

AQUACULTURE

SYNERGISTIC EFFECTS OF FLAVOBACTERIUM COLUMNARE ON MORTALITY FROM DISEASED CATFISH

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THERE WAS AN INCREASED RISK FOR MORTALITY IN CHANNEL CATFISH THAT WERE EXPOSED TO BONT/E AND CHALLENGED WITH F. COLUMNARE SUGGESTING THAT COLUMNARIS DISEASE COULD SYNERGISTICALLY AFFECT CATFISH MORTALITIES WITH SUBLETHAL POND EXPOSURE TO BONT/E DURING VTC OUTBREAKS.

Visceral toxicosis of catfish (VTC) is a disease primarily of food-sized fish that causes aberrant swimming and sudden mortality in late fall and early spring when pond temperatures are between 18 and 22°C. The cause of VTC was shown to be botulinum serotype E (BoNT/E), and field mortalities were associated with a neuromuscular blockade induced by the toxin.

Catfish purportedly affected by VTC were submitted by farmers to the Mississippi State University College of Veterinary Medicine Aquatic Diagnostic Laboratory (ADL), where they were bled, necropsied, and examined for characteristic lesions of VTC. The presumptive diagnosis was confirmed through a bioassay using catfish fingerlings injected with serum from the affected fish. Catfish sera that caused mortality in sentinel fingerlings within 96 hours with lesions

typical of VTC-affected fish were considered positive. Sera that did not cause mortality in sentinel fingerlings within 96 hours were considered negative.



Catfish, affected by VTC, swimming in a vat on their sides (still alive) because they lost neuromuscular control to swim upright.

Because fish presented to the ADL were showing VTC clinical signs in the pond but were not causing mortalities in sentinel fingerlings, we considered that additional synergistic factors could be interacting with sublethal doses of BoNT/E to effect mortalities from VTC. One such factor was the bacteria *Flavobacterium columnare*.

Flavobacterium columnare is the most commonly diagnosed bacterial infection of catfish in the Mississippi Delta. The bacteria causes ulceration and necrosis of the skin, mouth, and gills of fish. Columnaris disease outbreaks can occur in

catfish ponds at approximately the same temperature as VTC outbreaks.

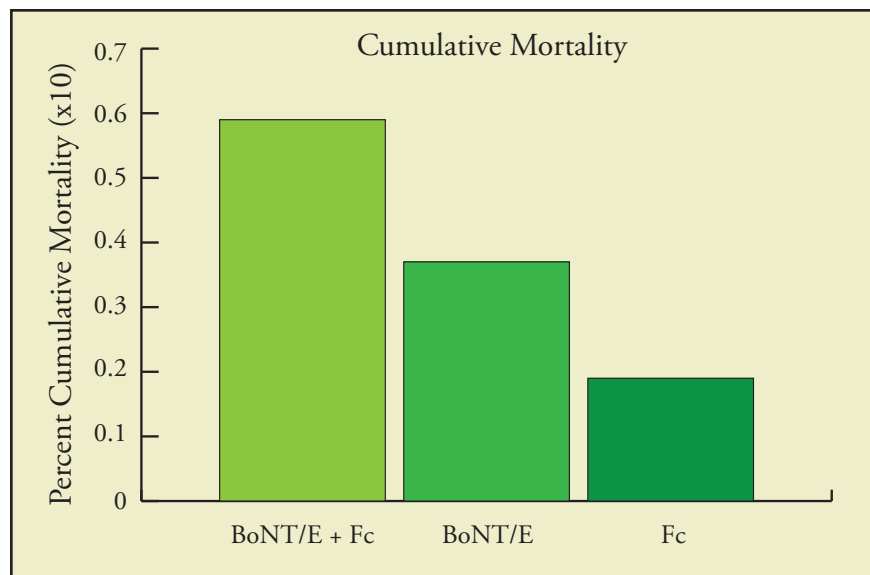
We designed a research study to determine whether there was a synergistic effect between sublethal doses of BoNT/E and *F. columnare* in catfish using 3 treatment groups:

1. Fish injected with BoNT/E and immersion-challenged with *F. columnare* (BoNT/E +Fc)

2. Fish injected with BoNT/E (BoNT/E) only

3. Fish immersion-challenged with *F. columnare* (Fc) only

Mortalities were cultured, necropsied, and examined for characteristic lesions of VTC. The cumula-



Cumulative mortality in catfish that were exposed to botulinum serotype E and Flavobacterium columnare (BoNT/E + Fc), botulinum serotype E (BoNT/E), or Flavobacterium columnare (Fc).

catfish that were exposed to BoNT/E and challenged with *F. columnare* suggesting that columnaris disease could synergistically effect catfish mortalities with sublethal pond-exposure to BoNT/E during VTC outbreaks.

tive mortality and relative risks for mortality were calculated post termination.

A significant difference was seen between the BoNT/E +Fc, and the other 2 groups. The cumulative mortality was 58%, 36%, and 18% for the BoNT/E +Fc, BoNT/E, and Fc, respectively.

In conclusion, there was an increased risk for mortality in channel