Marine Secondary Metabolites (MSM) from Macro Algae Enhance Bacterial Clearance in Hemolymph of *Penaeus monodon*

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(Received 1.10.08, Accepted 4.11.08)

Key words: bacterial clearance, *Penaeus monodon*, *Vibrio alginolyticus*, *Vibrio fischeri*, *Hypnea musciformis*, immunostimulant, hemolymph clearance, marine secondary metabolites

Abstract

Marine secondary metabolites (MSM) from macro algae were incorporated into four experimental feeds for juvenile shrimp (*Penaeus monodon*) as follows: 1.0% *Hypnea musciformis* extract (diet 1); 0.1% *H. musciformis* extract (diet 2); 1.0% *H. musciformis* extract with 500 mg *Ulva fasciata* extract and 50 mg of the antibiotic levamisole (diet 3); 1.0% *H. musciformis* with 500 mg *U. fasciata* per kg body weight (diet 4). Diet 3 enhanced bacterial clearance to 99.69% in the hemolymph of shrimp challenged with *Vibrio alginolyticus* and *Vibrio fischeri*, significantly higher than clearance rates in all other treatments and the unmedicated control. Results suggest that feed containing MSM is a good alternative to application of antibiotics in controlling bacterial diseases in shrimp.

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