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BULLETIN 437  
AUGUST 1972



# Experience and Location as Factors Influencing Income from Commercial Catfish Enterprises

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# Experience and Location as Factors Influencing Income from Commercial Catfish Enterprises\*

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## INTRODUCTION

**F**ISH HAVE BEEN commercially cultured in farm ponds for thousands of years. However, it was only recently that the commercial production of catfish reached a position of economic importance in the United States. In 1968, for example, about 500 acres of impounded water were used for the intensive production of catfish (1). By middle 1971 over 5,000 acres of water were used for catfish production (2). The tenfold increase over the 3-year period indicated the rapidity with which the industry grew.

The growth in catfish production was associated with much misinformation as well as a lack of information regarding the profits to be obtained from producing catfish. In addition many of the problems associated with confined, high density production were not recognized. As with any new industry, producers learned from current research as well as from experience.

A previous study indicated the differential returns based upon size of the production unit (3). In general the larger catfish operations were more profitable. However, sufficient data were not

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\* This study was conducted under research projects Hatch 299 and 630 R (S-83) supported by State and Federal Funds. Appreciation is expressed to catfish producers and others who supplied information to make this study possible.

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available to fully describe salient characteristics of Alabama commercial catfish producers. Neither were data available to determine if locational advantages were present within the State. Thus, the general objective of the study was to delineate specific characteristics of commercial catfish operations and the influence of certain characteristics on costs, returns, and investment. Specific objectives were:

1. To determine the influence of experience in commercial catfish production on costs, returns, and investment.
2. To determine the influence of location of production on costs, returns, and investment.

### METHOD OF STUDY

The names, addresses, and type of production of all catfish producers in Alabama were provided by Alabama County Extension and Soil Conservation workers. The complete list of producers included 1,150 individual operations. Data were collected by personal interview with 703 producers in all Alabama counties. Marketing and production data for commercial production were compiled from 236 of these producers. Extensive cost and return data from 53 producers in 17 counties were used to supplement the general cost information for use in preparing budgets.<sup>1</sup>

The data were first analyzed to identify characteristics of the operators and of catfish operations. Second, the data were subdivided on the basis of the experience of operators. Finally, the operations were analyzed with respect to physical location within the State. For purposes of analysis the State was subdivided into three areas: Northern, Central, and Southern, see figure.

After completion of the Statewide surveys on production and costs the questionnaires were edited and transposed to magnetic tape. All calculations were performed using the entire sample size as a base. Thus, in estimating average chemical cost, the total expenditures for chemicals were divided by the total number of producers. If all producers did not purchase the specific cost item then average cost was lower than most producers actually paid. The proportion of producers who utilized the major production items was determined and reported in the characteristics section.

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<sup>1</sup> See Appendix for cost procedures.



Northern, Central, and Southern areas as divided for analysis of costs, returns, and investments of commercial catfish producers, Alabama, 1970.

### Characteristics of Operations and Operators

Information describing the operation and situation of Alabama's catfish industry was not available in 1970. For this reason, a comprehensive account of the various operations of the producers interviewed was offered. An analysis of the data provided a systematic method for determining Alabama's commercial catfish situation.

#### Size of Operations

In 1970, commercial catfish operations ranged in size from 1 to 71 acres of water with an average of 13 acres. Average pond size was 5.6 acres. Two-acre ponds comprised the largest portion, 19 per cent, of total sample acreage. Four-acre and 1-acre ponds accounted for the next two most significant segments of total acreage with 14 and 10 per cent, respectively. Only 16 per cent of total sample acreage was devoted to production of catfish in ponds of 30 acres or more.

The average number of ponds per catfish producer was slightly less than three. The percentage of producers who had different numbers of ponds was as follows:

<i>Number of ponds</i>	<i>Percentage of producers</i>
1.....	53
2.....	20
3-5.....	15
6-8.....	7
9 or more.....	5

#### Operator Characteristics

Ninety-one per cent of the commercial catfish units sampled were operated by the owner. Only 4 per cent were directed by a manager. The remaining 5 per cent were organized and operated as a partnership.

Producers ages ranged from 22 to 72 with an average of 47 years. The largest segment, 19 per cent, was in the 41-45 age grouping. Seventy-three per cent of the producers were over 40 years of age.

Only 9 per cent of the producers indicated catfish production was their primary occupation. Forty-one per cent classified themselves as farmers. Those who specified farming as their primary occupation had an average of 15 years experience in farming. Years in farming ranged from 2 to 52 years.

Experience in catfish production was generally lacking among producers. Experience ranged from 1 to 8 years with an average of 2.5 years. Fifty-eight per cent of the producers had only 2 years experience. Another 21 per cent had 3 years experience, while 7 per cent had only 1 year of experience.

### Expansion of Production

Catfish production began major growth in 1967 when 19 per cent of the respondents constructed their first pond for catfish, Table 1. Also in 1967, 11 per cent of the producers stocked their first catfish pond. In 1968, 45 per cent of those interviewed constructed their initial catfish pond. The pond construction increase was followed by a similar increase in stocking in the following year. Pond stocking lagged construction by a year, primarily because producers usually contracted for pond construction in summer and fall but waited until late winter or early spring to stock.

Twenty per cent of the producers added additional ponds to their operation in 1968. Further expansion of the number of ponds per producer continued in 1969 and 1970. Although comprehensive data were not available from producers in 1970, County Extension and Soil Conservation workers disclosed that requests for pond construction information and catfish feasibility data were widely demanded in mid-1970. These requests indicated that interest in pond construction and stocking would continue at a rapid pace, at least for a few years after 1970.

TABLE 1. PER CENT OF COMMERCIAL CATFISH PRODUCERS, BY YEAR OF POND CONSTRUCTION AND STOCKING, FIRST AND LAST POND, ALABAMA, 1970

Years	First pond <sup>1</sup>		Last pond <sup>2</sup>	
	Constructed	Stocked	Constructed	Stocked
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>
Before 1960.....	7	2	4	0
1960-1963.....	5	2	0	0
1964.....	5	2	0	0
1965.....	7	4	0	0
1966.....	5	7	4	0
1967.....	19	11	4	8
1968.....	45	27	44	12
1969.....	7	45	28	48
1970.....	---	---	16	32
Total.....	100	100	100	100

<sup>1</sup> Fifty-three producer responses were included in the first pond section.

