Central America

PD/A CRSP researchers from Auburn University, and the Laboratorio de Calidad de Agua in Choluteca, as well as farm operators from the Grupos Granjas Marinas, Honduras, tested the effects of dietary protein (20 and 40%) and feeding rate on food conversion (FCR) and nitrogen discharge in the semi-intensive production of shrimp (*Penaeus vannamei*). Researchers found that neither a high feeding rate nor a high protein level in the diet of *Penaeus vannamei* affected production. Shrimp yields were not significantly higher at high feeding rates, and FCRs were very high. This indicated that the shrimp were overfed. Because shrimp were overfed the design of the low feeding rate treatment was undermined, and conclusions cannot be drawn regarding the effects of a high protein diet at very low feeding rate. Ponds from this study had a net discharge of organic material measured as total nitrogen, total phosphorus, chlorophyll-*a*, and BOD_2, and a net consumption of inorganic nitrogen. There was also a net discharge of filterable phosphate from the high feeding rate treatments and a net accumulation of filterable phosphate in the low feeding rate treatment. Research results corroborated previous studies conducted in Choluteca—as feeding becomes more efficient, the impacts of shrimp farming on estuarine environment should decrease.

In a companion study conducted during the dry season, researchers tested the effects of dietary protein and feeding rate on feed conversion and nitrogen discharge in the semi-intensive production of *Penaeus vannamei*.. Dietary protein level did not affect shrimp yields, which confirms results from previous studies. Increased feeding rate with the 20% protein feed did result in significantly greater shrimp yield; however, neither final individual shrimp weight nor survival differed significantly. Researchers suspected that shrimp survival was partially responsible for differences in shrimp yields rather than the two feeding rates, 50 and 75% of the feeding curve, for the 20% protein feed. Survival of shimp given the 20% protein feed at 50% of the feed curve was 5.2% lower than of the shrimp offered 20% feed at 75% of the feed curve. Further, research results concurred with prior studies indicating that minimal shrimp growth occurs after 11 to 12 weeks of culture during the dry season in Honduras. Profits may be reduced if shrimp culture is continued beyond 12 weeks. Low FCRs indicated that efficient feed management strategies were employed. With lower FCR values, the potential pollution impacts of pond effluents are reduced, because less nitrogen and phosphorus are added to ponds.

In an ongoing effort, the Honduras team continued to monitor estuarine water quality. The data collected supplemented a baseline of information established on selected chemical, biological, and physical characteristics of water at points along major shrimp producing estuaries in southern Honduras. The objective of this study was to detect trends over time regarding the impacts of shrimp farming on water quality. Preliminary results of monitoring since the inception of the project in 1993 indicate that total nitrogen concentrations have not increased with time; however, farm management to minimize effluents during the dry season is critical for preventing eutrophication of estuaries and conditions not able to sustain shrimp culture.

Fish reproduction is another focal point of CRSP research. In general, the oral administration of 17α-methyltestosterone (MT) is used for the sex reversal of newly hatched tilapia. Research to determine the optimal dose of MT to date has yielded inconsistent results. This may be due to environmental influences during the treatment. Therefore, PD/A CRSP researchers at Auburn University conducted studies to determine the efficacy of different dosages of MT for sex reversal when tilapia were held either indoors or outdoors. In addition the scientists evaluated the potential of freeze-dried bull testes as a dietary source of testosterone for tilapia sex reversal. Naturally occurring sources of testosterone may be a potential alternative to synthetic androgens for tilapia sex reversal.

Freeze dried bull testes were not effective in producing male tilapia populations of 95% or greater. The percentage of males obtained when bull testes composed half of the ration was significantly greater than non-treated populations; however, the percentage was too low to be practical. The effectiveness of 17α-methyltestosterone (MT)

was not affected by either indoor or outdoor treatments. Differences were not found in the efficacy of treatment dosages. Populations composed of greater than 97% males resulted from treatment rates of 15, 30, 45, and 60 mg MT/kg of diet. Survival rates were low after a 28-d MT treatment period, with survival in aquaria ranging from 16.7-27.7% and 25.7-43.6%, and survival in hapas ranging from 25.7 -43.6%. In addition feed ratios appeared to influence survival rates. Fry given feed containing bull testes on a 1:1 ratio was 28.3%, and 69.2% for fry given 1:3 feed ratio.