4. Increasing the stocking rate from 10,000 to 20,000 per acre did not significantly affect survival.
5. Addition of dry, pelleted fish feed did not significantly increase hardness of well water.
6. Fertilization, and addition of soil significantly increased hardness of well water.
7. Approximately 17 ppm total hardness was the minimum required for survival of young crawfish.
8. Apparently a direct relationship existed between total hardness and survival, production per acre, and average size of crawfish.
9. Mineral content of crawfish exoskeletons from pools with no soil was significantly less than that from pools with soil or from ponds.
10. Sex ratios favored males in pond experiments and females in pools.
11. Average weight of mature male crawfish was greater than that of mature females.

LITERATURE CITED

Broom, J. G. 1961. Production of the Louisiana red crawfish, *Procambarus clarkii* (Girard), in ponds. Master's Thesis, Auburn University, 38 pp. Unpublished.

Broom, J. G. 1963. Natural and domestic production of crawfish. Louisiana Conservationist. 15(3):14-15.

Forney, J. L. 1958. Raising bait fish and crayfish in New York ponds. Cornell Extension Bulletin 986. 30 pp.

LaCaze, Cecil G. 1966. More about crawfish. Louisiana Wildlife and Fisheries Commission. Wildlife Education Bulletin No. 96. 16 pp.

Thomas, Carl H. 1965. A preliminary report on the agricultural production of the red-swamp crawfish (*Procambarus clarki*) (Girard) in Louisiana rice fields. Proceedings Southeastern Association of Game and Fish Commissioners. 17:180-186.

Viosca, Percy, Jr. 1961. Crawfish culture-mudbug farming. Louisiana Conservationist. 13(3):5-7.

POND CONSTRUCTION AND ECONOMIC CONSIDERATIONS IN CATFISH FARMING

Roy A. Grizzell, Jr.
Biologist, Soil Conservation Service, USDA
Little Rock, Arkansas 72201

Profitable catfish farming requires careful attention to suitable water supplies; good fishpond sites; hatching, feeding, and handling fish; and adequate facilities for an orderly operation of harvesting and marketing.

Good agricultural land is often suitable for catfish farming and has been widely used. Land that is poorly suited for other farm uses may also be developed into profitable ponds for raising catfish. In addition to the primary purpose of growing fish, a fish farm may provide secondary benefits such as: (1) irrigation water; (2) water for livestock; (3) feeding and resting areas for waterfowl; (4) boating; (5) fishing; (6) picnicking; and (7) water for fire fighting.

POND SITES, DESIGNS, AND CONSTRUCTION

A catfish pond needs complete protection from floodwaters, proper distribution of water supplies, and convenient drainage facilities.

Successful fishpond sites require soils of good water-holding qualities, practical engineering designs, and high quality construction. The Soil Conservation Service has technicians who are highly capable of handling soils and engineering problems. They are experienced in designing fishponds on sloping or flat lands.

Site Selection

Because no two ponds are alike, each site should be carefully inspected. After consulting a map showing soil characteristics or test boring the soil to determine structure qualities, the technician will determine if the soil has the capacity to hold water. He will also evaluate the site to determine that the topography is suitable for proper drainage of the pond and that an adequate outlet is available for disposal of the water.

If flooding is a hazard, identify the historic high water mark and construct levees above this level to protect the pond. On large watersheds, a flood channel or diversion that bypasses the ponds may be essential for the protection of the structure and to prevent excessive loss of fish and fertility.

When possible, ponds should be located where topography is flat or nearly flat. On flat land rectangular ponds with the water supply located at the highest elevation and drainage located toward the lower elevation are most practical. On sloping lands the ponds should be designed to fit the contour of the land and make maximum use of the water supply. Ponds may have the water surface at different elevations on sloping land.

Constructing the Fish Farm

Where maximum production is desired, all timber should be cleared from pond sites before construction starts. Trees, stumps, and roots interfere with harvesting operations by snagging and hanging seining equipment.

The entire base of the dam or levee should be cleared of trees, stumps, or roots and all debris removed to obtain adequate bond with fill material. On porous soils, or where seepage through the dam may be a problem, a core trench deep enough to penetrate impervious soil should be constructed.

