11. Before stocking, remove fingerlings from the holding ponds and disinfect with 15 p.p.m. formalin plus 1 p.p.m. acriflavine for 4 or more hours. Then stock in the commercial production ponds at the rate of approximately 3,000 per acre at any time of year that ponds are available. Use only 1- to 4-inch fingerlings for stocking during the period March to October, and the larger fingerlings for stocking only after October to prevent reproduction in the commercial ponds.
12. Fertilize the commercial production ponds once monthly for 4 months using 100 pounds 8-8-2 per acre per application if stocking occurs between February and October.
13. Do not feed when water temperatures are below 60° F. While temperatures are higher, feed Auburn No. 1 fish feed at rates between 3 and 5 per cent of the body weight of fish per day, six days per week. Do not feed at rates above 25 pounds per acre per day.
14. For fish stocked in July, the following schedule for fertilization and feeding was successful:
    a. Fertilize once monthly in July, August, September and October using 100 pounds 8-8-2 per acre per application.
    b. Feed as follows:
        5 pounds/acre/day in September
        10 pounds/acre/day in October
        10 pounds/acre/day March 15 to April 1
        20 pounds/acre/day in April
        25 pounds/acre/day in May and June
15. Cease feeding about 1 week before draining. This procedure should yield approximately 900 pounds fish per acre at a cost of about 12 cents per pound for the fertilization and feeding.

PRELIMINARY RESULTS ON THE COMMERCIAL PRODUCTION OF CHANNEL CATFISH IN PONDS

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The channel catfish (*Ictalurus punctatus*) has been used for a great number of years as a sport fish in ponds in the West,[1] but little work has been published on its production on a commercial basis. Reported are per acre yields of 71 to 92 pounds of channel cats from fertilization and an average of 238.6 pounds when the fish were fed soybean cake.[2]

In 1955-56, additional experiments on commercial production of channel cats were conducted at Auburn with fingerlings furnished by the Osage Springs Minnow Farm of Rogers, Arkansas. Since results from these experiments indicate that this species is promising as a commercial fish, a preliminary report on this work is given here.

PRODUCTION OF CHANNEL CATFISH

Prior to stocking, the channel catfish were treated with 10 p.p.m. potassium permanganate for 1 hour, 15 p.p.m. formalin for 12 hours, followed by 1 p.p.m. acriflavine for 12 hours. In addition, they were treated with dibutyl tin oxide in the feed to remove intestinal parasites.[3]

1 Toole, Marion. Utilizing stock tanks and farm ponds for fish. Texas Game, Fish and Oyster Comm. Bul. 24, 53 pp., 1950.

2 Swingle, H. S. Experiments on commercial fish production in ponds. Proc. Southeast. Assn. Game and Fish Comm. 1954:69-74.

3 Allison, Ray. A preliminary note on the use of di-n-butyl tin oxide for removing tapeworms from fish. Progressive Fish-Cult. (In press.)

Because of the small number available, experiments on production were set up in two 0.1-acre ponds. These were stocked at the rate of 1,000 and 2,000 channel cats per acre on October 1, 1955. The experiments were terminated and the ponds drained August 23, 1956. Both ponds were fertilized once in 1955 and 8 times in 1956, using 100 pounds 8-8-2 per acre at each application.

The feed used was the Auburn No. 1 fish feed composed of 35 per cent soybean oil meal, 35 per cent peanut oil meal, 15 per cent fish meal and 15 per cent distillers dried solubles.[4] This was added as a dry mix to the ponds daily for 6 days each week as follows:

Dates Fed	*Pounds Per Acre Per Day for Stocking Rates Per Acre of: 1,000 Cats*	*2,000 Cats*
October 3-14	5 pounds	5 pounds
October 15–November 15	10 pounds	10 pounds
March 12–August 18	10 pounds	20 pounds
Total Pounds Feed	1,765 pounds	3,165 pounds

The results on draining after the 11-month period, expressed on an acre basis, were:

October 1, 1955 Stocking Rate		*Recovered on Draining August 23, 1956*			
Number	*Pounds*	*Number*	*Pounds*	*Per Cent Survival*	*Cost Per Pound (Cents)*
1,000	60.0	950	773	95.0	12.7
2,000	120.0	1,960	1,242	98.0	15.0

The above cost is the cost of fertilizer and feed per pound of fish produced. In determining the production, the original weight of the fish was subtracted from the weight recovered at time of draining.

