

Enhancing product quality in catfish fillets: understanding and reducing incidence of red fillet

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Collaborator(s): Dr. Brian Bosworth, USDA ARS; Keith Miller, Superior Catfish Products

Objective(s):

1. Determine whether red fillet is caused by a combination of high temperatures, low oxygen conditions and handling stress or high temperatures, high oxygen conditions and handling stress.
2. Compare catfish fillet quality and physiological parameters through sampling catfish at farms prior to and during socking and at processing facilities post-transport in eastern Mississippi during hot summer temperatures.

Milestones for FY 2016-17:

1. Commercial farm to processor sampling of water quality and fillets: partially met.
Collection and analysis of catfish fillets from commercial processor has continued on past project length to provide a more complete understanding of annual patterns in red fillet, by providing a full 1 year of sampling. In addition, several more farms are being sampled this summer to provide a more complete data set on farm conditions prior to the processor.
2. Focused experiments on channel catfish under controlled conditions to simulate environmental relationships potentially causing red fillet: fully met
Findings from experiments funded under this project have provided important information leading to further experiments beyond this project elucidating the causes of red fillet.

Progress Report:

Two undergraduate students and two graduate students were trained and benefited professionally from working on this project. Collaboration with a commercial catfish food processor was initiated in 2016 and continues to date evaluating historical and present data on red fillet incidence and conducting weekly sampling of fillets. Weekly sampling has categorized types of red fillets and quantified incidence in pond harvests. Collaboration with commercial farm grow-out operations was initiated in 2016 and several more farms will be sampled to continue collaboration beyond the length of the study. Water quality is sampled in grow-out ponds, in the sock post-seining, and in the hauling truck between the farm and the processing plant. Experiments were completed at Mississippi State University investigating several combinations of environmental treatments on the incidence of red fillet in commercial sized catfish. Data are currently being analyzed for submission to peer-reviewed publications.

Accomplishments

Major accomplishments include establishing collaborative relationships with commercial farms and processing facilities. These relationships have facilitated data sharing and are mutually beneficial to farms, processors and applied scientists. A second major accomplishment has been examining what combination of environmental conditions may lead to increased incidence of red fillet in market-sized channel catfish using facilities at Mississippi State University (MSU). A third major accomplishment is the continued collaboration between the MSU South Farm Aquaculture Facility and Department of Wildlife, Fisheries and Aquaculture and the facilities at the Department of Food Science, Nutrition, and Health Promotion providing valuable research connections to understand red fillet, and bridging live animal and post-processing research.

Significant Activities that Support Special Target Populations:

Activities under this project support commercial catfish farmers and processing plants. This important industry is a major employer and significant part of the economy in rural areas of the Southeastern US. To this end, the research has been presented to a tour of young industry leaders in the US Catfish Industry at Mississippi State University, and to regional farmers at the North Mississippi Producers Meeting in Verona, Mississippi.

Technology Transfer:

- 1 Number of web sites managed: http://www.fwrc.msstate.edu/water/south_farm/
- 2 Number of non-peer reviewed presentations and proceedings

International Cooperation / Collaboration

No agreements

Publications:

Schilling, M.W., Suman, S.P., Zhang, X., Nair, M.N., Desai, M.A., Kezhou, C., Ciaramella, M.A., Allen, P.J. 2017. Proteomic approach to characterize biochemistry of meat quality defects. Meat Science. doi:10.1016/j.meatsci.2017.04.018.

Ciaramella, M.A., Nair, M., Suman, S.P., Allen, P.J., Schilling, M.W. 2016. Differential abundance of muscle proteome in cultured channel catfish (*Ictalurus punctatus*) subjected to ante-mortem stressors and its impact on fillet quality. Comparative Biochemistry and Physiology. 20:10-18.

Presentations:

Allred, S., Shao, W., Schilling, M.W., and Allen, P.J. (2017, February). Assessing red discoloration in catfish fillets. Oral presentation at the 2017 Annual Meeting of the Mississippi and Alabama Chapters of the American Fisheries Society, Biloxi, MS.

Allen, P.J., Ciaramella, M., Schilling, M.W., Bosworth, B., Kim, T., Suman, S., Peterman, M. and Avery, J. (2016, May). Enhancing product quality in catfish fillets: understanding and reducing the incidence of red fillet. Oral presentation at the 2016 Food Science Initiative Conference, Starkville, MS.

Project photograph



Figure 1. Red fillet (top) compared to acceptable fillet (bottom).