Using soil material that has enough clay to hold water, construct a dam or levee high enough to maintain a minimum of three feet of water. Top width should usually be 12 feet on the outer levees or on any levee where truck traffic is necessary to facilitate feeding and harvesting operations.

Dams and levee slopes should be 2 to 1 on the outside and 3 to 1 on the inside as a minimum. On large ponds of 10 or more acres, a 4 to 1 slope or a false berm may be desirable. A little extra effort at this time may prevent costly erosion or levee breaks. All slopes, tops of dams and levees, and disturbed areas should be vegetated immediately after construction.

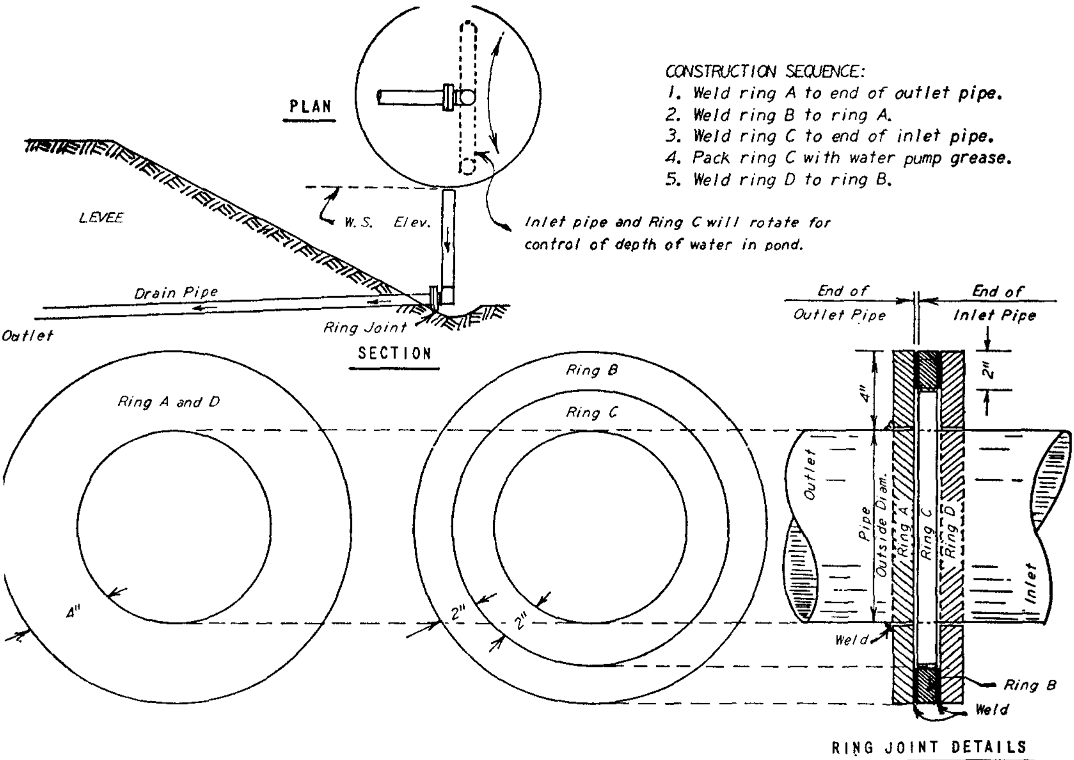
The Harvesting Basin

Pond bottoms should be sloped so that water will drain evenly toward a harvesting basin. A fall of 0.2 of a foot for each 100 feet is desirable. The harvesting basin should be constructed at the lowest elevation and normally 2 to 2½ feet below all other elevations. They may be constructed in a semi-circular form with a radius of about 150 feet in ponds of from 2 to 5 acres and proportionally larger in others.

Drainpipes

Pipes should be large enough to drain ponds promptly and completely. It takes about 2½ days to drain a pond containing 5 acre feet of water with a 6 foot head, using a 6 inch pipe.

Most fish farmers prefer the three ring turn-down pipe (see attached design). This device acts as an overflow and drain pipe and permits desired water levels to be established simply by adjusting the



NOTES:

1. Thickness of material for rings will vary with size and weight of pipe installed.
2. Use post to hold riser in position.
3. An additional elbow on levee side of ring joint will permit riser to be lowered perpendicular to the levee.

