

# Agricultural Economic and Policy Perspectives

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## Modular Catfish Production

The price of catfish received by producers is presently above \$0.70/lb and the cost of fish feed is in the \$230/ton range. Both are good for catfish farmers. However, it was not that long ago producers were receiving 55 cents per pound and paid \$300/ton for feed. Imports were one of the contributing factors to the low price producers received, but the anti-dumping tariffs placed on Vietnamese "catfish-like" fish have reduced imports, but the China catfish card looms on the horizon. Another factor that has caused increased catfish production costs is the increase in individual fish size required by processing plants. The result of each of these effects has been to decrease net returns to catfish producers.

What is in store for the future of the U.S. catfish producer. It is expected that continued imports of catfish-like fish or other fish products will compete with U.S. farm-raised catfish. Secondly, there will be future years in which catfish feed will be expensive. And third, the larger fish size requirement is here to stay as these fish become the desired 3-5oz fillets that are so popular with catfish consumers. So for catfish production to continue to be profitable and competitive changes in production management and technology must occur.

When is the best time to make management and technology changes to the farm? The "best" time to implement management changes may be when catfish prices are high and feed prices are low (i.e., now). What changes can be made to positively affect catfish production returns? There are some

new technologies and disease vaccines available that have been shown to increase net returns, though costs may increase in the process of producing even greater receipts and net returns. This article discusses one production management scheme that some larger catfish farms, greater than 400 acres, have been slowly evolving toward over the past several years.

Presently, the majority of the U.S. catfish industry uses a multiple-batch production system. This system has been very good at producing  $\frac{3}{4}$  to 1-1/4 pound catfish which was the desired size range of processors until the late 1990's. Some suggest that the multiple-batch production system no longer works under the larger catfish size requirements. The multiple-batch system has two, three or four different sizes of catfish grown concurrently in a production pond which allows partial harvesting of foodsize fish about any time of the year. Fingerlings are stocked once or twice a year and fish are partially harvested once or twice a year as well -- the multiple-batch production system is continuous with ponds being drained only every 7 to 12 years. This system allows producers to manage around off-flavor fish, by having at least some ponds on-flavor and with harvest-sized fish. In the multiple-batch system fingerlings are stocked into the pond at a rate of 7,500 fingerlings per acre and grown from 4" or 5" to 1.5 pounds and may take 24 to 30 months.

Problems with the multiple-batch production system include having large amounts of fish biomass in the pond that often result in problems related

*Continued on page 2*

## Consumer Debt and Housing Prices

Are consumers overspending on housing? The continual increase in housing prices and the use of financing other than conventional mortgages could be trouble spots for the U.S. economy. House price depreciation could hurt consumers and lenders just like the drop in farmland values in the mid 1980's hurt many farmers.

The rise in house prices has been quite dramatic over the last several years (see Figure 1). As the figure indicates, prices have risen over 5% per year in most areas of the country since 1998. Some areas, such as California, have risen much more dramatically. 2004 saw an especially large

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*Catfish - Continued from page 1*

to diseases, water quality and bird depredation. Certain spring and fall disease outbreaks affect smaller fish more than larger fish and in the multiple-batch system it is difficult to get medicated feed to the targeted smaller fish size as larger fish eat the feed supplied first leaving little, if any, feed for the smaller fish. Additionally, all ponds have fish in the 4" to 8" size range most vulnerable to bird depredation. Another problem with the multiple-batch system is that high mortality may occur but these losses may not be detected or known for 18 to 30 months, i.e., when ponds are partially harvested. Thus, it is difficult to know pond fish inventories with much certainty. Presently, producers stock high numbers of fingerlings once or twice a year to get around these inefficiencies.

An alternative production system, called the "modular" production system, is beginning to emerge that could eventually replace the traditional multiple-batch production system. In the modular production system, there are three modules or phases of production with a harvest and a re-stocking occurring at the end of each phase. In phase one the producer has the choice of growing fry to 4" or 5" fingerlings or he can purchase this size fingerling from a hatchery. These fingerlings are counted and stocked into phase two ponds at a high density (50,000/acre) and grown to ¼ pound "stockers." Only 13% of the operation's pond acreage need be in phase two ponds to harvest enough stockers to stock the remaining 87% of ponds in the next phase. In phase three, the ¼ pound stockers are stocked at a low density (4,800/acre) into ponds for final growout to a 1.5 pound size. Ponds in this system are "zeroed out" after phase one and phase two by lowering the pond level and using rotenone to kill any remaining fish. Phase three ponds will be partially harvested two or three times before a final harvest is conducted and then the pond will be "zeroed out" as well.

