CHAPTER I

INTRODUCTION

The giant black tiger prawn *Penaeus monodon* is one among approximately 100 species of penaeid prawns and shrimp commercially important in capture fisheries and / or aquaculture. Its large size, fast growth rate, high survival, handling tolerance and successful breeding in captivity make it the predominant culture species in the Indo-Pacific region, ranging northward to Japan and Taiwan, eastward to Tahiti, southward to Austraria, and westward to Africa (Racek, 1955; Holthuis and Rosa, 1965; Motoh, 1981, 1985). In 1994, Thailand was recorded as the biggest exporter of black tiger prawn in the world with the production more than 250,000 metric tons creating total income more than 36,000 millions baht. However, the export of black tiger prawn from Thailand has decreased dramatically and continuously in the years of 1995 and 1996 to 179,051 and 148,735 metric tons, respectively (กรมเศรษฐกิจการพาณิชย์, 2539).

There are many reasons for explaining such a remark decrement, eg., the high competition among shrimp production countries, the Thai government's policy concerning the prohibition of shrimp culture in paddy land in order to pause the expansion of marine shrimp culture from the seacoast intruding to the inland area, the rapid deterioration of the seacoast ecosystem around the land where the tiger prawn culture take place, etc. In order to retain the income of the country's significant agricultural product, the enhancement of shrimp production per land area as well as the addition of value to the product should be simultaneously considered. Unquestionably, nutrition contributes a crucial part for the achievement of both goals. Good and proper nutrition of culture diet prolongs the survival rate of naturally weak shrimp larva while the fortification of diet with lecithins benefits growth and health of shrimp (Camara 1994; Paibulkichakul et al., 1996). The nutritional enrichment of n-3 highly unsaturated fatty acids (HUFA's) into feed diet also advantages growth, survival and the tolerance of shrimp larvae to environmental stress (D'Abramo et al.,1981; Teshima,1982; Kanazawa,1982,1985; Briggs et al.,1988; Chen and Jenn,1991; Ree et al., 1994).

It has been widely accepted that n-3 HUFA's, particularly C20:5n-3 namely eicosapentaenoic acid (EPA) and C22:6n-3 namely docosahexaenoic acid (DHA) derived majorily from marine fish, ameliorate atherogenesis, inflammation, thrombus formation, gene expression, cell-to-cell communication etc., which consequently decline the risks for cardiovascular disease (CVD) and many ailments (McPherson and Spiller,1996). Increment of n-3 HUFA's in shrimp's tissue thus provides at least two advantages. In one hand, n-3 HUFA's benefit the yield of shrimp production via the promotion of growth and survival rate as early mentioned whereas in another hand the accumulation of n-3 HUFA's in shrimp flesh adds even higher value to shrimp product to be an alternative rich source of n-3 HUFA's for people with high risk of CVD.

In order to augment n-3 HUFA's in shrimp's tissue, Kontara, Coutteau and Sorgeloos (1997) cultured *Penaeus japonicus* larva with diet supplemented with n-3 HUFA's in form of fish oil or triglycerides. They demonstrated that such larva could accumulated HUFA's exclusively EPA and DHA in tissue. Interestingly, both HUFA's were found in significant amount in two subclasses of tissue phospholipids: phosphatidylcholine (PC) and phosphatidylethanolamine (PE). It has been well recognized that phospholipids are essential lipids mostly involving in triglycerides and cholesterol transport in the prawn (Tesima et al., 1986) and are the main structural component of cell membranes. Correct formation of membranes with phospholipids is thus necessary for the effective function of the cells (Dahlan 1989).

Dahlan et al. (1996) prepared high yield of lecithins from fish meal and introduced as sources of choline and DHA. They also employed such a n-3 HUFA rich lecithin as emulsifier for the preparation of lipid liposomes and fat emulsion (Dahlan 1995). Later, This group of investigators demonstrated that liposomes of fish meal lecithins could behave as a carrier of n-3 HUFA's especially DHA providing to blood cells of both erythrocytes and platelets (Dahlan et al., 1997a; 1997b; 1997c).

Since lecithins of fish meal constitute majorily of PC with n-3 HUFA's in their moiety, the question was raised whether this n-3 HUFA rich lecithins as the simultaneous fortifier of n-3 HUFA's and lecithin into shrimp's diet would be superior to the conventional soya lecithins or not. In the present study, therefore, n-3 HUFA rich lecithins derived from both local and imported fish meal were introduced for the first time as feed supplement into shrimp's diet. The effects of these lecithins on growth, survival rate and the tolerance for environmental stress present study were investigated and the obtained results were compared to those of shrimp larva fed diets with and without the supplementation of soya lecithin.

Objectives of the study:

1. to extract lecithins from two kinds of fish meal and characterize their lipid composition compared to commercially available soya lecithin employed in the study,

2. to study the effect of diets fortified with fish meal lecithin on growth and survival of *Penaeus monodon* larvae compared to those of diets with and without soya lecithin,

3. to study the effect of salinity on growth, survival and stress resistance of *Penaeus monodon* postlarvae fed diets with different sources of lecithin.