FISH POND-DRAIN PIPE RING JOINT

USE WITH SHALLOW WATER DEPTHS
DRESSER COUPLING MAY BE
SUBSTITUTED FOR RING JOINT

pipe. The deign of the turn-down pipe can be modified to allow water to be removed from the bottom of the pond by using a double-sleeve device.

A screen should always cover the end of the drain pipe inside the pond to prevent loss of fish when water is discharged.

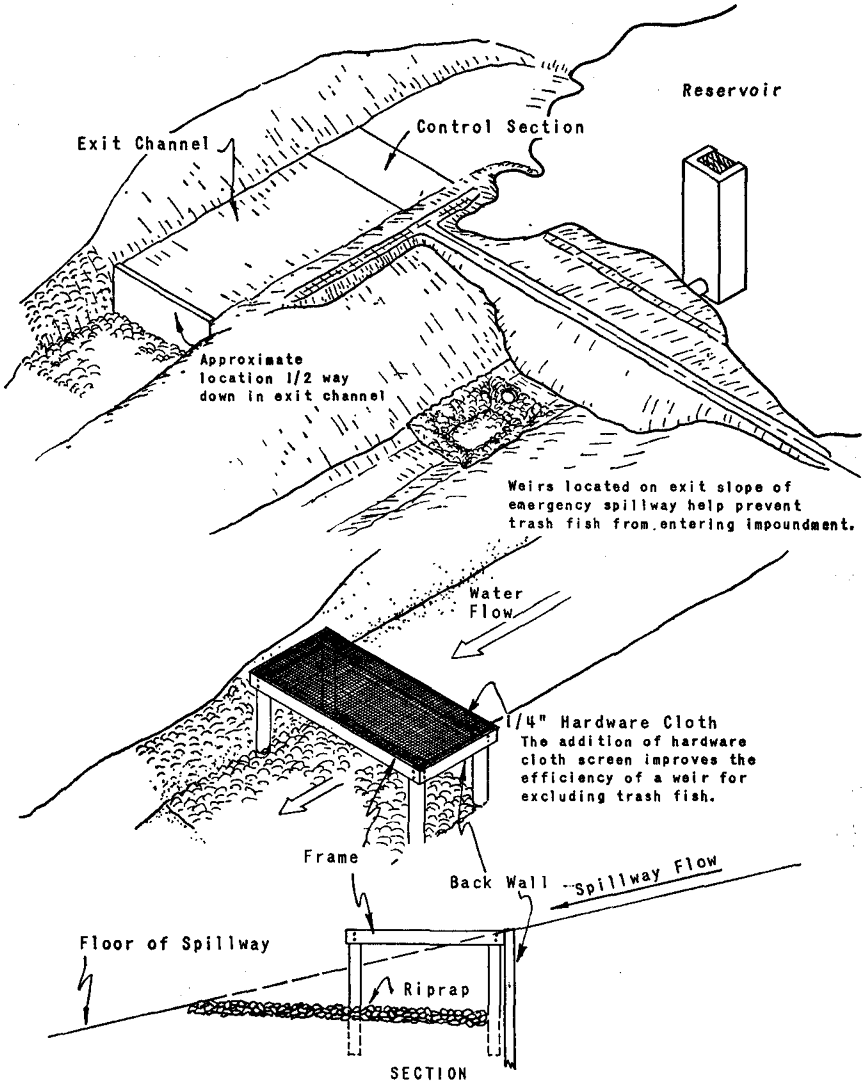
An anti-seep collar should be placed around the drain pipe within the dam or levee. This device keeps water from seeping along the drain pipe and causing leaks and also discourages digging activities of musk-rats and crayfish.

Spillways

Loss of fish through spillways can be disastrous to a fish farmer. Spillways, where required, should be carefully designed. They should be wide enough to hold the depth of flow to less than 6 inches. Storage of storm water should be provided by setting the overflow pipe at a lower elevation than the spillway.

Trash fish entering a pond through a spillway can wreck a fish farmer. To prevent this, construction of an overfall or weir on the back slope of the spillway is essential. (See atached design.)

EXIT CHANNEL WEIR TO EXCLUDE TRASH FISH



Depth

A minimum depth of 3 to 4 feet will maintain fish without trouble in the South. North of Arkansas a depth of 6 to 8 feet may be necessary to prevent winter kill.