The high survival of the fish stocked and the high production per acre show this to be a very promising commercial species. Further experimentation will be necessary to fully measure its possibilities.

PREPARATION FOR MARKET

While the channel cat has a limited market sale as live fish, most must be sold as dressed fish.

The loss on dressing was determined, where the head, skin and viscera were removed.

Live Weight (293 Cats)	201.5 pounds
Dressed Weight (293 Cats)	121.5 pounds (60.3%)
Loss	80.0 pounds

Of the original live weight, the percentage of losses due to various parts were:

Head	23.6 per cent
Skin	4.2 per cent
Viscera	9.0 per cent
Body Fluids	2.8 per cent

The labor required for dressing was approximately 3.3 man-minutes per fish, or 18 fish were dressed per man-hour. At 50 cents per hour, the labor cost for dressing was 6.3 cents per pound of dressed fish.

Since these fish dress out at 60.3 per cent, with a cost of 15 cents per pound live weight, the cost per pound dressed fish was 24.9 cents plus 6.3 cents for labor, a total of 31.2 cents. The fish were sold at 50 cents, giving a profit above feed and fertilizer costs of 18.8 cents per pound. The return per acre, with a stocking of 2,000 fish, was $140.79 to cover the cost of the fingerlings for stocking and other labor and capital costs of production. It is evident that fingerlings for stocking must be available at low cost if these fish are to return a reasonable profit to the fish farmer.

[4] Developed by E. E. Prather of this Station as a supplemental feed for minnows.

CONCLUSION

In preliminary test, the channel catfish (*Ictalurus punctatus*) was promising as a commercial species in ponds. With feeding and within a 11-month period, a stocking rate of 1,000 fish per acre gave a production of 773 pounds per acre, while 2,000 fish per acre gave 1,242 pounds. Commercial production awaits the solution of problems involved in reliable and inexpensive rearing of fingerlings for stocking.

REVISED PROCEDURES FOR COMMERCIAL PRODUCTION OF BIGMOUTH BUFFALO FISH IN PONDS IN THE SOUTHEAST

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The bigmouth buffalo (*Megastomatobus cyprinella*) has been grown experimentally in ponds on a commercial basis at Auburn for the past 5 years. Methods of producing the young fish for stocking and results of preliminary experiments on their commercial production to a marketable size have been reported previously.[1] The present paper summarizes these results and reports the results of additional experiments on various phases of the commercial production of this species.

Selection and Care of Brood Fish: Bigmouth buffalo one or more years old and weighing 1 pound or more were found to be satisfactory for brood fish. Two- to 4-pound brood fish were preferred when available because they gave higher production of young fish. Brood fish should be selected from the most rapid growing individuals each fall as ponds are drained. To eliminate external parasites and to reduce disease, the brood fish should be thoroughly examined for parasites or external sores and carefully disinfected before placing them in the wintering ponds.

Treatment for Parasites and Disease: Prior to stocking in wintering, spawning, or other ponds, adult fish should be routinely treated with potassium permanganate at 10 p.p.m. for 1 hour, with formalin at 15 p.p.m. for 6 hours, and with acriflavine at 1 p.p.m. for twelve hours. The treatments can best be made in vats of wood or concrete, or in small earthen pools. Fish must be removed from the permanganate solution or it must be rapidly diluted with fresh water after 1 hour as this concentration is toxic to buffalo fishes at longer exposures. The formalin and acriflavine solutions are not toxic even at prolonged exposures. These treatments kill external protozoan parasites, gill flukes, and disease organisms on the body surface or in the water. They are ineffective against internal parasites and diseases.

Such treatments were also ineffective in curing ulcers appearing on the body of the brood fish following loss of scales or mechanical injury. It was found possible, however, to cure these ulcers by swabbing the injured area with cotton dipped in 20 per cent potassium permanganate solution. Care must be taken to keep this concentrated solution from coming into contact with the gills of the fish.

Wintering the Brood Fish: The treated brood fish should be stocked in the wintering pond during the period November-January. The pond should have water 4 to 6 feet deep and should not have a constant stream of fresh water pouring into it. When brood fish were wintered at the rate of 1,000 pounds or more per acre of wintering pond, excretion from the fish built up a repression preventing reproduction in that water. When stocked at 580 pounds per acre in December, reproduction was prevented until heavy rains occurred at a temperature of 70° F. in March. Heavy inflows of fresh water at temperatures

1 Swingle, H. S. Experiments on commercial fish production in ponds. Proc. Southeast. Assn. Game and Fish Comm. 1954:69-74.