<sup>2</sup> Forty-six producer responses were included in the last pond section. Ponds were not double counted.

### Catfish Income

Sixty per cent of the producers indicated they were satisfied with the income received from their catfish operation. Production of catfish contributed the following percentages of total income of the respondents:

<i>Percentage of total income received from catfish</i>	<i>Percentage of producers</i>
51-100.....	3
26-50.....	3
6-25.....	34
1-5.....	60

Catfish was not a major income producing enterprise for the 1969-1970 producers in terms of total income. Ninety-four per cent of the producers received less than 25 per cent of their total income from catfish in 1970. This was primarily due to production on a limited basis with few ponds and small acreage.

### Source of Loans

Twenty-five per cent of the respondents revealed that they borrowed money to enter the catfish business. Loans were provided by local commercial banks (65%), Farmers Home Administration (14%), Production Credit Association (14%), and Federal Land Bank (7%). Apparently managers of financial institutions thought that catfish production was a better risk than it had been in previous years.

### Water Supply

Water supply was a major concern of catfish producers in Alabama in 1970. Wells were used by 24 per cent of the producers. Twenty-nine per cent of the producers depended on springs to supply water for ponds. In most cases the water supply from wells and springs was supplemented by watershed, since most ponds were constructed to facilitate an effective flow of rainwater into the pond. An inadequate water supply was indicated as a problem by 20 per cent of those contacted.

### Pond Drainage

In the early stages of development of the catfish industry, many ponds were built with inadequate drainage systems. In 1970, only 4 per cent of the producers interviewed indicated their ponds were not drainable. However, in many cases although the



ponds were drainable, the drainage system was inefficient. Numerous producers indicated drain pipes were too small to remove a sufficient amount of water in a short period of time. Also, many ponds were not built with catch basins; thus, harvesting required more labor. Drainage time per acre ranged from .6 of an hour to 268 hours with an average of 17 hours.

### **Fingerling Purchase**

Alabama's commercial catfish producers purchased fingerlings from 20 sources. Fingerling producers were located in Alabama, Mississippi, and Georgia. Commercial catfish producers paid an average of \$54 per 1,000 for fingerlings. The average fingerling stocking rate was approximately 2,000 per acre. Since the purchase of fingerlings represented an investment of over \$100 per acre, commercial catfish producers attempted to purchase only high quality fingerlings which had been treated for parasites and diseases.

### **Feeding**

Purchase of feed was split fairly evenly among three sources: (1) producer cooperative purchasing organizations, (2) feed and seed stores, and (3) directly from a mill. Producers used both sinking and floating feed with an average cost of \$105 per ton and \$143 per ton, respectively. Eighty-four per cent fed floating feed. Producers preferred floating feed primarily because it allowed them a means to judge the rate of consumption by fish and thus avoid problems resulting from over or underfeeding. Fifty-three per cent employed the consumption methods for judging their feeding rate. Feeding charts were used by 25 per cent of the respondents. Charts provided feeding rates based on the stocking rate, age, and size of fish.

Another method for determining feed consumption was feeding based on body weight of the fish. The major disadvantage of this method was that the weight of fish could only be estimated. This method was also time consuming since samples of fish had to be caught and weighed. Even after an average body weight was established, an estimate of pond population had to be made. Total body weight of the fish was multiplied by 3 per cent, the standard feeding rate prescribed for efficient growth, giving total feeding rate. Since total feeding rate was based on estimates, overfeeding or underfeeding was possible. Producers learned that both overfeeding and underfeeding were costly. Underfeeding resulted in

a low growth rate, while overfeeding led to high feed conversion rates as well as oxygen depletion problems in some cases.

A small percentage of those interviewed employed a "guess method" for feeding. This method was even worse than the body weight method since no direct relationship was reached between the number and size of fish and the amount of feed.

The majority of commercial producers fed fish 7 days a week. The percentage that fed each day was as follows:

<i>Day</i>	<i>Percentage who fed</i>
Monday.....	98
Tuesday.....	98
Wednesday.....	97
Thursday.....	97
Friday.....	97
Saturday.....	95
Sunday.....	52

Fewer operators fed on Sunday primarily because of recommendations from former studies based on the assumption that fish need a day to consume excess feed. In some cases, this resulted in a lower growth rate since there was no excess feed to consume on the offday with the consumption feeding method.

Eighty-three per cent of the respondents indicated they fed in the afternoon. In many cases, this was a matter of convenience. Feeding required an average of approximately 4 minutes per acre. Although the requirement per acre was higher for small ponds, this time period indicated feeding was not a major labor requirement on a day-to-day basis for Alabama's commercial catfish producers.

About two-thirds of the producers indicated they checked fish for growth. An estimate of growth rate gave producers an idea of how well their feeding programs were functioning. An analysis of changes in growth rates also enabled producers to identify problems before excess damage was done. A monthly check of growth rate was made by 57 per cent of those interviewed.

### **Labor**

Total labor requirements were low for Alabama's commercial catfish producers. The major labor requirements necessitated an average of one person per operation. On an April to October basis, inclusive, labor requirements averaged approximately 7 minutes per acre per day. The majority of this labor was furnished by the owner and his family.

Yearly labor requirements averaged 278 hours, including both small and large producers. This requirement represented an average of 20 hours per acre per year for catfish production in Alabama.

In many cases, processors furnished all or part of the harvest labor. For those producers who furnished harvest labor, labor requirements averaged 6 hours per acre. In the cases where producers had to furnish labor for harvesting, neighbors and friends usually volunteered their service in exchange for a few fish or for a small fee.

Maintenance, fertilizer, and chemicals were not major input requirements for those interviewed. Only 35 per cent utilized fertilizer in the production of catfish. Twenty-six per cent of those contacted used some type of chemical in the production of the 1969-70 crop. Thirty-one per cent had expenditures for maintenance.

