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Alternative Opportunities for Small Farms: Catfish Production Review¹

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Catfish farming in the United States has experienced tremendous growth in the past twenty years. Production has increased from 5 million lbs in 1972 to nearly 500 million lbs in 1996. The majority of production is concentrated in the Mississippi Delta region with an estimated 155,000 acres of ponds.

Catfish farms in Florida differ greatly from the large, established operations in the leading catfish producing states. Approximately 80% of Florida catfish producers have less than 20 acres of ponds and view aquaculture as an alternate means of supplementing their income. Recent development of catfish production acreage in Florida consists of traditional row crop farmers diversifying their farm income with 15 - 40 acres of catfish.

Catfish production is capital intensive and involves many risks and has been described as one of the most management intensive forms of farming. In addition to the high entry cost, Florida producers are faced with the many growing pains of a young industry. Among these are higher production costs associated with a small scale of operation and limited developed infrastructure. Additionally, market conditions are influenced by large producers and processors which pose new challenges for small producers in finding their market niche.

Marketing Situation

Farm raised catfish can be marketed in a variety of ways. Typically, large producers sell to processing plants that can accommodate large quantities of fish. These processing plants often have specific fish size requirements and farmers must manage their production to meet processor demands. Most southeast catfish processors have demanded a live catfish of 1.5 to 3 lbs in size for fillet products. A market exists in the southeast for smaller catfish (1/2 to 1 lb live), which is processed into 3 to 5 and 5 to 7 ounce whole dressed fish. This is a popular size fish for the "whole catfish platter" common in many southeast restaurants. However, the smaller fish costs more to raise and in some cases competition exists from wild caught catfish.

Another key consideration for small Florida catfish producers is that selling to a processing plant is considered a wholesale market and consequently, farmers receive the lowest prices for their fish. Because of these low prices, smaller farm size and higher production costs, the majority of Florida producers have opted to sell fish in retail markets. Although retail outlets accommodate smaller volumes of fish, they offer year-round and higher profit margin market opportunities.

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A popular method of retailing fish is to sell fish live or freshly dressed at the farm site, retail seafood stores or restaurants. When retail markets exceed-individual farmer supply some small farmers participate in cooperatives or sell through farmers markets.

Fee-fishing lakes where fishermen pay by the pound of fish caught or by the day of fishing, also offer attractive alternatives for the small producer. Other small growers may specialize in producing fingerling fish which are sold for grow out to market size or for restocking recreational fishing ponds.

Because of high production costs, it is recommended that small farmers retail as much of their product as possible. However, it is important to note that additional marketing cost and increased time demands are associated with retail marketing. In addition, retail markets depend on a steady supply of fish. Farmers servicing retail markets must plan and manage their production to meet their customer needs. A well thought out marketing plan, taking available resources and profit potential into consideration, is essential to a successful catfish farming enterprise.

Labor and Capital

Commercial catfish farming requires significant start up and operating capital along with management skills and time. Pond construction costs, including earth moving, water supply and drainage systems can range from \$2,500 to \$5,000/acre. In addition, necessary equipment, such as aerators and harvesting and feeding equipment, brings the total capital outlay requirements to \$5,000 to \$8,000/acre. If a suitable site is not previously owned, the additional cost of land must be incorporated into the total investment requirements. Total capital requirements can be significantly affected by site location, pond size and facility design. Careful attention to proper pond design and construction is important to minimize costs. The expense of local and state permits must also be considered.

In addition, operating or annual production capital is necessary. Major operating costs include: feed, fingerlings, electricity for well and aerators, labor for feeding, water quality management and harvesting, miscellaneous supplies including dip nets, waders, etc., equipment and pond repairs and chemicals for disease treatments. Feed, which makes up about half of the operating cost of producing catfish, is imported into Florida from Georgia and Alabama, therefore, increasing

the cost to farmers in Florida. In addition, farms less than 20 acres may not be able to justify using bulk feed delivery and are forced to use bagged feed which costs about \$40 to \$50/ton more than bulk feed. 1997 prices for bagged feed have been high averaging \$375 per ton.

In many cases it is only the farmers who have land and equipment available that can diversify into catfish farming without incurring large expense. Because of the higher start up and operating expenses and risk of catfish production, it is necessary for the producer to carefully consider the best marketing opportunity and follow recommended management practices to accurately evaluate the economic potential of catfish farming.

Establishment

Commercial catfish production ponds are generally between 1 to 20 surface acres in size and 4 to 6 feet deep. Florida ponds between 0.5 and 5 acres have been shown to be reasonably manageable units. Large ponds are cheaper to construct (per acre), but small ponds are easier to manage. Farmers selling fish to processors prefer ponds 5 - 10 acres, which when harvested, will provide enough fish to fill a live haul truck (10 to 18,000 pounds). Farms selling to retail market would benefit from using smaller ponds. The preferred construction method involves building levees by compacting layers of clay soil. Ponds are typically rectangular, 2:1 or 3:1 length to width, with a 1 to 2% slope from end to end. Ponds should be constructed with clean smooth bottoms to facilitate ease of harvesting. The presence of potholes or stumps can significantly reduce the efficiency of netting fish for removal. It is recommended that ponds have individual water supplies and drain lines to prevent spread of diseases and other problems.

New farms may be required to discharge all pond water into a retention or detention pond depending on farm production level and facility design. Specific information on aquaculture permitting is available through The Florida Department of Environmental Protection and local Water Management Districts.

