

学位論文全文に代わる要約  
**Extended Summary in Lieu of Dissertation**

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学位論文題目 : Effects of functional polysaccharides derived from insects on cultured  
Title of Dissertation prawns

(昆虫由来機能性多糖の養殖エビに対する効果に関する研究)

学位論文要約 :

Dissertation Summary

Aquaculture is regarded as the fastest growing food producing industry, and also one of the most rapidly growing sources of food animal protein in the world. One of the most traded aquaculture products in terms of commercial value is shrimp (FAO, Rome, 2015). Among of aquaculture commodities, crustaceans are one of the most traded aquaculture products in terms of commercial value. Half of the total productions of crustaceans is dominated by *Litopenaeus vannamei* or commonly named as white shrimp.

In aquaculture developments efforts, disease is one of the causes of production failure, including on shrimp farming. Vibriosis is the most common bacterial disease in aquaculture farms of prawns in worldwide. Since a long time ago, researchers and farmers are working hard to answer this question. One of the popular solution that has been emerged is vaccination. However, practical application of vaccination is time consuming and laborious. All of the data suggests that shrimp have relatively primitive immune systems that can not respond to vaccination.

Another option that can be used for preventing diseases is the use of antibiotics. But frequent antibiotic treatment can be harmful to the natural environmental and can stimulates the mutation of antibiotic-resistant strain of bacteria or viruses. In this situation, a new, safe, and effective techniques is needed to deal against diseases in aquaculture activity. One of the promising solution for solving this problem is the usage of insects. Several studies have reported that insects have various useful substances include molecules with various pharmacological properties, such as anti-viral and microbial activity, and the capacity to enhance the immune response in human, life stock, poultry, and aquaculture fish.

In this study, the author found the vibriosis effect on prawns survival rate and the effectively of silkrose-BM to prevents vibriosis via the activation of innate immunity.

In chapter 1, the author demonstrated challenge study system for the vibriosis of Japanese tiger prawn with a high virulent of *Vibrio penaeicida* strain to develop a model system for bacterial disease in crustacean species. The result of this chapter showed that high mortality for Japanese tiger prawn not only through direct injection into muscles, but also through natural route infection. And its suggested that challenge study system used in this study will be served as a model system to investigate efficacy of the immunostimulative agents including insects derived polysaccharides for bacterial disease of crustacean species.

In chapter II, the author used silkrose of B.mori as a feed supplement for *Litopenaeus vannamei* and *Marsupenaeus japonicus*, before challenged with *Vibrio penaeicida*. It was further found that, after infection prawn survival was significantly improved in the silkrose-BM diet groups. However, the author cannot exclude the possibility that other substances contained in the B.mori pupae such as anti-microbial peptides and chitin play a role together with silkrose-BM. Based on previous challenge system, the author conducted more detail of the potential of silkrose in shrimp, such as : feeding trial, disease resistance, growth performance, meat quality and histopathology. The data result showed that *Litopenaeus vannamei* were obtained with dietary inclusion of silkrose-BM at concentration of 0.25 ug/g group significant increases in the body weight gain, survival rate significantly improved and shown the hardest in the term of meat texture.

In this chapter also reported the high release of Bcell and Rcell in *Litopenaeus vannamei* Hepatopancreas. Hepatopancreas is one of the indicators in the shrimp body which can be used to identify the shrimp health condition. The high presence of Bcells and Rcells of shrimp fed with silkrose 0.25 µg/g indicating a high rate of excretion from hepatopancreas, and also justify shrimp health condition, with intracellular digestion and absorption. As we can see the result, its suggest that bioactive substances like silkrose-BM with the right silkrose amount effectively prevents vibriosis in penaeid prawns via the activation of innate immunity, and will become more important tools for bacterial disease protection in future prawn cultivation.

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