Harvests with seines are difficult in ponds having a depth over 6 feet.

Size

As fish farmers gain knowledge and experience they usually build bigger ponds. Many ponds are now being constructed in the 10 to 40 acre size. It is desirable to start with a few acres and after gaining experience enlarge the operation.

A part-time fish farm may vary from a few to 20 or 30 acres. Based on present returns, a family should operate 30 to 40 acres or more if they expect this to be their sole source of income.

A "typical" 20-acre catfish farm may consist of four small brood and holding ponds averaging about one acre each and four production ponds averaging four acres each. Small ponds are more expensive to construct and utilize more space than larger ponds. For example, the levees of a 40-acre pond will occupy 4.84 acres and cost about $137.20 per acre for earth moving while the levees of four ponds averaging 10 acres each will occupy 7.38 acres and cost about $274.50 per acre.

Larger ponds receive better wind action than small ponds and thus have less oxygen problems. Contrasted to large ponds, small ponds provide better flexibility for harvesting, overcoming oxygen shortages, and treating diseases and parasites. Small ponds can be drained and refilled quickly.

Levee or dam erosion may be a serious problem in large ponds. To alleviate this condition the long axis of large rectangular ponds should be perpendicular to the prevailing winds where practical. Conversely, the long axis of small ponds should be parallel to the prevailing winds to permit better movement of oxygen into the water.

Water Quantity and Quality

A dependable supply of good quality water is needed for satisfactory catfish farming. The best source is a well or spring, in order to avoid problems such as trash fish, excessive flood waters, muddiness, diseases, and parasites. Water from streams or ponds that collect runoff are also suitable if the best known management precautions are understood and followed. Water from springs, streams, and runoff may not be adequate during dry summer months.

The amount of well-water available must be sufficient to supply the pond or ponds. The number of gallons per minute (gpm) can be converted into acre-feet. (1,000 gpm equals 4.4 acre-feet in 24 hours.) If you do not have an operating well, a test well should be bored before definitely deciding to construct a catfish pond. The size of ponds must be limited to the available water supply. (A 6-inch well flowing 1,200 gpm will furnish enough water for a catfish operation of about 40 acres.) Well water usually has excessive carbon dioxide or nitrogen and no oxygen—a combination lethal to fish. The gases can be dispersed easily and quickly and the water oxygenated by splashing the flow over baffles or screens before it enters the pond.

Water from runoff, streams, and irrigation canals invariably have trash fish populations which will get into ponds and compete seriously for both feed and space. In hatchery ponds trash fish may completely eat all reproduction. If it is necessary to use water from sources other than wells and springs, the only device that satisfactorily prevents fish and fish eggs from entering ponds (except through spillways) is a saran screen filter. Where water is discharged at high velocities a box type filter (Figure 1) is necessary. Where only low velocities are discharged a sock type filter (Figure 2) is satisfactory. Where runoff water is the only source, a collection or storage reservoir probably will be necessary to supply the fish farm.

Whatever the source of water, its quality should be carefully checked. The most desirable water will have a pH range between 6.5 and 8.5, a total hardness of 20 to 150 parts per million or total alkalinity between 30 and 200 parts per million. If water is too soft (less than 15 ppm of total hardness or 30 ppm of total alkalinity) agricultural limestone or hydrated lime should be added. If water is too hard (usually more than 200 ppm) sulphate of ammonia fertilizer may be used.

