The Effects of Stocking Densities on Growth and Survival of *Penaeus vannamei* in Cow Manure-Enriched Ponds

Cheng Sheng Lee, James N. Sweeney
and **Billy Richards**
Oceanic Institute
Makapuu Point, Waimanalo, Hawaii 96795, U.S.A.

Ecuadorian *Penaeus vannamei* were stocked in eight dirt ponds (approximately 163 m^2) at four different types of density, i.e., 5 shrimp/m^2, 10 shrimp/m^2, 15 shrimp/m^2, and 20 shrimp/m^2. The initial body weight ranged between 1.1 and 3.8 g. No commercial feed was given to the shrimp. The only input to the pond was 30 kg of cow manure/week. Shrimp were sampled either weekly or bi-weekly for body weight measurements. Water quality parameters, such as temperature, pH, DO and turbidity were recorded twice daily; nutrients (nitrite, nitrate, ammonium and phosphate) and BOD were measured twice weekly. The chemical composition of the cow manure was analyzed. After 14 weeks' experiment, the shrimp were harvested, weighed and counted. Survival and total yield were compared among treatments.

The results showed negative correlation between stocking density and growth. The weekly growth of shrimp was between 0.7 and 1.0 g. There was no relationship between stocking density and survival. Survival averaged 68%. The most suitable stocking density should be judged by profit. However, the total yield of shrimp was higher in the higher stocking density.

Role of Bacteria and Meiofauna in the Productivity of Prawn Aquaculture Ponds

David J. W. Moriarty
CSIRO Marine Laboratories
P.O. Box 120, Cleveland, Qld. 4163
Australia

Detrital food chains, based on the use of manures and compost have been used in aquaculture for centuries. Heterotrophic bacteria convert organic detritus into protein and thus constitute an important food source in ponds. Bacterial growth rates, and thus productivity, in natural environments can be calculated from the rate of tritiated thymidine incorporation into DNA. Rates of oxygen consumption by bacteria can be estimated from values for production. The tritiated thymidine method has been used to measure bacterial production in aquaculture ponds where a pelleted food was fed to penaeid prawns. It was found that most of the pelleted food was supporting bacterial growth, with bacterial production ranging from 0.43 to 2.1 $mgC\ell^{-1}d^{-1}$ in the water and 150 to 500 mgC $m^{-2}d^{-1}$ in the sediment. Bacterial biomass and growth rates were shown to be regulated by meiofauna, which in turn were eaten by the prawns. Primary production was not significant in the ponds. More oxygen was consumed by bacteria in the water column than was produced by photosynthesis of phytoplankton.

Average shrimp yields at harvest were: chicken manure, 262 kg/ha; cow manure, 218 kg/ha; feed, 387 kg/ha; and control, 160 kg/ha. Average survival for each treatment was 50, 76, 58 and 79%, respectively. The percent yield of *P. vannamei: P. stylirostris: P. occidentalis* by weight for the four treatments was 85:15:0, 87:13:0, 78:22:0, and 92:9:0, respectively. *P. occidentalis* suffered 100% mortality during the production period. Average weights of shrimp at harvest were 8.72, 7.32, 12.07, and 5.98 g for the respective treatments. Ratios of average individual weights for *P. vannamei: P. stylirostris* for the treatments were 2.00:1, 1.99:1 and 2.22:1, respectively. Manures and feed significantly increased yield over the control ($P < .0002$). Feed significantly increased yield over that of the manures ($P < .0001$); while yields for manures did not differ ($P > .05$). Survival was not significantly different among treatments ($P > .05$).

The Effects of Manures and Pelleted Feeds on Survival, Growth and Yield of *Penaeus stylirostris* and *Penaeus vannamei* in Panama

Glenn I. Garson
Department of Fisheries and Allied Aquacultures
Auburn University
Alabama 36849, U.S.A.

Richard M. Pretto
National Directorate of Aquaculture
Panama

and

David B. Rouse
Department of Fisheries and Allied Aquacultures
Auburn University
Alabama 36849, U.S.A.

Brackishwater ponds (0.8 m deep and 600 m^2) on the Pacific Coast of Panama were stocked at 5/m^2 with postlarval shrimp (1 cm, 0.05 g) collected from the wild. Species composition at stocking was 56% *Penaeus vannamei,* 33% *P. stylirostris* and 11% *P. occidentalis.* Experimental treatments received different nutrient inputs consisting of cow manure (4,500 kg/ha dry wt.), chicken manure (4,500 kg/ha), 25% protein pelleted feed (790 kg/ha) and a control (no nutrient input), each replicated five times, in random order. Water was exchanged 5 to 10% per day and the production period was 120 days during the 1982 rainy season.