### **Marketing**

Markets were available in sufficient numbers in 1970 to transfer total production of catfish to consuming units at a favorable price. According to the producers interviewed, demand for catfish exceeded the supply. Ninety-two per cent of the interviewees indicated they could have sold more catfish. The primary marketing channels used by producers were: (1) processing plants, (2) grocery stores and fish markets, (3) restaurants, and (4) individuals.

Processors purchased an average of 13,527 pounds of catfish from commercial producers at an average price of \$.37 per pound in the 1969-70 crop year. Prices ranged from \$.30 to \$.40 per pound of fish. Purchases by processors ranged from 500 pounds to 93,000 pounds for the 1969-70 crop of catfish marketed through processors.

Eight per cent of the catfish producers in the sample sold fish to grocery stores and fish markets. These purchasing units ranged from 3 to 35 miles away from the producers. Grocery stores and fish markets paid an average price of \$.55 per pound of fish with a range from \$.35 to \$.85 per pound. The higher prices were obtained for dressed fish. Producers marketed an average of 9,000 pounds through these channels.

Only 2 per cent of the producers sold catfish to restaurants. Eating establishments were sometimes owned by the producer

who harvested at various times depending upon the demand for catfish and the inventory of fish at the restaurant. Catfish producers who sold fish to restaurants received an average price of \$.55 per pound with a range between \$.50 and \$.60. Respondents marketed an average of 2,800 pounds of fish through this channel.

Fifteen per cent of the producers sold fish to individuals. The majority of these fish were sold at the pond site, but some were dressed and delivered to the purchaser. Producers received an average of \$.52 per pound for fish sold to individuals. Prices ranged from \$.30 to \$1.00 per pound. Average sales to individuals by these producers were approximately 1,000 pounds.

Marketing of catfish to individuals at the pond or by delivery offered some potential for growth. Ponds were located an average of only 9.6 miles from a population center. Thirty-three per cent of the producers were located near a town with a population range of 3,000 to 4,000 people. Ten per cent of the producers were near a town with a population of approximately 25,000 people.

### **Operator Opinions of Catfish Business**

To obtain the consensus of opinion among producers concerning the situation and potential of commercial catfish production in Alabama, producers were asked some general questions about their operation. While the largest number of commercial producers entered the catfish business for a profit, a significant number initially raised catfish for their personal use.

<i>Response</i>	<i>Percentage of total</i>
Felt they could make money.....	38
Wanted pond for private use.....	21
Already had pond available.....	12
Built pond for other purposes.....	10
Hobby.....	10
Advice from others.....	9

Only three of these categories indicated that the respondent entered catfish production primarily for the profit motive although it was recognized that the producer probably expected to make a profit.

When producers were asked if they would advise other individuals to enter commercial catfish production, 77 per cent gave a positive answer while 7 per cent were uncertain. The three primary yes answers: (1) yes, but the individual must consider

his own situation, (2) yes, can make a profit, and (3) yes, if the individual has a suitable location.

Sixty-one per cent of the respondents disclosed they were planning to increase the size of their operation. The other 39 per cent signified that they would maintain the same size operation. The potential for greater return was given by 66 per cent of the producers as the reason for their planned increase in production. The next most significant reasons offered were: (1) to take advantage of excess demand, (2) to utilize unused land, and (3) to get a larger operation.

Those who preferred not to expand usually indicated reasons which would have limited them even if they had wanted to expand. The two most common reasons, no suitable land available and just built new ponds, represented 27 per cent and 23 per cent, respectively, of those who gave a negative answer.

Disease problems were not extensive among the catfish operations studied. Only 9 per cent of the producers reported disease problems in their operations. Although diseases were not widespread among catfish operations, those producers whose fish were diseased felt the problems were major. For this reason, producers learned to recognize disease symptoms and what course of action to follow in case of problems.

The problem most commonly mentioned by the interviewees was maintaining the proper pond oxygen level. Other problems encountered by producers were as follows:

<i>Problem</i>	<i>Percentage of total</i>
Lack of uniform growth.....	16
Fish being stolen.....	14
Algae.....	13
Small percentage of stocked fish harvested.....	11
Trash fish.....	5
Floods.....	3
Processor problems.....	3

Although these problems were important in 1970, new ideas and methods may be adopted to eliminate many of them in the future.

Thirty-one per cent of the respondents indicated they would change their ponds if they could rebuild. The responses most often given were: build larger ponds, remove trash from pond, smooth the bottom of the pond, use larger drain pipe, change the shape of the pond, and improve the catch basin.

Commercial catfish production in Alabama was performed by many units which varied with respect to size, location and pur-

pose in 1970. As catfish production becomes more viable, production units will become more similar in form and operation.

### **Analysis of Costs and Returns**

The ultimate determinant in any business conducted for a profit is the spread between the cost of producing a unit and the returns from the sale of the unit. It is axiomatic that producers will attempt to allocate their resources such that a given input leads to the greatest possible net output.

Costs were divided into two types, fixed and variable. Fixed costs were those which did not change with the level of production. Typical fixed costs included taxes and interest on borrowed funds. Additional fixed costs in catfish production included pond and equipment depreciation. Once a pond was built the construction costs were fixed whether or not the pond was used for raising catfish. Variable costs include feed, fingerlings, disease control, and other costs that fluctuate with the level of production. In most agricultural production activities the variable costs exceed the fixed costs.

For all commercial catfish producers interviewed total annual costs were \$341 per acre or \$.28 per pound of catfish produced. Variable costs were \$294 per acre and fixed costs were \$47. Net returns after sale of the product were \$167 on gross sales of 1,228 pounds of catfish per acre of water. Average sales price was \$.41 or a differential of \$.13 between the cost of production and the sale price per pound of catfish produced. Producers utilized about 20 hours in labor growing the fish and 6 hours in harvesting per acre of water in production. Total investment requirements for both land and equipment was \$772 per acre.

