

Tanthip Napaumpaiporn 2014: Water Qualities on Feeding Behavior and Immune Responses of Pacific White Shrimp (*Litopenaeus vannamei*). Doctor of Philosophy (Fisheries Science),  
Major Field: Fisheries Science, Department of Fishery Biology. Thesis Advisor:  
Assistant Professor Niti Chuchird, Ph.D. 116 pages.

The aim of this study was to find the effect of water qualities on feeding behavior and immune responses of Pacific white shrimp (*Litopenaeus vannamei*). Two sets of experiments were performed, both in laboratory and in grow-out ponds. For laboratory trial, 15 shrimp (6-8 g) were reared in 100-liter aquaria (salinity 25 parts per thousand). Three experiments were studied, the first experiment, the effects of water temperature on feeding behavior and immune responses of shrimp were investigated. Juvenile shrimp were kept continuously at  $29\pm 1^{\circ}\text{C}$  for 24h and slowly switched to  $24\pm 1^{\circ}\text{C}$  for 24h before slowly switched to  $29\pm 1^{\circ}\text{C}$  while control group shrimp were constantly maintained at  $29\pm 1^{\circ}\text{C}$ . Results showed that temperature had an effect on feeding behavior of shrimp. Shrimp raised in low temperature ( $24\pm 1^{\circ}\text{C}$ ) had significant slower ( $P<0.05$ ) feeding rate than the control group ( $29\pm 1^{\circ}\text{C}$ ). The immune parameters including total hemocyte count, percentage phagocytosis and bactericidal activity from treatment group were significantly lower ( $P<0.05$ ) than the control group. In the second experiment, the effects of dissolved oxygen (DO) on feeding behavior and immune responses of shrimp were studied. Juvenile shrimp were kept at three DO levels (above 4, 2-4 and less than 2 mg/l) at normal temperature ( $29\pm 1^{\circ}\text{C}$ ). Shrimp with DO less than 2mg/l had the highest leftover feed at 14.36% which was significantly higher ( $P<0.05$ ) than the group that was in DO 2-4 and above 4 mg/l. The immune parameters including total hemocyte count and percentage phagocytosis were significantly lower ( $P<0.05$ ) in the group that was in DO less than 2 mg/l. The third experiment was carried out at three DO levels (above 4, 2-4 and less than 2 mg/l) and temperature was maintained at  $24\pm 1^{\circ}\text{C}$ . Shrimp raised in DO less than 2 mg/l had the highest leftover feed at 74.07% with significant difference ( $P<0.05$ ) from other treatments. The immune parameters including total hemocyte count and percentage phagocytosis were significantly lower ( $P<0.05$ ) in the treatment with DO less than 2mg/l. For farm trial, three different shrimp feeding techniques were studied at shrimp farm in Tha-Chang district, Surat Thani province. The experiment had 3 treatments employing the 3 feeding techniques including manual feeding (technique 1), automatic feeding with time setting (technique 2), and automatic feeding with sound detection (technique 3). Stocking density was 75 post-larvae (PL)/ $\text{m}^2$  and culture period was 90 days. Results showed that the average daily growth (ADG) from techniques 2 and 3 were 0.21 and 0.24 g/day, respectively, which were higher than that obtained from technique 1 (0.18 g/day). The feed conversion ratio (FCR) from techniques 1 to 3 were 1.55, 1.47 and 1.30, respectively. The best mean body weight was found in shrimp fed by technique 3 at 21.52g while the poorest weight was 15.12g found in shrimp fed by technique 1. No significant differences in survival rates were found in all treatments. The yield from techniques 1 to 3 were 1,672.00, 1,739.30 and 2,407.44 kg/rai, respectively. Water quality parameters in the experimental ponds were within the suitable ranges for shrimp culture.

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Thesis Advisor's signature