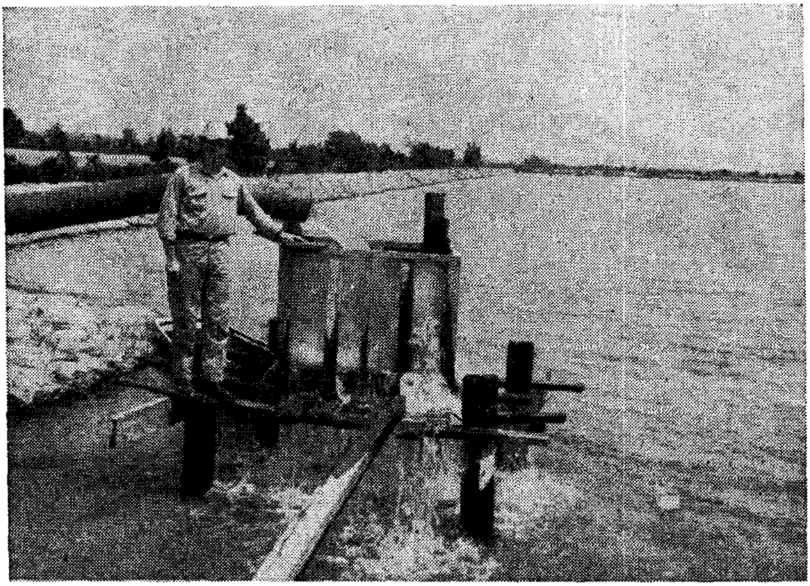


FIGURE 1.—A BOX TYPE MONOFILAMENT SCREEN FILTERS WATER BEING DISCHARGED UNDER HIGH VELOCITY. FILTER MATERIAL IS USUALLY GOOD FOR ONE YEAR.

FIGURE 2.—THIS MONOFILAMENT FILTER SCREEN EFFECTIVELY PREVENTS TRASH FISH INTRODUCTIONS WHEN ATTACHED TO LOW VELOCITY DISCHARGE PIPES.

ECONOMIC CONSIDERATIONS

A good catfish farmer continually looks for ways to cut costs and maintain an efficient program and a quality product.

First, he analyzes all items that cost money—time (labor); pond construction and maintenance; pumping costs; feed; equipment; mechanization; transportation; land values; taxes; and losses due to oxygen deficiencies, diseases, and parasites.

Second, he measures his actual production (yields) in terms of pounds of fish per acre or in income from fishing permits. His costs of feed per pound are converted to pounds of live fish produced in order to determine if his feeding operations are wasteful or efficient.

He can compare his operations with those shown in Tables 1 to 8, which are actual examples of farmer experiences.

Markets are many and varied. Each operator should take advantage of the most favorable market. He should assess the market to determine if it is best to sell fish for (1) fingerlings, (2) brood fish, (3) albinos and hybrids, (4) fee-fishing lakes, (5) on-the-farm food sales, both live and dressed, (6) specialized restaurants, and (7) for food and fish markets.

TABLE 1.—CHANNEL CATFISH FINGERLING PRODUCTION BASED ON A ONE-ACRE OPERATION—POND SPAWN METHOD.

Initial Costs	
Construction of pond, approximately 1,500 cu. yds. moved @ 15¢	$ 225.00
Drain pipe	182.00
Prorated* costs of relift pump (also used for rice farming)	21.43
20 pairs of brood fish (120 pounds @ $1.00)	120.00
Annual Costs	
Pond construction and pipe, amortized @ 6% for 20 yrs. ($407.00 x .08718)	35.48
Relift pump amortized @ 6% for 10 yrs. ($21.43 x .13588)	2.91
Brood fish amortized @ 6% for 4 yrs. ($120.00 x .28825)	34.59
Pond maintenance	14.00
Pumping costs, 6 acre feet x $3.10	18.60
Filter	10.00
Feed, 1,370 pounds @ $5.00 cwt.	68.50
Taxes	2.00
Equipment purchases (prorated*)	18.00
Labor costs—feeding and daily checking	60.00
harvesting	62.50
Transportation—use of pickup truck (prorated*)	17.50
Total Costs of Production	$ 344.08
Gross Returns	
50,000 fingerlings (3" to 4") @ $0.05 ea.	$2,500.00
Less costs of production	344.08
Net Returns—to land and management	$2,155.92
Cost of producing fingerlings (each)	$ 0.007

Feed Conversion: 1.65:1 (pounds of feed required to produce one pound of fish)

* Prorated from total farm operation.

TABLE 2.—CHANNEL CATFISH FINGERLING PRODUCTION — EIGHT ACRE OPERATION—POND SPAWN METHOD.

