



PD/A CRSP SIXTEENTH ANNUAL TECHNICAL REPORT

WATER EXCHANGE TO RECTIFY LOW DISSOLVED OXYGEN

*Eighth Work Plan, Honduras Research 4 (HR4)
Abstract*

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ABSTRACT

In Central America semi-intensive shrimp production technology is used by many producers. Semi-intensive production technology is characterized by final stocking rates of 5 to 11 shrimp m⁻², daily water exchange at ≤ 10% of pond volume, and use of 20 to 25%-protein feeds. The role of water exchange in semi-intensive shrimp culture is being evaluated in Honduras. Recently completed research (HR3) indicated that daily or emergency water exchange did not affect significantly shrimp production, but that water quality was better in ponds that received daily water exchange. However, differences in water quality generally did not become pronounced until the latter half of the 12- to 16-week production cycle. Producers may find unacceptable the risk associated with utilizing an emergency-only water exchange policy. However, it appears that the current standard practice of initiating water exchange the fourth week post-stocking is not the most efficient exchange strategy. This experiment builds on the previous experiment. The objectives of this experiment are to evaluate the effect of time of initiation of water exchange on pond dissolved oxygen, water quality, and shrimp production. Nine 0.93-ha ponds located on a commercial shrimp farm in southern Honduras are being used for this completely randomized design study. Water will be exchanged at 10% of pond volume per day, six days per week beginning four, seven, or ten weeks after stocking. The experiment is being conducted during the rainy season and will be repeated during the dry season. Ponds for the rainy season experiment were stocked with hatchery-spawned post-larval *Penaeus vannamei* at 150,000 PL ha⁻¹ (15 PL m⁻²) on 14 August 1998. Shrimp are fed six days per week beginning two weeks after stocking. Feed rate for all ponds is based on the theoretical feeding curve for *Penaeus vannamei*:

$$\text{Log}_{10}Y = -0.899 - 0.56\text{Log}_{10}X$$

where

Y = feed rate as a percent of biomass and
X = mean shrimp weight in grams.

Daily feed rate is calculated for individual ponds and then averaged so that all ponds receive the same quantity of feed on a daily basis. Feed is offered once daily. Shrimp growth is monitored weekly by cast net samples of each pond's population. Feed rate is adjusted weekly based on shrimp samples. Water quality variables in each pond are measured monitored weekly in pond and intake water. Water samples are analyzed for pH measured potentiometrically, nitrate-nitrogen by cadmium reduction, total ammonia-nitrogen, soluble reactive phosphorus, chlorophyll *a*, total alkalinity by titration to pH 4.5 endpoint, salinity, and 2-d biochemical oxygen demand at 20°C. Total nitrogen and total phosphorus are determined by nitrate and phosphate analysis, respectively, after simultaneous persulfate oxidation. Dissolved oxygen concentration and temperature are measured in ponds twice daily (0400 and 1600 h) at 25 cm below the water surface.

