CHAPTER IIX

CONCLUSION

Four isolates of photosynthetic bacteria (*Rhodobacter* sp. TM3, *Rhodobacter* sp. TM11B, *Rhodobacter sphaeroides* TN5 and *Rhodobacter sphaeroides* SV2) from shrimp ponds were selected for study on the possible application as feed supplement in the black tiger shrimp. Only *Rhodobacter* sp. TM11B gave a small improvement in shrimp body color when compared to the control and the other PSB diets, but did not significantly increase the concentration of astaxanthin. Moreover, growth performances were highest in the control and the group fed with synthetic astaxanthin. Supplementation of bacterial cells in high levels may cause retardation of growth in shrimp, due to the lack of palatability, imbalance of amino acid profile, or the production of anti-matabolites or toxin during fermentation. Hence, it is nescessary for optimization for growth and carotenoids production of photosynthetic bacteria to reduced the amount of cells materials in shrimp diet. In the optimization study, a culture medium contained 3 g/l of yeast extract and peptone, 1 g/l monosodium glutamate with 5 μM ferric citrate, pH 7 and 5 % NaCl provided the condition that can increase 227.2 % of total carotenoids compare to normal G5 medium.

When the black tiger shrimp fed test diets contained lyophillized *Rhodobacter* sp. TM11B cells produced in optimization medium, the growth performance were not difference among the group fed 1 % *Rhodobacter* sp. TM11B, 100 ppm astaxanthin and control group. But slightly increment of total carotenoids and di-ester astaxanthin were observed only in the shrimp fed 5% *Rhodobacter* sp. TM11 B. However, the efficiency of this photosynthetic baterial isolate is lower than *Spirulina* and synthetic astaxanthin-supplemented diet. Because the application of dried *Spirulina* in shrimp feed will be increase the production cost, so it is nescessary to study on other natural

source of carotenoids compared to the *Spirulina*-supplemented diet, in order to improve body color and reduced the feeding cost in black tiger shrimp. Because, astaxanthin and β-carotene have been report as the suitable materials for pigmentation in black tiger shrimp, but the supplementation of crude cells material showed a reduction on growth performance, so the natural carotenoids extract could be possible to applied in shrimp feed. Therefore, the commercially β-carotene extract from Dunaliella (Betatene® or Algro Natural®) were selected to compared its efficiency with *Spirulina*-supplemented diet, synthetic astaxanthin and β-carotene in shrimp feed. The result showed that blood parameters, growth performance and survival were not significantly different among shrimp fed the test diet contained same lavels of synthetic astaxanthin, β-carotene, Dunaliella extract and dried *Spirulina* cells material. Moreover, astaxanthin levels were not significantly different in the shrimp fed all carotenoid-supplemented diets. It was indicated that the Dunaliella extract can be added in shrimp diet in order to increase pigmentation in the black tiger shrimp. Finally, the feeding experiments showed that 125 ppm of β-carotene extracted from *Dunaliella* gave a positive result in pigmentation in black tiger shrimp. But, 300 ppm of β-carotene from *Dunaliella* shown its high efficiency for pigmentation and increased in WSSV or stress resistance in black tiger shrimp.