

## Losses Caused by Enteric Septicemia of Catfish (ESC) 2002–09

The USDA's National Animal Health Monitoring System (NAHMS) conducted its third national study of the U.S. catfish industry, Catfish 2010. There were 424 participating producers in Catfish 2010. The study focused on four States, which were divided into two regions. The East region was defined as Alabama and Eastern Mississippi; the West region included Arkansas, Louisiana, and western Mississippi. Results from Catfish 2010 related to losses among catfish production types due to enteric septicemia of catfish (ESC) are presented here. In addition, Catfish 2010 results are compared with results from the NAHMS Catfish 2003 study.

ESC remains an important disease of farm-raised catfish. Channel catfish (*Ictalurus punctatus*) are the species most susceptible to ESC infection. In 1999, economic losses due to ESC were estimated to be as high as \$60 million (Klesius and Shoemaker, 1999). ESC vaccines have been approved in recent years.

Clinical signs in catfish infected with ESC are both physical and behavioral, neither of which is specific for the disease. Visible physical signs include small circular red spots on the entire body, bloody areas on base of fins, a raised reddish area or ulcerated areas on top of the head, bulging eyes, and a bloated abdomen. Behavioral signs are a reduction of feeding, erratic movement while swimming, and "standing" (floating with head up and tail down). Not all fish in the same pond will always have the same set of signs, and acute cases may have no signs.

A gram-negative bacterium, *Edwardsiella ictaluri*, is the cause of ESC. Infection usually occurs in the spring and fall when water temperatures fall into a range of 22 to 28°C (72 to 84°F). Mortality due to infection decreases greatly outside this temperature range. Stress and poor environmental conditions can lead to higher losses due to the disease. Some factors that may be related to increased losses include improper diet, poor water quality, close confinement, handling, low chloride levels, and water temperature fluctuations. Fingerlings entering their first fall season after winter suffer the most losses, while older fish are generally more resistant.

*E. ictaluri* is readily spread from fish to fish through water or by cannibalism of infected fish. The bacteria may enter through the gills or nasal passages to reside in the brain, resulting in neurologic signs. In addition, *E. ictaluri* is reputed to be transferred from pond to pond via nets or other fomites or by mechanical transfer by birds.

Early intervention with approved antibiotics delivered through feed can be helpful in decreasing mortality (Tucker and Robinson, 1991). Management techniques involving batch production, increased water quality (e.g., aeration), vaccination, and decreased stocking density should also assist in control of ESC.

### Broodfish operations

Broodfish are adult catfish intended for use in spawning. In 2009, 11.5 percent of breeding operations reported losing broodfish to ESC; however, only 0.9 percent of all broodfish losses were due to ESC. Results from Catfish 2003 were similar to those from Catfish 2009. In 2002, the percentage of breeding operations that reported losing broodfish to ESC was higher than the percentage of all broodfish losses due to ESC (9.1 and 1.4 percent, respectively). Broodfish losses from ESC are relatively low compared with losses due to other causes. This difference is likely due to broodfish being exposed to ESC at a young age and the subsequent lower susceptibility to the disease. Of other identified causes of loss in broodfish, fighting was reported by the highest percentage of operations (26.4 percent during 2002 and 34.6 percent during 2009).

### Fry/fingerling operations

Fry are newly hatched fish less than 1 inch long. For this study, fingerlings were considered to be 1 to 8 inches (2 to 60 lb/1,000 fish). In 2009, the percentage of fry/fingerling operations that lost any fingerlings to ESC was three times as high in the West region as in the East region (table 1). In 2009, 20.2 percent of fry losses were attributed to ESC (data not shown). The percentage of operations that reported ESC as a cause of fry/fingerling loss was also higher in the West region than in the East region in 2002. Additionally, the percentage of all fry/fingerling operations that reported ESC as a cause of fingerling death in 2002 was nearly three times that

reported in 2009 (52.9 and 19.3 percent, respectively) [table 1]. The change in ESC-related losses from 2002 to 2009 could be due to the more intensive production practices (feeding, stocking densities) used in 2002, the availability of a new antibiotic, or differences in environmental conditions such as water temperatures.

**Table 1. Percentage of fry/fingerling operations that lost any fingerlings prior to harvest because of ESC, by study\* and by region**

Percent Operations					
Catfish 2003			Catfish 2010		
East	West	All Operations	East	West	All Operations
42.1	57.8	52.9	8.7	27.7	19.3

\*In Catfish 2003, producers were asked to report on reasons for fry loss for the previous two years while in Catfish 2010 the loss was limited to 2009.

### Foodsize-fish operations

Fingerlings are grown to foodsize fish in a variety of management conditions, but are harvested at a target weight of about 1.5 pounds. In Catfish 2010, a higher percentage of operations in the East region than in the West region lost any foodsize fish to ESC (table 2). Unlike loss in fry/fingerlings, in both study years a higher percentage of operations in the East region than the West region lost foodsize fish to ESC or had outbreaks of ESC.

**Table 2. Percentage of foodsize-fish operations that had ESC outbreaks or lost any foodsize fish to ESC,\* by study year and by region**

Percent Operations					
Catfish 2003			Catfish 2010		
East	West	All Operations	East	West	All Operations
65.1	54.9	60.6	43.3	25.4	36.6

\*In Catfish 2003, whether an operation had ESC outbreaks was assessed while in Catfish 2010 whether an operation had loss from ESC was assessed.

### Conclusions

ESC remains an important problem for the catfish industry, especially in fingerling production. Additionally, even though research shows that older fish are less likely to be affected by ESC, many operations with foodsize fish have experienced losses due to ESC,

although these losses seem to be decreasing. Another encouraging trend is that ESC in fry and fingerlings also seems to be decreasing. These stages of catfish are reputed to be the most susceptible to ESC. It is difficult to determine whether vaccination, management changes, or other factors have led to the overall decrease in ESC losses. In any case, the catfish industry appears to be making gains in controlling ESC.

### References

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For more information, contact:

USDA–APHIS–VS–CEAH  
 NRRRC Building B, M.S. 2E7  
 2150 Centre Avenue  
 Fort Collins, CO 80526-8117  
 970.494.7000  
 Email: NAHMS@aphis.usda.gov  
<http://www.aphis.usda.gov/naahms>

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