

The Emerging Importance of Aquaculture

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Kevin B. Howard provided research assistance.

When people consider the various enterprises associated with agriculture, aquaculture is unlikely to spring to mind. Simply put, aquaculture (or, as it is commonly called, "fish farming") is the growing and harvesting of fish—similar to any other agricultural commodity—for human consumption or other purposes. Since the 1960s, selected states in the Eighth Federal Reserve District have played a major role in the emergence of the largest component of the domestic aquaculture industry—the channel catfish. This article examines the growth of the catfish industry in the Eighth District, looks at recent trends, and discusses future challenges.¹

One key sector is the production of farm-raised channel catfish. In 1990, catfish production was the fourth most valuable fish crop in the United States—just behind salmon, shrimp and crabs. Total catfish sales reached a record \$323.2 million in 1990, a 19.8 percent increase over 1989. In fact, since 1981, catfish sales have grown at an average annual rate of 18.2 percent. In comparison, the total value of U.S. commercial fish landings between 1981 and 1990 increased at an annual rate of 4.6 percent from \$2.4 billion to \$3.6 billion.²

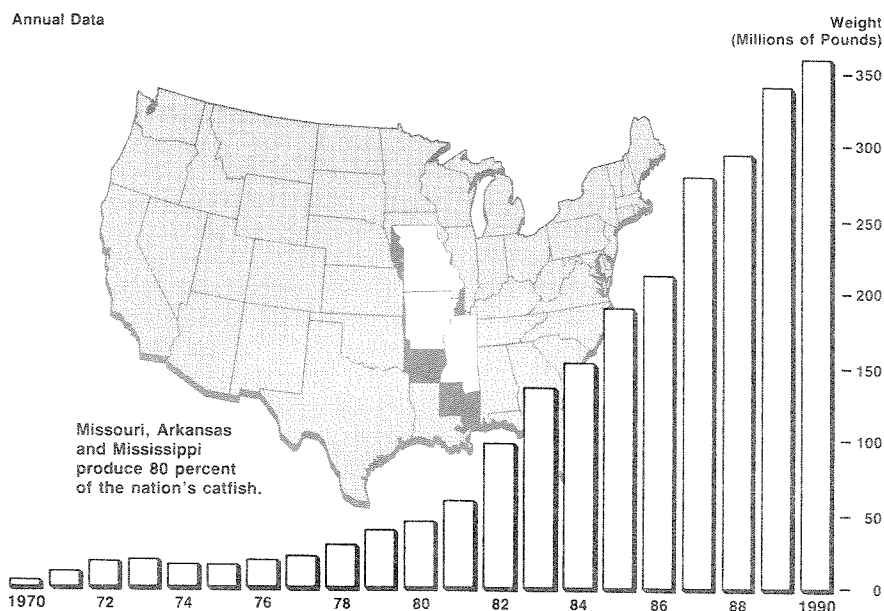
The growth of the catfish industry since the early 1970s has been rapid. As shown in figure 1, catfish production in 1970 totaled about six million pounds; production then grew rapidly, reaching 46.5 million pounds in 1980—an average annual growth rate of 23.3 percent. Although the production numbers posted in the 1980s dwarf those of the 1970s, the average annual growth rate from 1980 to 1990 is still 22.7 percent. Growth, however, has slowed in recent years. From 1987 to 1990, production has increased at an average annual rate of 8.7 percent; year-to-date production as of September 1991 is up 5.9 percent from one year earlier.

Supply and Demand Trends

U.S. aquaculture is a diverse industry—producing everything from alligators to baitfish.

One factor contributing to the slowdown in production is the disincentive of lower prices. The average price paid to producers in September 1991

Figure 1
Total Catfish Production



¹Measured as total live weight of fish delivered for processing.

(59 cents per pound) was roughly 21 percent less than the previous year and was the lowest in more than four years.³

Additional perspective on the growth of the catfish industry can be gained by examining the number of producers and the number of acres of water surface area devoted to catfish production. In 1982, there were 987 operations producing catfish. Operations more than doubled to 1,987 in 1988. Since then, the number has increased slightly—rising to 1,998 as of July 1, 1991.

The doubling of catfish operations has produced a commensurate increase in water surface area. In 1982, 73,840 acres were used in catfish production. By July 1991, this number had more than doubled to 166,160. Furthermore, this acreage understates somewhat the actual production capacity of the industry, as an additional 13,000 acres are reported as either under construction, under repair or withheld from production. The number of producers has declined for the past two years, while water surface area has continued to increase, which reflects a trend noticed in other agricultural sectors, namely, a larger production capacity per farmer.

The increased production of catfish—and large harvests of wild fish species—suggests that an increase in demand for fish has occurred. Indeed, per capita fish consumption has increased steadily over the years. This trend has coincided with an upward trend in poultry consumption and a downward trend in beef and pork consumption. For example, in 1980, per capita consumption of fish measured 12.5 pounds, beef consumption measured 72.1 pounds and poultry consumption measured 42.6 pounds. Since 1980, per capita consumption of fish has risen by an average annual rate of 2.2 percent to 15.5 pounds in 1990. During the same period, per capita poultry consumption has risen by nearly twice as much—4.1 percent per year—while beef consumption has *fallen* by 1.2 percent per year.⁴

One well-publicized factor that partially explains the preceding trends is the change in consumer preferences away from red meat toward fish and poultry. While the dietary benefits of increased fish and poultry consumption—at the expense of red meat consumption—are open to debate, this shift in consumer preferences has certainly aided the catfish industry.

