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PRODUCTION ECONOMICS RESEARCH IN AQUACULTURE IN THE EIGHTIES

by

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Production economic research questions in the eighties will depend on the fishery being considered. In Texas there are three species that are of major concern. Catfish as an industry in Texas started about 12 years ago and range in size from a small backyard operation to the largest being approximately 100 acres. Crawfish began in Texas about 4 or 5 years ago. Some rice land is being used for crawfish production. Research in Penaed shrimp has been conducted in Texas since 1969 and this year the first facility will produce about 20 acres of shrimp. Question asked of extension personnel vary with the problems associated with the industries.

Crawfish harvesting can occur from November through May. Producers want to know on a month by month basis cost related to pumping water, different amounts of bait used for harvest and labor for harvest (wages higher in colder weather)? In addition, they want to know what is the most efficient size pond and the most cost efficient pump for various size systems.

Catfish producers want to know what it cost to get into the business. What size production facility is needed to supply a processing plant? What is the most efficient size for one person to operate? How much labor is required for different size facilities? How much product do you have to sell for different size system to break even? What is the difference in demand feeders versus hand feeding versus mechanical feeding.

Shrimp mariculture has three stages. They are maturation and reproduction, hatchery and pond production. The most limiting constraint to shrimp mariculture becoming an industry in Texas is the availability of PL's (the size shrimp to be stocked in ponds). Persons interested in

shrimp mariculture want to know what is the smallest size facility in which all three stages can be included. If PL's could be purchased, what is the smallest size firm and pond size that would pay back in 4 or 5 years. In talking with researchers and persons interested in investing in a shrimp mariculture facility, they all seem to know what production scheme will maximize profits without having any knowledge of either costs or returns. And every person has a different scheme.

There are several issues that production economist need to address in the eighties. The first question relates to economies of size. This issue relates to both, size of the firm and size of the equipment or ponds within the firm. For example, there are substantial economic efficiencies between a one and two acre pond. In shrimp hatcheries facilities we found that in small size facilities the cost was very sensitive to the size of tank whereas in large size facilities the size of tank was less important. Economies of size are important in infant industries with unknown risk because potential investors want to capture most of the economies yet, keep their investment to a minimum.

The second question, production economies need to address is production strategies that maximize profit for a given facility. Question to be answered here relate to size of animal stocked, size of animal harvested, length of growing season, number of crops per growing season, number of animals stocked and monoculture versus polyculture. This is particularly important in an infant industry where there are no tried and true way of producing a fish.

Environment control is the third area of research that production economist need to be concerned. Some fish are very sensitive to the environ-

ment such as lobster where others are not such as tilapia. This question involves not only which variables need to be controlled but also the means by which they can be controlled. For example, oxygen is an important variable in any aquaculture system. Controlling oxygen not only affect the cost of producing an animal but also the quantity, size and quality of the animal produced which has a direct effect on revenue and profit. In shrimp, we have shown that dissolved-oxygen below 3 ppm increase risk and lower profit beacuse of poor production whereas, maintaining dissolved-oxygen above 4 ppm reduces risk but lowers profit because of increased cost. In older industries, where production practices are well established, production economist need to be concerned with feed cost and least cost rationing.

Finally, production economist must be concerned with the type of research being conducted by the fisheries biologist. One of the basic input in production economics is the production function. It has been my experience that fisheries biologists do not generally conduct the type of research or keep the appropriate data that will allow the production economist to obtain a physical production function. An example of this was when we went to develop cost and returns budgets for catfish production, data was not available even though biological research on catfish had been carried on for a number of years. The production economist can be helpful to the fisheries biologist by informing him which variable are economically important and the fisheries biologist is helpful to the production economist by providing him the data to estimate the physical production functions.