One key to better management found in the modular production system is the additional harvests that occur between phases that allow checks on survivability and accurate re-stocking of fish into the next phase of production. Because fish are ¼ pound in size for stocking into the final phase, there is little mortality as these fish have been "hardened" by one spring and two fall disease "seasons" already and if they were going to die from diseases they would have most likely already have done so. The second key is that during the fingerling to stocker phase this system takes advantage of the fish's growth potential and their appetite has been likened to high school boy's appetite, i.e., eating everything in sight and growing in leaps and bounds.

Another advantage of the modular production system over the multiple-batch system is that it produces larger-sized fish consistently. Second, it improves inventory knowledge as any losses are known once a phase harvest occurs, allowing stocking adjustment to be made going into the next phase. A new potential advantage from this system is the flexibility and quick reaction the system gives to producers to address changes in processor weight specifications or sell fish while the price is high. Both could be

effectively addressed during the relatively short duration of the final growout period through modification of the number and size of stockers produced in the fingerling to stocker phase ponds and in the stocking number put into the final growout acreage. The modular system also offers a decrease in the probability of water quality and disease problems for the final growout phase because stocking density and therefore total pounds of fish in the pond will be lower than in the multiple-batch system. Economic losses arising from bird depredation can be minimized through farm pond allocations, i.e., by placing densely stocked phase two ponds in areas of the farm having high activity that would keep birds away. The length of the stockers harvested from phase two ponds just exceeds the 8" size documented to be at the upper most length that cormorants will eat. Final growout can then be conducted in ponds located further away from activity centers with decreased fear of large losses due to bird depredation.

A partial budget analysis of the changeover from a multiple-batch to a modular production system was conducted to determine if the change would result in a positive increase in net returns. The analysis was conducted on a hypothetical 1,100 acre catfish farm presently using a multiple-batch production system and stocking 7,500 fingerlings per acre into growout ponds. This type of farm requires 5 managers/laborers and feeds close to 8,000 tons of 32% protein feed in a year to produce 5.45 million pounds of fish annually. In contrast, the modular production system would be expected to harvest 6,500 pound/acre of 1.67lb catfish or 6.23 million pounds of catfish annually. The modular system uses 643 tons of 35% protein feed in phase two and 6,063 tons of 32% protein feed in phase three. It should be pointed out that the figures used in phase two of the modular system were based on the results of Mississippi State University research and engineered enterprise budgets were used for the multiple-batch production system also conducted at MSU. The partial budget presented here summarizes key differences in the engineered enterprise budgets for each production system.

Changes in the operational revenue from this production system transformation included the difference in total production in the modular system (6.23 million lb) and the current multiple-batch system (5.45 million lb). At a sales price of \$0.70 per pound, the increased production from the modular system results in an added income of \$544,839 or \$568/acre of foodfish production.

Several operational changes were identified that would be expected to lead to production cost reductions. The most significant reduction was found in total feed costs. Total feed requirements for the modular system were 6,706 tons (643 tons of 35% protein feed in phase two and 6,063 tons of 32% protein feed in phase three). In the multiple-batch system total feed requirements are expected to be 7,956 tons. The reduction in feed usage associated with the modular system amounts to \$173,655 or \$181/acre (assuming \$407/ton of 35% protein feed and \$230/ton of 32% protein feed).

*Catfish - Continued from page 2*

Other aspects of the modular system contributing to cost reductions are a decrease in the number of fingerlings required for initial stocking. The multiple-batch system requires 8.25 million fingerlings annually while the modular system only requires 7 million fingerlings annually. This occurs because the 50,000 fingerling stocking rate used in phase two is for only 140 acres (13% of all acreage) whereas the multiple-batch system stocks 7,500 per acre over 1,100 acres.

There is a reduction in required off-flavor treatments since such treatments are not necessary on the 140 acres devoted to phase two, non-food fish, production. Also, an additional 2hp/acre of aeration is required in phase two of the modular production system (the multiple-batch production system in this example initially has 2hp/acre).