Initial Costs	
Construction of ponds, 22,500 yds. @ 20¢	$ 4,500.00
Drain pipes	312.00
Well costs $1,400.00) Pump 1,500.00) To serve 40 acres Motor 800.00)	3,700.00
70 pairs of brood fish (420 pounds @ $1.00)	420.00
Annual Costs	
Pond construction and pipe amortized @ 6% for 20 yrs. ($4,812.00 x .08718)	419.51
Well amortized @ 6% for 20 yrs. ($1,400.00 x .08718 ÷ 5)*	24.41
Pump amortized @ 6% for 15 yrs. ($1,500.00 x .10296 ÷ 5)*	30.88
Motor amortized @ 6% for 4 yrs. ($800.00 x .28859 ÷ 5)*	46.17
Annual maintenance on well, pump, and motor (prorated)	85.00
Pond maintenance	35.25
Pumping costs, 6 acre-feet x 8 acres = 48 acres-feet x $11.20	537.60
Brood fish amortized @ 6% for 4 yrs. ($420.00 x .28859)	121.20
Feed—12 tons of pellets @ $92.00 ton	1,104.00
1,000 pounds minnow meal @ $98.00 ton	49.00
Rent	100.00
Equipment purchases (prorated)	148.00
Transportation—feeding and hauling	150.00
Labor costs—feeding and daily checking	480.00
harvesting	500.00
Total Costs of Production	$ 3,831.02
Gross Returns	
200,000 fingerlings @ $0.07 ea.	$14,000.00
Less costs of production	3,831.02
Net Returns—to land and management (8 acres)	$10,168.98
Average net return per acre	1,271.12
Costs of producing fingerlings (each)	0.018

Feed Conversion: 5.7:1

* Prorated to 40 acre operation.

TABLE 3.—CHANNEL CATFISH FINGERLING PRODUCTION — EIGHT-ACRE OPERATION—USING PENS, HATCHING TROUGHS, AND NURSERY PONDS.

Initial Costs	
Pond construction (includes ponds, drain pipes, and canals into 8 ponds	$ 5,720.00
50 pens @ $25.00 per pen	1,200.00
Vat house and hatching troughs	1,300.00
50 pair of brood stock (300 pounds @ $1.25)	375.00
Annual Costs	
Pond construction amortized @ 6% for 20 yrs. ($5,720.00 x .08718)	498.67
Pens amortized @ 6% for 4 yrs. ($1,200.00 x .28859)	346.30
Vat house and hatching troughs amortized @ 6% for 20 yrs. ($1,300.00 x .08718)	113.33
Brood stock amortized @ 6% for 4 yrs. ($375.00 x .28859)	108.22
Pond maintenance	80.00
Feed—7½ tons of pellets @ $127.20 ton	954.00
800 pounds minnow meal @ $127.20 ton	50.88
Taxes	16.00
Equipment purchases (prorated)	120.00
Transportation, feeding and hauling	544.00
Labor costs—feeding and daily checking	518.75
harvesting	51.00
Total Costs of Production	$ 3,401.15
Gross Returns	
200,000 fingerlings @ $0.05 ea.) 100,000 fingerlings @ $0.03 ea.)	$13,000.00
Less costs of production	3,401.15
Net Returns—to land and management	$ 9,598.85
Average net return per acre	$ 1,199.85
Costs of Producing Fingerlings (each)	$ 0.011

Feed Conversion: 4.9:1

TABLE 4.—COMMERCIAL FOOD PRODUCTION—CHANNEL CATFISH IN FIVE ACRE OPERATION.

Initial Costs	
Construction of pond, 12,500 cu. yds. @ $0.19	$ 2,375.00
Drain pipe	168.00
Well $1,500.00) Pump 1,750.00) to serve 45 acres Motor 1,400.00)	4,650.00
Service buildings (prorated)	98.00
Annual Costs	
Pond construction and pipe amortized @ 6% for 20 yrs. ($2,543.00 x .08718)	221.68
Well amortized @ 6% for 20 yrs. ($1,500.00 x .08718 ÷ 9)	14.53
Pump amortized @ 6% for 15 yrs. ($1,750.00 x .10296 ÷ 9)	20.02
Motor amortized @ 6% for 10 yrs. ($1,400.00 x .13588 ÷ 9)	21.13
Service buildings amortized @ 6% for 20 yrs. ($98.00 x .08718)	8.54
Annual maintenance on well, pump, and motor (prorated)	72.00
Pond maintenance	75.00
Pumping costs, 31.8 acre-feet @ $12.00	381.60
Fingerlings, 7,500 @ $0.04 ea.	300.00
Feed, 7 tons @ $95.00	665.00
Taxes	3.00
Equipment purchases (prorated)	26.00
Labor costs—feeding and daily checking	90.00
harvesting	36.00
Transportation—feeding and hauling	108.50
Total costs of production	$ 2,043.00
Gross Returns	
7,450 pounds @ $0.50 lb.	$ 3,725.00
Less costs of production	2,043.00
Net Returns—to land and management	$ 1,682.00
Average net returns per acre	336.40
Costs of Producing Fish (Pound)	0.27
Feed Conversion: 1.87:1	

