INVESTIGATIONS ON THE PROPAGATION AND SURVIVAL OF FLATHEAD CATFISH IN TROUGHS

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The persistent need for an effective predator to control forage fishes in farm reservoirs has led to considerable interest in the potential of the flathead catfish (*Pylodictis olivaris*). Unfortunately, adequate numbers of stocking-size flatheads have not been available for a complete evaluation of the role of this predator in farm reservoirs. Much of the shortage has been attributed to the difficulty with which this species has been artificially propagated. Disease, cannibalism, and a failure of fry to accept feed have been blamed for the lack of success.

Fish culturists have used one of three general methods to produce flatheads for stocking. These practices have met with varying degrees of success. Some workers have spawned this species naturally in ponds and have left the fry with adults for the first year. A second method has been to hatch the eggs artificially and then transfer the fry to fertilized rearing ponds. A more recent method was employed by Snow (1959) in which he attempted to raise fry to fingerling size in troughs. Sneed et al (1961) demonstrated that fingerlings could be produced in this manner.

Reported survival rates from fry to fingerling sizes have been as low as four to six per cent. In many cases the survival figures have not been recorded. Most of the losses have been attributed to one or more factors. These include:

1. A failure of the fry to accept the initial feed.
2. Cannibalistic tendencies of this species.
3. Disease and parasites.
4. Predation by animals and insect larvae.

In view of the limited success and many problems encountered by other workers it was considered appropriate to present the procedures used at the Fish Farming Experimental Station. A summary of techniques used in culturing flathead catfish from the egg to stocking size is presented.

SPAWNING TECHNIQUES

Broodstock was taken from a variety of sources during the preceding fall. The fish were stored in a one-acre pond and provided with an abundance of forage fish. Sexually mature fish were paired, given injections of chorionic gonadotropin (700 units per pound of body weight), and placed in spawning pens. Egg masses were taken from the spawning containers and placed in a mechanical hatching trough. Water supplied from a nearby pond had the following physical-chemical properties: pH 8.2, total alkalinity 250 ppm, temperature range 75 to 82 degrees F.

Hatching commenced on the sixth day and was complete by the end of the seventh day. Two days after hatching, the sac fry were transferred to aluminum feeding troughs 6.5 feet long, 12 inches wide, and nine inches deep. The water level was maintained at eight inches. Water, taken from the source described above, entered at the head of the trough at the rate of 50 gallons per hour.

FEEDING PROCEDURE

Food was offered when the fry first demonstrated a feeding behavior by circling the trough near the sides. This response usually occurred when absorption of the yolk sac was nearly complete. At a temperature of 77 degrees F. this phenomenon occurred when the fry were eight days old. Yolk from eggs boiled for 15 minutes was pulverized in a small amount of water and offered to the fry at the first feeding. This was the only food given for the first two days. On the tenth day after hatching, *Daphnia* were added to the diet. Frozen

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shrimp replaced the egg yolk on the 13th day. Up to this point feed was presented hourly during the day with a single night feeding just before midnight. The fry were kept on the diet of *Daphnia* and shrimp until they were 18 days old. Night feedings were then discontinued. On the 18th day they accepted finely ground trout pellets (meal). Fresh carp flesh that had been boned and finely ground was also offered on the 18th day. Although the fry preferred the carp flesh, they would eat the meal if offered by itself. To encourage the fry to accept artificial food, they were given the trout meal 15 minutes before carp flesh was provided. This diet was continued until the fish were seven weeks old.

DISEASE AND PARASITES

On the 23rd day after hatching the young flatheads were found to be harboring a heavy infestation of *Scyphidia.* The fish were given a 45-minute dip treatment of 250 ppm (1:4,000) formalin. This treatment eradicated the parasite but the subsequent mortality was greater than had been expected. Bacteriological examinations and cultures proved to be negative. The losses were persistent and on the 28th day the fish were provided with feed containing 2.5 grams terramycin per 100 pounds of fish per day. Within eight hours a favorable response was evident and the mortality rate declined. However, after three days it began to climb and a second antibiotic, chloramphenicol, was used without success. Although the fish fed well the mortality continued. Necropsies indicated the stomachs contained food. Affected fish showed convulsive spasms, partial paralysis, and a rigid curvature of the spine in the region of the anal fin. All lots of fish were again checked for parasites or bacterial infection.