Additional costs from this management change do occur. The modular system requires additional fuel and labor to seine and move fish after each phase of the modular production process. These operations also necessitate investment in additional aerators, seine nets, water pumps and tractors. Thus, interest, depreciation, and repair/maintenance costs are expected to be higher. Overhead costs (such as insurance) would also be expected to be higher due to the new equipment investments. In the modular system, there would be the hiring of additional seining labor. Finally, electricity costs are higher due to the need for increased aeration in the modular system.

From Table 2, it can be seen that the increased profits (\$784,949) are greater than the added costs (\$233,615). This indicates the changeover to a modular production system is financially sound with a net increase of \$551,334 or \$501/acre.

However, it is important to keep in mind the potential limitations of the partial budgeting analysis. First, the outcome of any partial budgeting exercise obviously depends on the assumptions

used in developing the enterprise budgets. The example presented here is particularly complex, in that it evaluates a fundamental change in the entire production system. Developing this partial budget requires a large number of assumptions about changes in total production, required investment in new equipment (and the terms under which that investment is made), and other required changes in physical factors of production. It is important to carefully consider the values used in estimating cost and return entries in the partial budget. In some cases, such information may not be available. Even when it is available, research and/or demonstration project results (or the experience of other producers) may be quite different from what an individual producer might realize on his or her operations. For this reason, it can be extremely beneficial to examine how changes in key values-such as fish or feed prices or anticipated changes in production levels-affect the outcome of the budget.

Second, this partial budget investigates how the profitability of the operation will be affected by a change in the operation once that change has been fully implemented. While this partial budget analysis reveals that the proposed change will be profitable, there may be significant cash flow implications from this change that cannot be addressed with the partial budget. For example, the partial budget examined here accounts for higher ownership costs (interest, depreciation, repair and maintenance) associated with additional equipment purchases. It does not, however, indicate whether or not cash flow within this system would be sufficient to make principal payments on any loans taken out to finance these equipment purchases. Likewise, once the change to a modular system is fully implemented, additional income/reduced costs should be more than sufficient to cover additional out-of-pocket expenditures on electricity and fuel. However, while the change is being implemented, would the producer be able to cover these higher costs until the benefits of increased production could be realized? Again, this is a cash flow issue that

cannot be addressed with the partial budget. The partial budget should be considered a first step in evaluating whether or not a proposed change to an operation is worth pursuing. If a comprehensive partial budget analysis (including an evaluation of several different price and production level scenarios) shows that the change would be likely to be profitable, then additional investigation would need to be performed to determine the most feasible means of implementing the change.

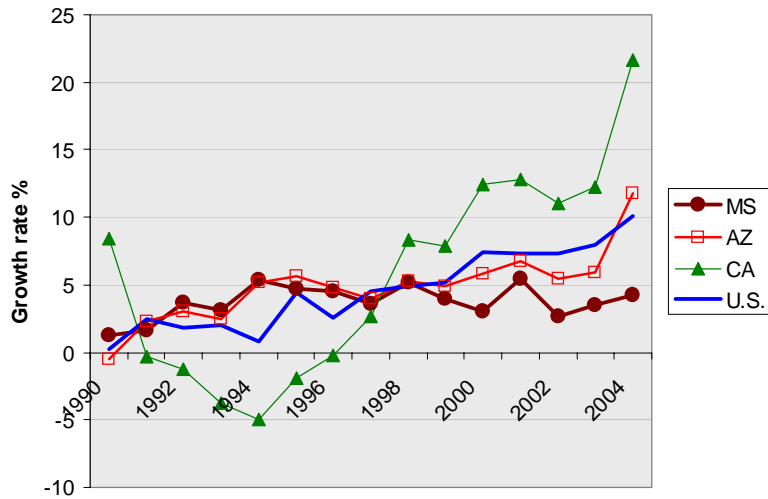
**Table 2.** Partial budget analysis of a change to a modular production system from a multiple-batch catfish production system for a 1,100 acre operation

<b>A. Increased Profits</b>		<b>B. Decreased Profits</b>	
<b>1. Added Income</b>		<b>1. Added Costs</b>	
a. Change in foodfish production (6,233,242 lb - 5,454,900 lb) x \$0.70/lb	\$544,839	a. Aeration electricity	\$88,022
		b. Labor	\$72,000
		c. Depreciation on equipment	\$14,207
		d. Repair & maintenance	\$19,405
		e. Additional transport of harvested fish	\$11,675
<b>2. Reduced Costs</b>		f. Diesel fuel	\$9,828
a. Foodfish/stocker feed	\$173,655	g. Interest on equipment	\$6,140
b. Fingerlings (-1.05 million 4.3" fingerlings)	\$53,750	h. Miscellaneous expenses	\$3,500
c. Reduced off-flavor costs (less diuron)	\$7,560	i. Interest on operating capital	\$8,838
d. Meter charges	\$5,145		
		<b>2. Reduced income</b>	N/A
<b>Subtotal</b>	<b>\$784,949</b>	<b>Subtotal</b>	<b>\$233,615</b>
<b>Profit or Loss (A-B) =</b>	<b>\$551,334</b>	<b>for the 1,100 acre farm per acre increase (excluding broodfish and renovation acreage)</b>	
	<b>\$501</b>		