While the average net returns for the entire sample of commercial catfish producers indicated were relatively high, there were substantial variations in returns among producers. To further examine the sources of these variations producers were first analyzed with respect to experience in raising catfish and then with respect to geographic location of production within the State.

### **Experience of Operator**

Data were subdivided into two groups: those producers who had produced catfish more than 2 years and those with 2 or less years of experience. The more experienced producers generally

TABLE 2. AVERAGE COSTS PER POUND OF CATFISH PRODUCED, BY ITEM AND PERIOD OF OPERATOR EXPERIENCE IN COMMERCIAL CATFISH PRODUCTION, ALABAMA, 1970

Item	More than 2 years	2 years or less
	<i>Dol.</i>	<i>Dol.</i>
<i>Variable costs</i>		
Feed.....	.105 <sup>1</sup>	.107 <sup>2</sup>
Fingerlings.....	.080	.087
Electricity.....	.004	.019
Maintenance.....	.002	.005
Transportation costs.....	.002	.005
Harvest labor.....	.008	.005
Fertilizer.....	.007	.004
Chemicals.....	.002	.002
Miscellaneous.....	.002	.002
Interest on oper. capital.....	.011	.012
<i>Total</i> .....	.223	.248
<i>Fixed costs</i>		
Pond depreciation.....	.016	.020
Equipment and facilities depreciation.....	.014	.014
Interest and taxes.....	.003	.005
<i>Total</i> .....	.033	.039
<i>Other costs</i>		
Land <sup>3</sup> .....	.005	.005
Labor.....	.030	.020
<i>Total</i> .....	.035	.025
<i>Total cost</i> .....	.291	.312

<sup>1</sup> Feed conversion: 1.94:1.

<sup>2</sup> Feed conversion: 1.85:1.

<sup>3</sup> Land was valued at \$100.00 per acre. Land investment was charged at six per cent.

had more acres of water in production although the acreage size of each pond was somewhat smaller. The difference, however, was not large enough to be judged significant in a statistical sense. The more experienced producers were able to produce a pound of catfish about \$.02 lower than the less experienced producers, Table 2. The total cost per acre for experienced producers was about \$13.00 higher, Appendix Table 1. The anomaly of higher acreage cost and lower poundage cost indicates greater productivity per acre. The experienced producers harvested over 100 pounds more catfish per acre than the less experienced producers.

There were only two areas where the experience of producers seemed to make a substantial difference — productivity per acre and marketing. Beside producing about 100 pounds more per acre, experienced producers also received a higher average price for fish, Table 3. As producers gained experience in the business they established markets for their fish. The dual factors of higher

TABLE 3. AVERAGE COSTS AND RETURNS PER POUND OF CATFISH PRODUCED, EXPERIENCE IN COMMERCIAL CATFISH PRODUCTION, ALABAMA, 1970

Item	More than 2 years	2 years or less
	<i>Dol.</i>	<i>Dol.</i>
Gross receipts.....	.440 <sup>1</sup>	.388 <sup>2</sup>
<i>Costs</i>		
Variable.....	.223	.248
Fixed.....	.033	.039
Total.....	.256	.287
<i>Returns</i>		
Returns to land, labor, and management....	.184	.101
Cost of land.....	.005	.005
Return to labor and management.....	.179	.096
Cost of labor.....	.030	.020
Return to management.....	.149	.076
Average investment.....	.552	.616
Return to investment, pct.....	27.7	13.0

<sup>1</sup> Average pounds of catfish produced per acre was 1,331. The figure included 18 pounds of catfish which were used for home consumption.

<sup>2</sup> Average pounds of catfish produced per acre was 1,202. The figure included 10 pounds of catfish which were used for home consumption.

yield and higher price allowed a net return to land, labor, and management of \$.08 per pound greater than the return to these factors for less experienced producers. This return was in excess of 100 per cent higher on a per acre basis, Appendix Table 2.

The less experienced catfish producers had an average investment per pound of catfish produced that was about \$.06 higher than investments of more experienced producers. The difference was primarily due to pond investment costs which were higher on newer ponds, Table 4. To the contrary, more experienced producers used about 14 more hours per acre in producing catfish, Appendix Table 3. The additional time used in feeding and maintenance could have contributed to the higher harvest rate. In addition the more experienced producers had a higher feed cost per acre and a lower feed efficiency. Nevertheless the feed cost per pound was lower for these producers.

Analysis of the data from experienced and less experienced producers indicates that catfish production involves an individual learning process. A producer needs a certain amount of experience to judge the proper feeding rate, to determine signs of stressed or diseased fish, and to recognize oxygen problems. In addition a producer must find a source of high quality fingerlings to stock the pond and a stable market in which to sell harvested fish.



TABLE 4. AVERAGE INVESTMENTS AND LABOR REQUIREMENTS PER POUND OF CATFISH PRODUCED, EXPERIENCE IN COMMERCIAL CATFISH PRODUCTION, ALABAMA, 1970

Item	More than 2 years		2 years or less	
	<i>Dol.</i>		<i>Dol.</i>	
<i>Equipment and facilities</i>				
Boat and motor.....	.007		.009	
Truck.....	.035		.040	
Tractor and mower.....	.019		.015	
Fish hauling tanks.....	.023		.000	
Storage shelter.....	.032		.046	
Motor and pump.....	.046		.030	
Well.....	.050		.062	
Miscellaneous.....	.006		.006	
<i>Total</i> .....	.218		.208	
<i>Other investment</i>				
Pond.....	.334		.408	
<i>Total investment</i> .....	.552		.616	
<i>Labor requirements</i>				
Operator.....	<i>Hr.</i>		<i>Hr.</i>	
Harvest labor.....	.020		.013	
Harvest labor.....	.005		.003	
<i>Total</i> .....	.025		.016	

Experience is important in catfish production as it is in any enterprise. The experienced producers display their ability to survive in a competitive market by increasing their profits.