TABLE 5.—COMMERCIAL FOOD AND BROOD STOCK—CHANNEL CATFISH IN TWO AND ONE-HALF ACRE OPERATION.

Initial Costs		
Construction of pond (2½ acres), approximately 7,700 cu. yds. moved @ $0.20		$ 1,540.00
Well $1,350.00) Pump $1,800.00) Motor $1,350.00)	To serve 40 acres	4,500.00
Drain pipe		120.00
Service buildings (prorated)		62.00
Annual Costs		
Pond construction and pipe amortized @ 6% for 20 yrs. ($1,660.00 x .08718)		144.72
Well amortized @ 6% for 20 yrs. ($1,350.00 x .08718 ÷ 16)		7.35
Pump amortized @ 6% for 15 yrs. ($1,800.00 x .10296 ÷ 16)		11.58
Motor amortized @ 6% for 10 yrs. ($1,350.00 x .13588 ÷ 16)		11.46
Service buildings, prorated to 300 acres, amortized @ 6% for 20 yrs. ($62.00 x .08718)		6.20
Annual maintenance on well, pump, and motor (prorated).		35.00
Pond maintenance		30.00
Pumping costs, 15 acre feet @ $11.50		172.50
Stocking fish, 4,300 averaging 0.9 lbs. ea. @ $0.50 per lb.		1,935.00
Feed, 8.51 tons @ $94.00 ton		799.94
Taxes		1.50
Equipment purchases (prorated)		42.00
Labor costs—feeding and daily checking		56.00
harvesting		22.00
selling costs		62.00
Transportation—feeding and hauling		60.00
Total Costs of Production		$ 3,397.25
Gross Returns		
983 fish averaging 3.25 pounds each sold for $1.00 per pound		$ 3,194.75
1,967 fish averaging 2.13 pounds each sold for $0.50 per pound		2,094.85
		$5,289.60
Less Costs of Production		3,397.19
Net Returns—to land and management		$ 1,892.41
average net returns per acre		756.96
Costs of producing fish (pound)		$ 0.46

Feed Conversion: 4.85:1

Mortality: 03%

TABLE 6.—COMPARISON OF BLUE AND CHANNEL CATFISH IN ONE ACRE OPERATION.

Initial Costs	
Construction of pond (1 acre), approximately 2,000 cu. yd. moved at $0.20 per yard ....$	400.00
Pipe	165.00
Construction of gravity flow canal	150.00
Service buildings (prorated to 60 acre operation)	77.00
Annual Costs	
Pond construction and pipe amortized @ 6% for 20 yrs. ($565.00 x .08718)	49.25
Canal amortized @ 6% for 20 yrs. ($150.00 x .08718)	13.07
Service buildings amortized @ 6% for 20 yrs. ($77.00 x .08718)	6.71
Pond maintenance	26.00
Fish (200 blues and 200 channel catfish), 1 lb. ea. @ $0.50	200.00
Feed, 2,730 lbs. @ $127.50 ton	171.39
Taxes	2.00
Equipment purchases (prorated)	14.00
Labor costs—feeding and daily checking	65.65
harvesting	12.00
Transportation—feeding and hauling	63.00
Total Costs of Production ....$	622.07
Gross Returns	
Channel catfish, 200 x 2.75 pounds	
Blue catfish, 200 x 3.75 pounds Total: 1,300 pounds @ $0.50 ....$	650.00
Less costs of production	622.87
Net Returns—to land and management	27.13

Feed Conversion:* 3.0:1

* Fathead minnows available at all times. This may account for better growth of blue catfish.