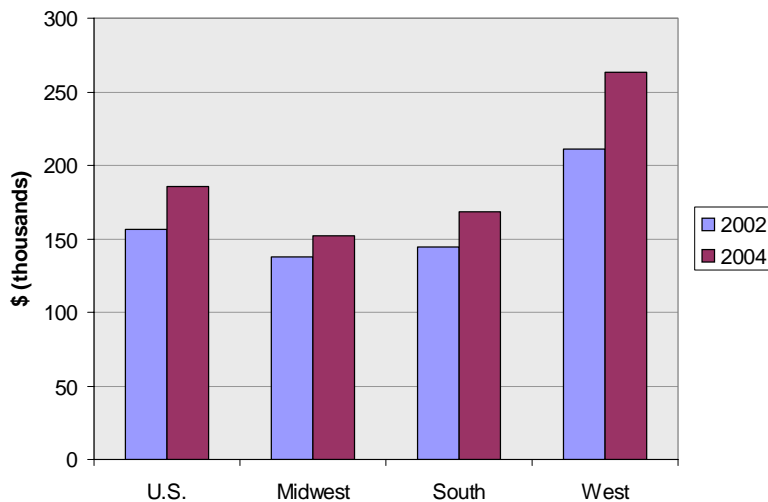
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**Note:** Modular production system has a target production of 6,500 lbs/ac and a target average harvest weight per fish of 1.67 lbs.

Consumer Debt - Continued from page 1



**Figure 1.** Yearly Change in Housing Prices  
 Source: National Association of Realtors



**Figure 2.** Median House Prices for 2002 and 2004  
 Source: National Association of Realtors

**Table 1.** Median House Prices and Income

Year	Median House Price	Payment as a % of Income	Median Income	Qualifying Income
2002	\$158,100	18.7	\$51,680	\$38,592
2003	170,000	18.1	52,682	38,064
2004	184,100	18.9	54,527	41,136
2005 (Mar)	193,600	19.3	56,521	43,680
Northeast	244,900	21.9	62,707	54,864
Midwest	154,800	14.8	59,339	35,088
South	168,100	18.6	51,491	38,256
West	291,400	28.4	57,246	65,040

rise in house prices with the U.S. average increasing by more than 10%. Mississippi's rate of house price increases has remained fairly constant at 5%.

Current median house prices are shown in Figure 2. As the figure illustrates, prices have increased dramatically from 2002 to 2004 with large regional differences in housing costs. The average house price in each region (not shown) is much higher due to some very expensive houses that skew the distribution.

Table 1 lists the median priced single-family home, the median family income, the qualifying income based on a 20% down payment, and the payment as a percentage of income. While the payment percentage has been inching upward, the median family income is still sufficient to afford the median priced family house. However, this is not true for all areas of the country. In the west, the qualifying income is \$8,000 more than the median income. This is a good indication of a housing bubble because something is going to have to give in the long run.

Table 1 does not illustrate all the potential problems either. Many consumers cannot afford the 20% down payment. These consumers are going to have even more trouble making payments. A similar table for first-time home buyers would show the median income below the qualifying income for the entire U.S. for a longer period of time. Also, the use of medians can hide individual trouble spots.

**Consumers response**

The rapid rise in housing compared to incomes has caused consumers to undertake more creative financing methods. Interest only loans used to be a novelty. Now, interest only loans make up 17% of loans, according to the Mortgage Bankers Association. Adjustable Rate Mortgages (ARM's) account for an additional 46% of loans. As might be expected, these two loans types are used most often in California.