### Location of Production

Catfish production was not evenly distributed over Alabama. Neither was commercial catfish production distributed in the same proportion as a total production, Table 5. The central area of the State had 40 per cent of all producers and of all commercial producers. However, this area had 65 per cent of all commercial acres and 48 per cent of all acres in production. The existence of two processing plants at Greensboro, Alabama, in Hale County gave producers an outlet for sale of fish. Hale and Dallas counties each had more acres in commercial production than the entire

TABLE 5. NUMBER OF PRODUCERS AND ACRES IN PONDS, COMMERCIAL AND ALL CATFISH PRODUCERS BY AREA, NORTHERN, CENTRAL, AND SOUTHERN ALABAMA, 1970

Location	Commercial producers		All producers	
	<i>No.</i>	<i>Acres</i>	<i>No.</i>	<i>Acres</i>
Northern.....	77	585.25	310	1,890.37
Central.....	95	1,829.00	439	3,858.78
Southern.....	64	419.15	401	2,275.15
State total.....	236	2,833.40	1,150	8,024.30

TABLE 6. AVERAGE COSTS PER POUND OF CATFISH PRODUCED, NORTHERN, CENTRAL, AND SOUTHERN, ALABAMA, 1970

Item	Northern	Central	Southern
	Dol.	Dol.	Dol.
<i>Variable costs</i>			
Feed.....	.140 <sup>1</sup>	.096 <sup>2</sup>	.128 <sup>3</sup>
Fingerlings.....	.120	.078	.091
Electricity.....	.008	.007	.014
Maintenance.....	.005	.004	.010
Transportation.....	.001	.004	.005
Harvest labor.....	.004	.004	.016
Fertilizer.....	.001	.006	.005
Chemicals.....	.001	.002	.003
Miscellaneous.....	.002	.002	.001
Interest on operating capital.....	.015	.011	.014
<i>Total</i> .....	.297	.214	.287
<i>Fixed costs</i>			
Pond depreciation.....	.020	.018	.023
Equipment and facilities depreciation.....	.013	.014	.015
Interest and taxes.....	.004	.003	.004
<i>Total</i> .....	.037	.035	.042
<i>Other costs</i>			
Land <sup>4</sup> .....	.004	.005	.005
Labor.....	.022	.025	.037
<i>Total</i> .....	.026	.030	.042
<i>Total costs</i> .....	.360	.279	.371

<sup>1</sup> Feed conversion: 1.87:1.

<sup>2</sup> Feed conversion: 1.79:1.

<sup>3</sup> Feed conversion: 2.23:1.

<sup>4</sup> Land valued at \$100.00 per acre. Land investment was charged at six per cent.

Southern area, Appendix Tables 4, 5, and 6. Processing plants were also located in Cullman, Montgomery, Calhoun, Geneva, and Mobile counties within Alabama. In addition there were numerous wholesale fish markets located throughout the State.

Commercial producers in central Alabama raised fish to a saleable weight for \$.07 less per pound than producers in northern Alabama and \$.10 per pound less than producers in southern Alabama, Table 6. The cost differential was primarily due to reduction in variable costs and better feed conversion ratios. The generally larger size of production units, as well as grouping of numerous units in the same area, allowed substantial savings on volume purchases of feed, fingerlings, and other production items.

Gross receipts per pound of catfish produced were highest in the northern area of the State, Table 7. The higher receipts per pound indicated increased sales to restaurants, fish markets, and live haulers. Greater gross receipts in the area overcame the

TABLE 7. AVERAGE COSTS AND RETURNS PER POUND OF CATFISH PRODUCED, NORTHERN, CENTRAL, AND SOUTHERN, ALABAMA, 1970

Item	Northern	Central	Southern
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
Gross receipts.....	.478 <sup>1</sup>	.397 <sup>2</sup>	.412 <sup>3</sup>
<i>Costs</i>			
Variable.....	.297	.213	.287
Fixed.....	.037	.035	.042
Total.....	.334	.248	.329
<i>Returns and other costs</i>			
Returns to land, labor, and management...	.144	.149	.083
Cost of land.....	.004	.005	.005
Return to labor and management.....	.140	.144	.078
Cost of labor.....	.022	.025	.037
Return to management.....	.118	.119	.041
Average investment.....	.540	.583	.675
Return to investment.....	22.7	21.3	6.9

<sup>1</sup> Average pounds of catfish produced per acre was 1,382. The figure included 25 pounds of catfish used for home consumption.

<sup>2</sup> Average pounds of catfish produced per acre was 1,200. The figure included 11 pounds of catfish used for home consumption.

<sup>3</sup> Average pounds of catfish produced per acre was 1,254. The figure included 35 pounds of catfish used for home consumption.

differential in production costs between northern and central areas. While the southern area producers gross receipts were higher than the central area, the differential was not high enough to overcome the unfavorable cost position. The southern area had the lowest net returns per pound of fish produced. The northern area with lowest cost and highest receipts also had the lowest production per acre.

The southern area had the highest investment per pound of catfish produced while the northern was lowest, Table 8. Producers in the southern area were not getting as efficient use of resources as were producers in the other two areas.

On a per acre of water in catfish basis, the relationships among the areas was even more striking. The central area had a variable cost advantage over the northern area for every item except transportation, fertilizer, chemicals, and miscellaneous. The feed cost differential alone exceeded \$70 per acre, Appendix Table 7. The area had a variable cost advantage over the southern area for every item except fertilizer and miscellaneous costs.

Gross receipts per acre were lowest in the central area, Appendix Table 8. The reduced receipts were due to lower production and lower sales price for the output. The northern area had the

TABLE 8. AVERAGE INVESTMENTS AND LABOR REQUIREMENTS PER POUND OF CATFISH PRODUCED, NORTHERN, CENTRAL, AND SOUTHERN, ALABAMA, 1970

Item	Northern	Central	Southern
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
<i>Equipment and facilities</i>			
Boat and motor.....	.011	.008	.011
Truck.....	.005	.036	.077
Tractor and mower.....	.011	.018	.005
Fish hauling tanks.....	.000	.035	.005
Storage shelter.....	.039	.037	.023
Motor and pump.....	.021	.041	.043
Well.....	.046	.049	.058
Miscellaneous.....	.002	.004	.003
<i>Total</i> .....	.135	.228	.225
<i>Other investment</i>			
Pond.....	.405	.355	.450
<i>Total investment</i> .....	.540	.583	.675
<i>Labor requirements</i>			
	<i>Hr.</i>	<i>Hr.</i>	<i>Hr.</i>
Operator.....	.014	.017	.025
Harvest labor.....	.003	.003	.010
<i>Total</i> .....	.017	.020	.035

highest gross receipts and net returns. The production level coupled with sales at higher prices overcame the unfavorable cost positions. The northern area also had the lowest equipment and facilities investment per acre, Appendix Table 9. However, their pond investment was higher than pond investment in the central area.

