothermic vertebrates, including fish (Hur et al., 2003). Therefore, the effects of these environmental factors on fish growth and metabolism warrant thorough investigation. WT change, one environmental stress factors, directly affects the metabolism of rearing fish. Barton and Iwama (1991) suggested that a rapid change of WT resulted in the changes of *in vivo* metabolism and hematology. In the present study, the effects of acute WT changes on the biochemical stress responses (DO and blood parameters) of olive flounder (*Paralichthys olivaceus*), a potential aquaculture species, were determined. Such knowledge would be useful for evaluating current olive flounder culture procedures and also for developing techniques to minimize stress during aquaculture.

Materials and Methods

Olive flounder (mean total length 19.1 ± 0.8 cm, mean body weight 53.7 ± 6.3 kg) was obtained from culture farm, and kept in a flow-through tank under natural

conditions of temperature and photoperiod. Fish density of olive flounder was 16.5 kg/m³. The WT, salinity and DO of the seawater during the period ranged 17.2±0.4-18.1±0.3 °C, 33-35‰ and 5.8-6.4 ppm, respectively. Feed (moisture pellet) was supplied twice (10:00 h and 17:00 h) at the rate of about 2-3% body weight per days. Food was withheld from the fish for 24 hours before each experiment. In Exp. I, WT raised from 20 °C (control WT) to 29 °C within 18 hours (0.5 °C/hour), after maintained at 29 °C for 96 hours, WT lowered from 29 °C to 20 °C within 18 hours (0.5 °C/hour) and maintained at 20 °C for 24 hours. In Exp. II, WT lowered from 20 °C (control WT) to 11 °C within 18 hours (0.5 °C/hour), after maintained at 11 °C for 96 hours, WT raised from 11 °C to 20 °C within 18 hours (0.5 °C/hour) and maintained at 20 °C for 24 hours. The Exp. III kept Exp. I and II consecutively.

Results and Summary

Cortisol and hematocrit levels of Exp. II showed no significant difference at experiment beginning and end, but Exp. I and III were significantly increased at experiment end. Glucose, hemoglobin, lactic acid, Na⁺, K⁺ levels showed no significant differences at experiment beginning and end in an all experiment ($P < 0.05$). In Exp. I and III, oxygen consumption showed a tendency to WT increase, but in Exp. II, it was decreased according to WT drop.

References

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