What is surprising is the use of non-traditional mortgages when 30-year fixed rates are still around 6%. This rate is still cheap from a historical perspective. The use of mortgages that require smaller monthly payments when traditional mortgages are relatively inexpensive seems to indicate consumers are buying houses at the top end of their payment capacity. By purchasing using an ARM or in-

terest only loan, consumers can get a more expensive house than they could with a conventional mortgage

There are at least two major problems with these loans. First interest rates are only fixed for the initial few years of the loan. Thus, as rates rise, consumers will have to pay more toward housing. The interest only loans usually require principal payments to be added to the loan payment after five years or so. In either case, higher payments will likely stretch consumers who were probably already near a maximum affordability when they bought the house in the first place.

The second problem with these loans is potential housing depreciation. If housing prices decline, then consumers who are not paying much in principal could easily lose whatever little equity they started with. Any housing depreciation will make it difficult for consumers to change houses as they will have to generate money for a down payment from a source other than home equity.

In summary, interest only loans and ARM's can be a viable financing alternative as long as housing continues to appreciate and interest rates remain low. However, a decline in housing prices or an increase in interest rates could make it difficult for consumers to make payments and it could limit a consumer's ability to change houses. There is a strong possibility that an increase in interest rates could go hand-in-hand with a decline in house prices.

In many of these high-prices areas consumers might be wise to either buy a smaller house with a conventional mortgage or consider renting. If the housing market ever duplicates the farmland situation of the mid-80's then those consumers who are heavily in debt could find themselves facing bankruptcy. Those lenders with a large portfolio of interest only or ARM loans could also face financial difficulties

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## MAEA Symposium

Agricultural policy and the state of the agricultural industry will be the topics of the Mississippi Agricultural Economics Association annual symposium in Starkville.

The 31st annual symposium will be held June 2 and 3 at Mississippi State University in the Forest Products Auditorium. The public and those representing the ag industry, business and finance are invited to attend. A \$20 symposium fee covers the Friday meeting and lunch.

Mark Keenum, chief of staff for Sen. Thad Cochran, will discuss the federal budget and the Farm Bill. Ken Hood, MSU Extension Service economist, and other speakers will discuss value added and alternative agricultural enterprises for Mississippi.

Topics of discussion will include the forest industry and product development, bio-diesel and alternative fuel technology, alternative uses of agricultural land such as ag tourism, and e-commerce in Mississippi.

The symposium begins Thursday afternoon with a scholarship golf tournament and steak social. The forum runs from 8:30 a.m. to noon Friday and ends with lunch. For more information on times and costs for Thursday's events or to register for the symposium, call (662) 325-2671 or visit <http://www.agecon.msstate.edu>.

### *Schedule*

Vance Watson - Vice President MSU, V.P for Ag, Forestry & Vet-Med  
Topic - The State of the University/College of Agriculture

Mark Keenum - Chief of Staff for Senator Thad Cochran  
Topic - "Federal Budget and Farm Bill"

Ken Hood - MSU Food & Fiber  
Topic - Value added and Alternative Agricultural Enterprises for Mississippi

Dan Seale - MSU Forest Product Lab  
Topic - Forest Industry and Product Development

Jim Miller - MSU Fisheries & Wildlife  
Topic - Alternative uses of Agricultural Land (Ag Tourism)

Parks Wells - Director of Tennessee Soybean Association  
Topic - Biodiesel

Joe Jordan - MSU Food & Fiber  
Topic - E - Commerce in Mississippi

Marty Brunson - MSU Fisheries & Wildlife  
Topic - "Catch a Dream Foundation"

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## Upcoming Events

- 3 Profitable Marketing & Harvesting of Timber-Fulton
- 5 How to Manage Your CRP-Pine Plantation-Booneville
- 5 Managing Pines for Timber & Wildlife-Oxford
- 7 Tree Identification Workshop-D'Lo
- 10 Forestry for Baby Boomers Workshop-Meridian
- 14 Forestry for Baby Boomers-Philadelphia
- 19 Business Management Workshop-Brookhaven
- 19 Statewide Dairy Field Day
- 20 Safety/Intro/BMP Workshops-Brookhaven
- 21 Forestry Wildlife Management for Profit & Recreation-Gallman
- 23 Mississippi Homemaker Vol. State Council-MSU
- 24 Tree Identification Workshop-Batesville

## USDA

### May 12

Crop production  
Cotton Ginning (annual)

### May 17

Milk production

### May 20

Cattle on feed  
Livestock slaughter  
Farm labor

### May 23

Catfish processing  
Chickens and eggs

### May 28

Agricultural prices

### May 31

Poultry slaughter

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