The southern area generally exhibited an unfavorable position relative to the remainder of the State. Small ponds and limited number of producers did not allow economies of volume purchasing. However, producers were able to sell fish for generally higher rates.

The southern area of the State has a climatic comparative advantage. The growing season is somewhat longer and average daily temperature is higher during the winter months. The area is at a disadvantage with respect to markets. Excepting Mobile, the southern area of the State has the lowest population density. Also, much of the area must compete with seafood products.

The central area of the State developed catfish production to a greater extent since alternative agricultural enterprises were limited. Catfish production net returns exceeded returns from major enterprises except cotton and peanuts both of which were restricted by allotments. As marketing channels for catfish develop, commercial production tends to center around processing

facilities. The present practice of hauling fish from the Mississippi Delta will no longer be feasible as processing capacity in that area expands. Producers must adjust production to allow year-round harvesting. Until marketing channels are stabilized, catfish production will remain extremely limited in Alabama.

### SUMMARY AND CONCLUSIONS

Catfish production as a farm enterprise does not have a long history in Alabama. A survey in 1971 indicated more than half of the producers had been in business less than 2 years. Production was characterized by many small producing units throughout the State. Over half of the producers had one pond.

Growth of the catfish industry began in 1967 when 19 per cent of the producers constructed their first pond. The greatest number of ponds was initially stocked in 1969. Growth in the industry was followed by problems in marketing fish. Many producers felt that the demand for catfish exceeded the supply. However, many of these same producers were not satisfied with the price they received for fish.

Disease problems occurred as producers placed catfish into more intensive growing situations. In addition, problems of oxygen deficiency arose when ponds were not properly aerated. Producers purchased pumps and used other means to increase dissolved oxygen during the summer.

Production labor was not a significant cost factor. After the fingerlings were stocked feeding and maintenance required only about 4 minutes a day per acre. Harvest labor usually required about 6 hours. Catfish production labor usually could be performed in the morning and evening without competing with labor required for other types of production.

Experience was an important factor in the amount of profit received from sales of catfish. The more experienced producers had established markets and received about \$.06 more per pound for fish. They also produced about 100 pounds more per acre than less experienced producers. With experience the operators were able to recognize disease problems before they reached epidemic proportions. In addition they had established feeding rates and aeration practices that minimized the incidence of oxygen stress.

Commercial production was concentrated in the central portion of the State. The concentration of production allowed cost

efficiencies in production in that area. Central areas producers were able to produce a pound of catfish for \$.28 and established markets for sales at \$.40 for a net differential of \$.12 per pound. Producers in neither of the other areas could produce fish at this average cost level although producers in both areas were able to market fish at a higher price.

Catfish production represents a viable alternative in farm management plans. With experience and after establishment of a market a catfish producer can anticipate net returns to land, labor, and management of approximately \$100 per acre. The net returns can be increased by efficient use of resources and maximum production from ponds. The labor requirements are such that production will not seriously interfere with other types of agricultural production.

Three cautionary notes must be added. An adequate supply of year round water must be available. Aeration equipment must be provided if the water supply is not free flowing. Pesticide or insecticide applications on other crops must not be allowed to contaminate the fish. As a final note, to reap profits catfish production must be conducted as a business. Treat a pond of catfish like a pen of steers being fattened. Buy quality fingerlings, feed a complete ration, and harvest healthy odor-free catfish.

#### LITERATURE CITED

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**APPENDIX**  
**Cost Procedures**

Feed, fingerlings, fertilizer, chemicals, utilities, property tax, insurance, and interest on borrowed capital were charged as indicated by the respondent. General maintenance expenditures were charged at the price reported by the respondent, but long-term maintenance outlays, dam or pond renovations, were depreciated by the straight line method with no salvage value. The straight line method was used because most farmers were familiar with the calculations. An estimated life of 20 years was used for maintenance depreciation — long term maintenance expenditures — as well as for pond depreciation. Ponds were also depreciated by the straight line method with no salvage value at prices indicated by the respondents.

Gas expense for truck use was based on individual cost responses or on yearly catfish share figures as reported by the producers. If the latter response was given, gas charges were computed by dividing total catfish mileage by 15 miles per gallon and multiplying the resulting figure by \$.25 per gallon for gas.

All labor expenditures except operator’s labor were charged at the rate indicated by the respondent. Labor requirements were based on actual catfish labor requirements.

Equipment and facilities were depreciated by the straight line method with no salvage value. Total costs for equipment and facilities were adjusted for percentage use in the catfish operation. Expected life of these items varied among entries as follows:

<i>Item</i>	<i>Expected life (years)</i>
Tractor and mower.....	12
Agitator.....	3
Well.....	20
Barn or shed.....	10
Motor and pump.....	6
Truck.....	10
Fish hauling tank.....	5
Boat and motor.....	5

Interest on operating capital was charged at seven per cent per annum based on a 9-month production period. Interest on land investment was charged at 6 per cent per annum.

Costs were not standard among all producers since some producers utilized different practices or performed only part of those practices common to other producers. Average costs were reported which were common to many producers. These cost procedures were used to calculate average total costs for producers in the sample.