Changes in supply and demand for fish, poultry and beef affect not only the quantities consumed and produced, but also their prices. Figure 2 shows catfish, beef and broiler prices from 1970 to 1990. In 1970, catfish prices averaged \$2.15 per pound, while beef prices averaged \$1.98 per pound and chicken prices averaged \$0.68 per pound. Although the inflation-adjusted price of all three goods has decreased between 1970 and 1990, the price of broilers has decreased much more than

beef or catfish. This may explain the higher growth rates of per capita broiler consumption.

Production by States

Although catfish is grown commercially in several states, a few states dominate the process. Table 1 shows that the six largest producing states account for roughly 94 percent of U.S. catfish sales, 71 percent of all operations and 93 percent of water surface area devoted to catfish production. Moreover, approximately 80 percent of all domestic catfish production occurs in the District states of Arkansas, Mississippi and Missouri.

Mississippi is, by far, the largest catfish-producing state in the United States. As of July 1, 1991, Mississippi had a little more than one-half of the U.S. water acreage devoted to catfish production and slightly more than two-thirds of U.S. catfish sales. Although catfish production in Mississippi is fairly widespread, two counties in the Delta region account for more than one-half of the water surface acreage. In fact, Humphreys County—with 31,865 acres—and Sunflower County—with 24,420 acres—each have more acres of catfish production than any other state.

As of 1990, catfish farming in Mississippi accounted for approximately 17 percent of livestock and products cash receipts and roughly 9 percent of total cash receipts (excluding government payments). Furthermore, at \$227 million, cash receipts from catfish operations in 1990 exceeded the combined cash receipts from corn, rice and wheat by nearly \$65 million.

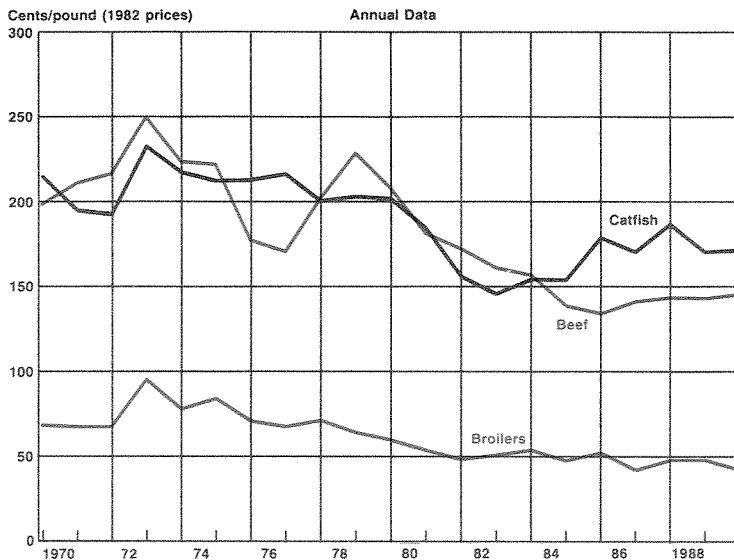
The dominance of Mississippi catfish farming is reinforced by looking at Arkansas—the nation's second-largest catfish-producing state. In 1990, Arkansas had total sales of just under \$30 million. Although significant, this was still just over \$1 for every \$8 sold by Mississippi growers. Similarly, production acreage in Arkansas, at about 21,000 acres, is less than one-quarter of that in Mississippi. Moreover, the average size per operation is exactly one-third as large as it is in Mississippi.

Catfish production in Arkansas occurs in several counties, but the greatest concentration is located in the extreme southeastern counties of Chicot and Ashley. Because of Arkansas' diversified agricultural sector, the catfish industry does not generate as large a share of agricultural output as it does in Mississippi. In fact, in 1990, catfish sales in Arkansas were 1.1 percent of livestock cash receipts and an even smaller 0.7 percent of total cash receipts.

Missouri is the only other District state to have significant commercial catfish production. As of July 1991, Missouri had 2,800 water surface

Figure 2

Prices of Wholesale Catfish, Beef and Broilers



acres engaged in production. This was same as last year and an increase of 200 acres from two years ago. Total sales, however, increased from \$2 million in 1989 to \$2.6 million in 1990. Other District states that have catfish production include Illinois, Kentucky and Tennessee. These states have relatively small operations, though, with each under 500 total acres.

Challenges Faced by the Catfish Industry

According to analysts, the largest obstacle facing the catfish industry today is over-capacity in the processing sector. Although it is estimated to be at least 50 percent—and possibly as much as 100 percent or more—processing capacity continues to increase.