Since these examinations proved negative the diet was carefully scrutinized. At this time the fish were receiving a high proportion of fresh carp flesh and the symptoms suggested that the fish might be suffering from a thiamine deficiency. Several corrective measures were taken and in all cases carp flesh was removed from the diet. One group of fish received an addition of thiamine hydrochloride in beef liver at the rate of one gram per 100 pounds of fish per day. A second lot received only beef liver. The response of the fish receiving the thiamine hydrochloride was almost immediate and the mortality ceased within 24 hours. In the trough receiving liver the response was less spectacular but in three days the symptoms and mortality had ceased. At the end of the thiamine treatment the fish were 50 days old and averaged three centimeters in length. The thiamine treatment was continued for seven days after which the fish were returned to a non-medicated diet consisting of equal proportions of carp flesh, liver and trout meal. No further dietary deficiency was encountered through the use of this ration.

An infestation of *Ichthyophthirius* was noted in the troughs when the fry were 45 days old. The fish were successfully treated for this condition by the application of formalin. The water supply pond received four treatments of 35 ppm at two-day intervals and the troughs were treated daily with 150 ppm for one hour. Losses due to the *Ichthyophthirius* infection were approximately one per cent of the total number of fish.

The fish were held in the troughs until the 88th day when they were stocked into ponds. At this time they averaged 1.7 grams and five centimeters in length. Total feeding time covered an 80-day period.

SURVIVAL

The survival rate was derived from the estimated number of sac fry, as determined by a volumetric calculation, and from the actual counts of live fish taken from the troughs. In spite of losses from two parasitic diseases and an apparent vitamin deficiency, the survival

was still 60 per cent of the original number placed in the troughs. A breakdown of the mortality figures is presented below.

Original number of sac fry (volumetric calculation)	4,130*
Number of fingerlings stocked (actual count)	2,478
Total observed losses (actual count)	1,568
SURVIVAL	60%

* It will be noted that the total number of fingerling fish stocked and the observed losses are less than the original estimate by 84 fish. This difference of two per cent is attributed to an error in the original estimation.

Losses attributed to each cause are as follows:

Cause	Number	Per cent of loss
Scyphidia and ensuing treatment	703	44.8
Possible thiamine deficiency	720	46.0
Ichthyophthirius and ensuing treatment	42	2.7
Accidental losses	22	1.4
Sacrificed fish	21	1.3
Non-feeders	10	0.6
Unexplained mortality	50	3.2
	1,568	100.0

An analysis of the mortality data presented above indicates several pertinent observations.

1. Two factors were responsible for 91 per cent of the losses. The suspected thiamine deficiency undoubtedly contributed to the excessive loss following the formalin treatment for *Scyphidia* since symptoms associated with formalin toxicosis were not pronounced.

2. Cannibalism was not considered a factor in the observed losses since no lacerations or teeth marks were noted on any of the moribund fish. No regurgitated or partially engulfed fish were seen.

3. If fresh carp flesh is used in the diet it should be supplemented with beef liver. Any other fish flesh which contains the anti-thiamine factor should also be suspect.

LITERATURE CITED

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A PRELIMINARY REPORT ON THE AGRICULTURAL PRODUCTION OF THE RED-SWAMP CRAWFISH (PROCAMBARUS CLARKI) (GIRARD) IN LOUISIANA RICE FIELDS

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INTRODUCTION

In most parishes of southern Louisiana crawfish are a highly popular food. They are prepared for eating in eight or more ways — boiled, bisque, stew, etoufee, fried, salad, cocktail, and pie. The supply is hardly able to meet the demand during late winter and early spring, the principal season of use.