APPENDIX TABLE 1. AVERAGE COSTS PER ACRE OF CATFISH PRODUCED, EXPERIENCE IN COMMERCIAL CATFISH PRODUCTION, ALABAMA, 1970

Item	More than 2 years	2 years or less
	<i>Dol.</i>	<i>Dol.</i>
<i>Variable costs</i>		
Feed.....	139.72 <sup>1</sup>	128.27 <sup>2</sup>
Fingerlings.....	105.60	104.16
Electricity.....	5.56	23.21
Maintenance.....	3.02	6.20
Transportation costs.....	2.99	6.38
Harvest labor.....	10.98	6.14
Fertilizer.....	9.74	4.51
Chemicals.....	2.72	2.42
Miscellaneous.....	2.79	2.07
Interest on operating capital.....	14.87	14.88
<i>Total</i> .....	297.99	298.24
<i>Fixed costs</i>		
Pond depreciation.....	22.24	24.53
Equipment and facilities depreciation.....	18.46	16.58
Interest and taxes.....	3.76	5.99
<i>Total</i> .....	44.46	47.10
<i>Other costs</i>		
Land <sup>3</sup> .....	6.00	6.00
Labor.....	40.50	24.00
<i>Total</i> .....	46.50	30.00
<i>Total costs</i> .....	388.95	375.34

<sup>1</sup> Feed conversion: 1.94:1.

<sup>2</sup> Feed conversion: 1.85:1.

<sup>3</sup> Land valued at \$100.00 per acre. Land investment was charged at six per cent.

APPENDIX TABLE 2. AVERAGE COSTS AND RETURNS PER ACRE OF CATFISH PRODUCED, EXPERIENCE IN COMMERCIAL CATFISH PRODUCTION, ALABAMA, 1970

Item	More than 2 years	2 years or less
	<i>Dol.</i>	<i>Dol.</i>
<i>Gross receipts</i> .....	586.97 <sup>1</sup>	466.38 <sup>2</sup>
<i>Costs</i>		
Variable costs.....	297.99	298.24
Fixed costs.....	44.46	47.10
<i>Total cost</i> .....	342.45	345.34
<i>Returns and other costs</i>		
Returns to land, labor, and management.....	244.52	121.04
Cost of land.....	6.00	6.00
Return to labor and management.....	238.52	115.04
Cost of labor.....	40.50	24.00
Return to management.....	198.02	91.04
Average investment.....	735.92	741.49
Return to investment, pct.....	27.7	13.0

<sup>1</sup> Average pounds of catfish produced per acre was 1,331. The figure included 18 pounds of catfish used for home consumption.

<sup>2</sup> Average pounds of catfish produced per acre was 1,202. The figure included 10 pounds of catfish used for home consumption.



APPENDIX TABLE 3. AVERAGE INVESTMENTS AND LABOR REQUIREMENTS PER ACRE OF CATFISH PRODUCED, EXPERIENCE IN COMMERCIAL CATFISH PRODUCTION, ALABAMA, 1970

Item	More than 2 years	2 years or less
	<i>Dol.</i>	<i>Dol.</i>
<i>Equipment and facilities</i>		
Boat and motor.....	9.39	10.84
Truck.....	46.47	48.01
Tractor and mower.....	25.01	18.00
Fish hauling tanks.....	30.98	0.00
Storage shelter.....	43.25	55.51
Motor and pump.....	61.00	35.91
Well.....	67.02	74.87
Miscellaneous.....	8.00	7.75
<i>Total</i> .....	291.12	250.89
<i>Other investment</i>		
Pond.....	444.80	490.60
<i>Total investment</i> .....	735.92	741.49
<i>Labor requirements</i>		
Operator.....	<i>Hr.</i> 27.0	<i>Hr.</i> 16.0
Harvest labor.....	7.0	4.0
<i>Total</i> .....	34.0	20.0

APPENDIX TABLE 4. NUMBER AND LOCATION OF COMMERCIAL AND ALL CATFISH PRODUCERS BY COUNTIES, NORTHERN AREA OF ALABAMA, 1970

County	Commercial producers		All producers	
	<i>No.</i>	<i>Acres</i>	<i>No.</i>	<i>Acres</i>
Blount.....	1	6.0	17	54.55
Calhoun.....	0	0	6	55.0
Cherokee.....	0	0	2	6.0
Cleburne.....	1	1.0	12	28.75
Colbert.....	4	14.5	7	42.5
Cullman.....	6	54.0	27	123.17
DeKalb.....	7	29.0	17	58.75
Etowah.....	3	19.0	9	189.0
Fayette.....	1	4.0	15	107.5
Franklin.....	1	20.75	14	174.5
Jackson.....	0	0	0	0
Jefferson.....	1	25.0	1	25.0
Lamar.....	0	0	1	1.0
Lauderdale.....	0	0	4	33.0
Lawrence.....	8	77.0	17	173.45
Limestone.....	4	56.0	26	117.0
Madison.....	10	41.5	30	138.95
Marion.....	1	7.0	27	88.75
Marshall.....	2	7.0	8	19.5
Morgan.....	5	23.5	20	87.75
St. Clair.....	1	4.0	6	33.0
Shelby.....	12	85.5	19	137.0
Talladega.....	1	50.0	9	118.0
Walker.....	7	57.0	12	66.75
Winston.....	1	3.5	4	11.5
<i>Total</i> .....	77	585.25	310	1,890.37

APPENDIX TABLE 5. NUMBER AND LOCATION OF COMMERCIAL AND ALL CATFISH PRODUCERS BY COUNTIES, CENTRAL AREA OF ALABAMA, 1970

County	Commercial producers		All producers	
	No.	Acres	No.	Acres
Autauga.....	2	5.5	6	44.50
Bibb.....	0	0	5	58.0
Bullock.....	0	0	5	84.0
Chambers.....	4	35.5	20	128.50
Chilton.....	0	0	6	36.0
Choctaw.....	9	101.0	132	524.33
Clay.....	0	0	20	65.00
Dallas.....	16	422.0	22	592.0
Elmore.....	1	35.0	12	158.50
Greene.....	4	17.0	15	45.0
Hale.....	30	866.5	34	1005.50
Lee.....	0	0	9	88.0
Lowndes.....	1	6.0	3	14.0
Macon.....	1	1.5	10	76.50
Marengo.....	4	19.0	15	54.75
Montgomery.....	2	8.0	9	138.00
Perry.....	4	84.0	6	121.50
Pickens.....	6	73.0	11	121.50
Randolph.....	0	0	11	21.50
Russell.....	0	0	1	2.00
Sumpter.....	4	87.5	8	114.50
Tallapoosa.....	2	11.5	44	104.95
Tuscaloosa.....	3	35.5	26	205.00
Coosa.....	2	20.5	9	55.25
Total.....	95	1,829.0	439	3,858.78

