



# Effect of dietary fatty acids on the fatty acid composition of *Penaeus monodon* juveniles.

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It was observed that mean survival and yield per ha obtained were significantly higher in deeper ponds, 70.36% and 343.2 kg/ha, respectively, compared with those in shallow ponds, 37.50% and 180 kg/ha, respectively ( $P < 0.05$ ). There was no significant difference in mean body weight at harvest for deep ponds (9.80 g) and shallow ponds (9.55 g). Results suggest that white shrimp production is better in deeper ponds than in shallow ponds.

### Effect of Dietary Fatty Acids on the Fatty Acid Composition of *Penaeus monodon* Juveniles

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Six purified diets containing either pollack liver oil or a combination of dietary fatty acids (18:1 $\omega$ 9, 18:3 $\omega$ 3, 20:5 $\omega$ 3) at 5% level and a control (no lipid) were assessed for their influence on the fatty acid composition of *Penaeus monodon* juveniles (0.2-0.5 g). After a 35-day feeding period, the fatty acid composition of the neutral lipid (NL) and polar lipid (PL) fractions of prawn total lipids was analyzed. All treatments showed that the prawn lipid contained high level of polyenoic acids (20:4 $\omega$ 6, 20:5 $\omega$ 3, 22:6 $\omega$ 3); likewise the sum of  $\omega$ 3 series fatty acids were high in the PL fraction. The component fatty acids of prawns showed a correlation with those of the diet. However, some dietary fatty acids were incorporated more into the NL fraction (18:1 $\omega$ 9, 20:5 $\omega$ 3) than in the PL fraction (20:4 $\omega$ 6). The ratios of 18:1 $\omega$ 9/22:6 $\omega$ 3 and (18:1 $\omega$ 9 + 20:1 $\omega$ 9)/(20:5 $\omega$ 3 + 22:6 $\omega$ 3) were found to be the lowest in the PL of the prawn pollack liver oil.

### Lipids and Essential Fatty Acids in the Nutrition of *Penaeus monodon* Larvae

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Total lipid levels and fatty acid distribution during larval development of *Penaeus monodon* were determined. Larvae were cultured utilizing standard rearing procedures and feeding schemes adopted by the Crustacean Hatchery of SEAFDEC Aquaculture Department in Tigbauan, Iloilo, Philippines. At each developmental stage (spawned egg,

nauplius, protozoa, mysis, postlarva), samples were collected for biochemical analysis.

Lipid content decreased with developmental stage (from egg to postlarva), indicating utilization of lipids as energy source during larval development and metamorphosis. The major fatty acids in the egg lipid were 16:0 (palmitic), 16:1 (palmitoleic), 18:0 (stearic), 18:1 (oleic), 18:3 (linolenic), 20:4 (arachidonic), 20:5 (eicosapentaenoic), and 22:6 (docosahexaenoic acids). As the larvae developed, levels of 16:1 and 18:1 fatty acids decreased with a corresponding increase in polyunsaturated fatty acids (PUFA), particularly 20:5 $\omega$ 3 and 22:6 $\omega$ 3. These indicate the importance of PUFA as dietary components.

Comparison was made between fatty acid changes during larval development and the fatty acid constituents of commonly used larval feeds (algae, rotifer, brine shrimp, egg yolk) for *P. monodon*. The algae and zooplankton were found to contain 20:5 $\omega$ 3, while egg yolk was high in total lipids but low in polyunsaturates. Most larval diets were deficient in 22:6 $\omega$ 3 fatty acid.

Crustaceans have been shown to have a limited capacity to biosynthesize long-chain PUFA; these have to be provided in their diet. These essential fatty acids must be available in appropriate amounts to ensure successful larval development and survival.

### Lecithin Requirement of *Penaeus monodon* Juveniles

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An 8-week feeding experiment was carried out to determine the lecithin requirement of *Penaeus monodon* postlarvae. Six shrimps with initial mean weight of 0.11 g were stocked in oval fiberglass tanks in a flowthrough system with 40 l of seawater. There were 5 replicates or a total of 30 shrimps per treatment. Diets were similar for all treatments except for the source of lipid and levels (0, 1 and 2%) of added soybean lecithin. Cod liver oil (treatments 1 to 3), crude degummed soybean oil (treatments 4 to 6) and refined soybean oil (treatments 7 to 9) were the three sources of lipid.

Differences in mean weight gain due to source among treatments were not significant after the fourth week of feeding but were significant after the sixth week. Mean survival rate was affected by source of lipid after the fourth and sixth weeks. Levels of lecithin significantly affected mean weight gain after the fourth and sixth week of feeding. Mean survival rate was significantly different among treatments after the sixth but not the fourth week. Although feed conversion or feed efficiency was generally poor, a trend is discerned. Feed conversion improved as dietary levels of lecithin increased from 0 to 2%. *P. monodon* juveniles need lecithin but the amount has yet to be defined.