In many areas of Florida, the sandy soils are not appropriate for constructing traditional clay bottom ponds. The high water table in many of the areas, however, creates conditions where ponds can be "dug" by excavating the sod. These ponds are then filled by seepage of ground water. Before constructing this type of pond, you must determine the extent of water table fluctuation, the ability to drain the pond by pumping,

and protection from flooding. Assistance in soil suitability can be obtained from your local USDA Natural Resource Conservation Service office.

A supply of good quality water is essential to successful fish farming. Although ground water ponds hold water when built in sandy soils with high water tables, another water supply is still necessary. Ponds built in clay sods above the water table generally require 1 to 3 times the pond volume replaced during the growing season. It is recommended that a minimum of 20 gals per minute/acre be available. Well water is preferred over surface water because it is free from wild fish, disease organisms and aquatic weeds. Water pumped from surface water supplies should be screened or filtered prior to use.

Production and Management

Common stocking rates of catfish for commercial growers are generally around 5,000 to 7,000 fish/acre and 8,000 to 10,000 fish/acre for producing smaller catfish (1/2 to 3/4 lb live weight). Production yields average 4,000 lbs/acre for larger fish. Yields for producing small catfish average 6,000 lbs/acre. Maximum feeding rates range up to 60 to 80 lbs/acre/day, 6 to 7 days a week, but can reach as high as 150 lbs/acre/day. Fish are stocked at fingerling size, usually between 4 to 6 inches and grown to the desired market size. After an initial stocking and growout period of 4 to 5 months for small fish and 6 to 8 months for large fish, the pond is partially harvested, the largest fish removed and replaced by an equal number of fingerlings. This cycle of partial harvest and restocking is continued for 2 to 3 years. At that time, it is necessary to drain the pond and completely remove all large fish that remain.

In contrast to the more popular multiple batch production system mentioned above, the single batch system involves stocking and harvesting a single crop of large fish every 8 to 10 months. Yearly draining is required to remove all fish which can significantly increase operating costs.

One of the most important facts the new fish farmer must face is that with intensive fish production, poor water quality and disease outbreaks can rapidly and dramatically lead to massive fish kills. High stocking and feeding rates result in heavy loads of wastes and nutrients entering the pond water. This typically leads to high oxygen demand and dense blooms of planktonic

algae. While algae is important and desirable for its role in oxygen production and waste removal, it also contributes to the majority of oxygen demand at night.

Once the pond is in production, the water quality variables of primary concern for the fish farmer are: (1) dissolved oxygen, (2) ammonia, (3) nitrite, and (4) pH. Certainly, in terms of oxygen, it is important to monitor levels at dawn (since pond oxygen problems occur most frequently between the hours of 2 a.m. and 6 a.m.), and in the late afternoon or evening. More frequent monitoring may be necessary if low oxygen problems are suspected. Fish farmers, during periods of oxygen crisis, typically work most of the night managing ponds often even if they are well equipped with aeration equipment. Farmers have a choice of tractor-powered paddlewheel aerators or electrically-operated paddlewheels. Tractor-powered aerators are used for emergency purposes and can be quickly moved from pond to pond. Because of the lower operating cost, electric paddlewheels are often installed in each pond. Continuous low level diffused aeration can be used as maintenance aeration to create an improved environment for fish production, however, this type of aeration usually is not adequate during a severe oxygen depletion.

Ammonia and nitrite problems often occur when oxygen is low. At times, however, they may be primary sources of *fish* stress. The pH level of water affects toxicity of ammonia and must be monitored along with ammonia to accurately determine the risk to fish. Poor water quality which stresses fish often leads to disease problems. Diseases are difficult to treat in ponds not only because of problems of distributing therapeutants, and the costs of treating such a large water volume, but also due to the fact that the Food and Drug Administration closely regulates those drugs and chemicals which can be legally used. Careful attention to water quality, feeding management and fish handling technique is essential to minimizing fish diseases.

Another significant problem in catfish production is off-flavor. Farmers producing fish for food must be concerned not only with quantity, but quality. Catfish produced intensively in ponds that receive heavy feed and high organic loads can occasionally become "off-flavored," tasting muddy or musty. These odors are compounds excreted by algae and bacteria growing in the pond which the catfish absorb. Processors and retail market outlets will not buy off-flavor fish and as a result the farmer is forced to keep his fish in the pond or other holding facility until the flavor problem can be solved.

Fish may take weeks to months to come back "on-flavor". Having to hold fish can greatly increase the cost of production and negatively impact cash flow.

Off-flavor is easily checked by cooking a skinless fillet in a microwave oven, smelling and tasting the meat. Of-flavors vary from the common earthy and musty to rotten egg and petroleum flavors. It is recommended that farmers routinely check fish approaching market size for off-flavor to monitor the marketability of fish. Additionally, farms should be designed with numerous ponds rather than a few to facilitate continual marketing of fish in the event of off-flavor.

Summary

Catfish farming is a capital intensive, high risk agricultural business. Developing a sound business plan is the first step and will assist the farmer in making a decision whether to grow catfish or not. The plan should thoroughly address all aspects of business including marketing, production and economics. In addition to the everyday challenges of water quality and fish management, the Florida producer has greater operating expenses. To optimize profit potential, it is recommended that small producers focus on retail market opportunities.