TABLE 7.—CHANNEL CATFISH FEE FISHING OPERATION — EIGHTY ACRES.

Initial Costs	
Construction of pond, 49,000 cu. yds. @ $0.14 per yard	$ 6,860.00
Drain pipe	415.00
8-inch well $1,800.00) Pump 2,000.00) Motor 1,650.00)	5,450.00
Service building	1,500.00
Annual Costs	
Pond construction and pipe amortized @ 6% for 20 yrs. ($6,860.00 x .08718)	598.05
Well amortized @ 6% for 20 yrs. ($1,800.00 x .08718)	156.92
Pump amortized @ 6% for 15 yrs. ($2,000.00 x .10296)	205.92
Motor amortized @ 6% for 10 yrs. ($1,650.00 x .13588)	224.20
Service building, amortized @ 6% for 20 yrs. ($1,500.00 x .08718)	130.77
Annual maintenance on well, pump, and motor	285.00
Pond maintenance	280.00
Pumping costs, 400 acre-feet x $12.00 (prorated for 3 yrs.)	1,600.00
Stocking fish, 80,000 pounds averaging 0.85 pounds each @ $0.40 lb.	27,200.00
Feed, 45 tons @ $98.00 ton	4,410.00
Taxes	128.00
Labor costs—feeding and hauling	515.00
tending concession stand	3,750.00
Transportation costs—feeding and hauling	361.00
Total Costs of Production	$39,844.86
Gross Returns	
Fishing permits @ $1.00 each	$13,000.00
Fish caught, 65,000 pounds @ $0.50 lb.	32,500.00
Profit from concession	4,400.00
	$49,900.00
Less Costs of Production	39,844.86
Net Returns—to land and management	$10,055.14
Average net return per acre	$ 125.69

TABLE 8.—RETURNS FROM BUYING AND SELLING CHANNEL CATFISH.

Costs	
Bought 672 pounds @ $0.40 per pound	$ 268.80
Delivery costs, 200 miles @ $0.15 per mile	30.00
Salary for driver	15.00
Dressing fish, 4 people took 4½ hours @ $1.25 per hour... (fish dressed out 59%)	22.52
Total Costs	$ 336.32
Gross Returns	
396½ pounds of fish sold for $0.95 per pound	$ 376.67
Net Returns—to management	$ 40.35

USE OF ANTIMYCIN AS A FISH TOXICANT WITH EMPHASIS ON REMOVING TRASH FISH FROM CATFISH PONDS[1]

JAMES W. AVAULT, JR., AND GILBERT C. RADONSKI[2]
School of Forestry and Wildlife Management
Louisiana State University
Baton Rouge, Louisiana 70803

ABSTRACT

Antimycin was applied to five fresh-water ponds at 3, 4, or 5 ppb, and to two salt-water ponds at 10 ppb. Undesirable fish, including four centrarchids and one cyprinid, were eliminated from four of five fresh-water ponds. Undesirable fish, including a centrarchid and a livebearer, were eliminated from both salt-water ponds. Mosquitofish, *Gambusia affinis*, were killed in five ponds, but were eliminated in none. Channel catfish, *Ictalurus punctatus*, that were in four ponds, were not killed. Antimycin showed real promise as a fish toxicant particularly for removing trash fish from catfish ponds. Antimycin, under the trade name fintrol, is registered as a fish toxicant by the Food and Drug Administration and by the U. S. Department of Agriculture. The retail cost to treat one acre-foot of water with 3 ppb antimycin was approximately $4.50.

INTRODUCTION

Trash fish in catfish ponds can be a major problem in fish farming. Fish such as green sunfish, *Lepomis cyanellus*, compete with catfish for food, space, oxygen, and may also introduce parasites (Hogan, 1966). Green sunfish compete with catfish for feed; this can be costly. They must be separated from catfish at draining; this requires extra labor and expense. Antimycin shows real promise for removing undesirable fish

[1] Proceedings of the 21st Annual Conference Southeastern Association of Game and Fish Commissioners, New Orleans, Louisiana, September 24-27, 1967.
[2] Present address: Ayerst Labs., P. O. Box 3157, Springfield, Missouri.
This study was supported by the Louisiana Wild Life and Fisheries Commission and by the L.S.U. Agricultural Experiment Station.