APPENDIX TABLE 6. NUMBER AND LOCATION OF COMMERCIAL AND ALL CATFISH PRODUCERS BY COUNTIES, SOUTHERN AREA OF ALABAMA, 1970

County	Commercial producers		All producers	
	No.	Acres	No.	Acres
Baldwin.....	5	29.00	28	148.25
Barber.....	11	33.50	30	167.25
Butler.....	0	0	18	100.0
Clarke.....	0	0	17	56.0
Coffee.....	5	18.00	33	207.50
Conecuh.....	2	15.00	12	92.50
Covington.....	1	5.00	14	69.0
Crenshaw.....	2	10.10	22	114.85
Dale.....	5	96.00	45	381.75
Escambia.....	3	8.00	22	138.50
Geneva.....	3	8.25	19	87.80
Henry.....	0	0	4	13.0
Houston.....	2	4.00	34	104.2
Mobile.....	6	98.50	22	184.5
Monroe.....	0	0	3	12.5
Pike.....	0	0	11	21.5
Washington.....	17	80.30	63	356.55
Wilcox.....	2	13.50	4	19.5
Total.....	64	419.15	401	2,275.15

APPENDIX TABLE 7. AVERAGE COST PER ACRE OF CATFISH PRODUCED, NORTHERN, CENTRAL, AND SOUTHERN, ALABAMA, 1970

Item	Northern <i>Dol.</i>	Central <i>Dol.</i>	Southern <i>Dol.</i>
<i>Variable costs</i>			
Feed.....	192.18 <sup>1</sup>	114.99 <sup>2</sup>	160.39 <sup>3</sup>
Fingerlings.....	162.29	93.19	113.93
Electricity.....	10.47	8.15	17.00
Maintenance.....	6.76	4.90	12.05
Transportation.....	2.06	4.40	6.67
Harvest labor.....	6.07	5.19	20.29
Fertilizer.....	0.70	7.17	5.93
Chemicals.....	0.56	2.26	3.88
Miscellaneous.....	2.35	2.78	1.26
Interest on operating capital.....	20.39	12.76	17.93
<i>Total</i> .....	403.83	255.79	359.33
<i>Fixed costs</i>			
Pond depreciation.....	28.01	21.27	28.22
Equipment and facilities depreciation.....	18.46	16.62	18.95
Interest and taxes.....	6.06	3.97	5.69
<i>Total</i> .....	52.53	41.86	52.86
<i>Other costs</i>			
Land <sup>4</sup> .....	6.00	6.00	6.00
Labor.....	30.00	30.00	46.50
<i>Total</i> .....	36.00	36.00	52.50
<i>Total cost</i> .....	492.36	333.65	464.69

<sup>1</sup> Feed conversion: 1.87:1.

<sup>2</sup> Feed conversion: 1.79:1.

<sup>3</sup> Feed conversion: 2.23:1.

<sup>4</sup> Land was valued at \$100.00 per acre. Land investment was charged at six per cent.

APPENDIX TABLE 8. AVERAGE COSTS AND RETURNS PER ACRE OF CATFISH PRODUCED, NORTHERN, CENTRAL, AND SOUTHERN, ALABAMA, 1970

Item	Northern	Central	Southern
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
<i>Gross receipts</i>	660.60 <sup>1</sup>	476.40 <sup>2</sup>	516.65 <sup>3</sup>
<i>Costs</i>			
Variable cost.....	403.83	255.79	359.33
Fixed cost.....	52.53	41.86	52.86
<i>Total</i> .....	456.36	297.65	412.19
<i>Returns and other costs</i>			
Returns to land, labor, and management....	204.24	178.75	104.46
Cost of land.....	6.00	6.00	6.00
Return to labor and management.....	198.24	172.75	98.46
Cost of labor.....	30.00	30.00	46.50
Return to management.....	168.24	142.75	51.96
Average investment.....	746.01	699.63	846.51
Return to investment.....	22.7	21.3	6.9

<sup>1</sup> Average pounds of catfish produced per acre was 1,382. The figure included 25 pounds of catfish used for home consumption.

<sup>2</sup> Average pounds of catfish produced per acre was 1,200. The figure included 11 pounds of catfish used for home consumption.

<sup>3</sup> Average pounds of catfish produced per acre was 1,254. The figure included 35 pounds of catfish used for home consumption.

APPENDIX TABLE 9. AVERAGE INVESTMENTS AND LABOR REQUIREMENTS PER ACRE OF CATFISH PRODUCED, NORTHERN, CENTRAL, AND SOUTHERN, ALABAMA, 1970

Item	Northern	Central	Southern
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
<i>Equipment and facilities</i>			
Boat and motor.....	15.03	9.70	14.33
Truck.....	6.43	42.85	96.70
Tractor and mower.....	15.38	21.89	5.82
Fish hauling tanks.....	0.00	42.49	5.82
Storage shelter.....	53.72	44.04	29.11
Motor and pump.....	28.57	49.26	54.58
Well.....	64.29	59.31	72.29
Miscellaneous.....	2.39	4.69	3.26
<i>Total</i> .....	185.81	274.23	281.91
<i>Other investments</i>			
Pond.....	560.20	425.40	564.60
<i>Total investments</i> .....	746.01	699.63	846.51
<i>Labor requirements</i>	<i>Hr.</i>	<i>Hr.</i>	<i>Hr.</i>
Operator.....	20.0	20.0	31.0
Harvest labor.....	4.0	3.5	13.0
<i>Total</i> .....	24.0	23.5	44.0