Main reservoirs of the bacteria *Aeromonas hydrophila* in commercial catfish raceways and ponds

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Aeromonas hydrophila is a gram-negative bacteria that causes motile Aeromonas septicemia (MAS) in many fish species. Typically, A. hydrophila is considered an opportunistic pathogen; however, an emergent strain which is especially deadly to commercially farmed catfish has become a major concern for the catfish industry since 2009. Catfish production is the top aquaculture industry in the United States, and the second largest producer is the state of Alabama. The emergent strain of A. hydrophila affects larger fish, which means that the fish are lost at market size. This results in enormous financial losses for farmers. The strain is especially prevalent in East Mississippi and West Alabama, which are two of the largest areas for catfish production.

The goal of this study was to determine a method for monitoring the number of Aeromonas spp. in catfish production ponds, and to determine if the bacteria had a niche preference within the sampling sties. To determine both of these ideas, we quantified its numbers in water, sediment, and biofilm using a water filtration method on a media selective for Aeromonas spp. In addition, we also wanted to investigate if there was a seasonal distribution of this pathogen in aquaculture ponds, as we hypothesized that the numbers of the bacteria would increase as the weather warmed over the summer, and would decrease as the weather cooled.

Sampling started in late July and was done monthly until mid-October, as well as during any disease outbreaks caused by Aeromonas spp. Samples were obtained from the same three ponds from a commercial catfish farm located in west Alabama. Serial dilutions were made from the samples and were then filtered and placed on a general growth media and a media selective for Aeromonas spp. After being incubated for 24hrs, plate counts were done to determine the number of bacteria. This process was repeated after every sampling event.

While statistical analysis of the data is still in progress, preliminary results indicate that biofilm and sediment appear to be the main reservoirs of Aeromonas spp. The data also indicate that as the water cooled in October (water temperatures in the October sampling were around 20-22°C compared to 30-33°C during the summer months), the amount of Aeromonas spp. present in the water decreased, but the amount present in the sediment increased. This observation aligned with our hypothesis that the Aeromonas might use the sediment as a refuge during cooler weather.

The next step for this project is to finish the statistical analysis of the data. We are also in the process of completing DNA extractions from the samples to determine if the Aeromonas spp. that were present in the samples were of the virulent strain, as it is impossible to determine with out genetic analysis.

By identifying the main reservoirs of pathogen, farmers can take steps to limit the amount present. This monitoring will help decrease disease outbreaks and minimize the financial losses these farmers suffer from these bacteria.

Statement of Research Advisor:

Evelyn has done an excellent job at organizing collection events, getting samples from a remote location, and processing them in the lab. Her work is the first to prove that the presence of Aeromonas in commercial catfish ponds is surprisingly high in all samples tested and that sediments and fouling of equipment favors the persistence of this pathogen in the farm environment. Her work will set the basis for further studies aimed at improving farm management strategies to reduce disease impact in aquaculture

—*Covadonga Arias, School of Fisheries, Aquaculture and Aquatic Sciences.*