This expansion has tended to increase the supply of catfish and reduce the real price of catfish received by the processing firm. In 1989, total processor sales of catfish (in pounds) increased 17.9 percent from the previous year; in 1990, although fairly moderate, the increase was 3.9 percent. Through September of this year, processor sales are running 5.9 percent ahead of last year's total. During the same period, real prices received by catfish processors have declined from an average of \$1.87 per pound in 1988 to \$1.71 per pound for 1990 (see figure 2). Moreover, since January 1991, real processor prices have fallen from \$1.61 per pound to \$1.48 per pound; this is nearly a 21 percent decline in real prices in a little

more than two years, and the lowest price in roughly six years. Consequently, profit margins have likely shrunk or turned negative for some processors. Economic theory suggests that those processors who are the least efficient at employing their economic resources will likely be forced out of the business.⁵

Despite this problem, the industry continues to add capacity.⁶ One explanation for this puzzling behavior might be that future prices are expected to be significantly higher, though there is no evidence to support such an explanation. Two other explanations provide better insights. First, grants have been issued by federal and state governments to build catfish processing plants in economically depressed areas with a goal of creating jobs. Second, catfish growers, lacking a viable marketing alternative for their product, band together to build a processing plant. Given that 75 percent to 85 percent of all processing plants are farmer-owned, this behavior may have been a response to the high growth in stocking rates undertaken by growers since the late 1980s.

A second, more long-term challenge facing the catfish industry is how to increase product awareness. The broiler industry faced an identical problem in its recent history. As the broiler industry developed new marketing techniques (admittedly, other factors such as vertical integration and mass production played a significant part as well), the industry began to post impressive growth.

A recent study found that slightly more than one-half of the respondents to a nationwide survey had heard of farm-raised catfish.⁷ More importantly, the study also found favorable attitudes toward

Table 1
Catfish Statistics By State

State	No. of Operations ¹	Water Surface Area ¹	Sales ²	Average Acres per Operation
Arkansas	202	20,700	\$ 29.6	102
Alabama	353	18,700	24.1	53
Louisiana	225	14,500	15.2	64
Mississippi	310	95,000	227.4	306
Missouri	125	2,800	2.6	22
Texas	202	3,300	6.0	16
Total U.S.	1,998	166,160	323.2	83

¹Measured as of July 1, 1991. Water surface area measured in acres.

²Total catfish sales for 1990 in millions of dollars.

SOURCE: Operations and water surface area taken from *Aquaculture Situation and Outlook*, United States Department of Agriculture (September 1991). Total sales listed in *Aquaculture Situation and Outlook* (March 1991).

catfish among consumers, grocers and restaurants. Not surprisingly, favorable attitudes tended to be the highest in the South and the lowest in the Northeast. These favorable inclinations may have induced the McDonald's Corporation to test-market a catfish sandwich in parts of five Southern states. Such marketing attempts by fast food chains, grocers and restaurateurs, as well as those by the industry itself, appear to be essential to continued expansion of the industry.

The industry faces other challenges as well. These include issues related to waste disposal in the growing and processing sectors and the potential gains that could result from genetic engineering, such as nutritional improvements and productivity gains resulting from a more efficient feed conversion process.

Because the catfish industry has become an important economic entity in the Delta Region, another concern is the maintenance of a viable labor force.⁹ Although the industry is relatively capital-intensive, the demand for experienced workers, whether in the growing or processing sector, remains high. As a consequence, average (nominal) wages in the processing sector have risen by

approximately 20 percent since last year. Although this wage increase resulted primarily from collective bargaining agreements reached last year between catfish processors and workers' unions, the fact remains that processors were willing to pay even higher premiums in some cases because of shortages of workers with certain skills.

Summary

Few industries in the agricultural sector can match the high growth rates posted by the farm-raised catfish industry during the last 20 years. Although the growth rate has slowed somewhat, the increasing importance of fish in the consumer diet should enable catfish to play a larger role in the future. Whether the catfish industry can become the high-growth broiler industry of the 1990s is not certain. What is certain, however, is that the farm-raised catfish industry faces many of the challenges—and opportunities—inherent to a relatively new industry.

¹The author wishes to thank Seymour Johnson, Mike McCall and David Harvey for providing assistance.

²U.S. commercial fish landings are classified as harvest of wild fish species (for example, salmon, shrimp or crabs) and exclude aquaculture products such as catfish or trout.

³Catfish prices tend to be seasonal. The price of the good, therefore, will be at its highest (lowest) when demand for the good is at its peak (trough).

⁴Measures of per capita consumption are on an edible weight basis.

⁵A good example would be the bankruptcy of a large processor in Texas, which had difficulty competing in the current market environment of tight profit margins.

⁶See the *Catfish Journal*, Catfish Farmers of America (April 1991), p. 6 and p. 11.

⁷See Carole Engle, et. al. "The U.S. Market for Farm-Raised Catfish: An Overview of Consumer, Supermarket and Restaurant Surveys," Arkansas Agricultural Experiment Station, Bulletin Number 925 (September 1990).

⁸These and other issues are discussed in David Harvey, *Aquaculture Situation and Outlook*, United States Department of Agriculture (September 1991).

⁹According to one unofficial estimate, the catfish industry annually contributes almost \$2 billion to Mississippi's economy and employs approximately 8,000.