Processing Farm-Raised Catfish: Opportunities for Improved Efficiency through Research

A Summary of the Workshop "Utilizing Advanced Processing Technologies in Catfish"

April 9-10, 2018

Coordinated by the USDA Agricultural Research Service and Mississippi State University

Background

In September 2017, representatives from two Mississippi catfish processing plants contacted ARS scientists Craig Tucker and Peter Bechtel to request a meeting to discuss the possibilities of enhancing the university and federal research programs in catfish processing. The request has considerable merit based on the following:

1) considerable advances have been made in processing technologies for other food animal industries;

2) many of these new technologies have not been adopted by catfish processors, either due to lack of knowledge of these advances, lack of engagement with equipment manufacturers, or the perceived expense of implementing these technologies;

3) catfish processing has received less attention from the research community than the production sector; and

4) recent innovation in catfish production technology has improved potential on-farm production to the point where dramatic improvements in farm efficiency will be difficult to sustain and the greatest gains in overall industry efficiency may be associated with improvements in the processing sector.

Further action on this opportunity was supported by administrative leadership from ARS National Program staff, ARS Southeast Area, and Mississippi Agriculture and Forestry Experiment Station. It was decided to convene a workshop in Stoneville, Mississippi, with the goal of engaging the research communities of ARS and Mississippi State University with commercial catfish processors and poultry processing engineers from the southeastern United States for the purpose of discussing advanced meat and seafood processing technologies that could be adopted by catfish processors to improve processing efficiency and effectiveness, with the ultimate goal of making U.S. aquaculture more competitive in the global marketplace.

A steering committee was formed consisting of Dr. Kurt Lawrence, Acting SEA Associate Area Director; Dr. Peter Bechtel, Research Leader, Food Processing and Sensory Quality Research Unit; Craig Tucker, Research Leader, Warmwater Aquaculture Research Unit; and Dr. Jimmy Avery, Aquaculture Leader, Mississippi State University Extension Service. Invitations were sent to representatives of all domestic catfish processing plants and to appropriate research and administrative personnel with ARS and Mississippi State University.

The workshop was held on April 9-10, 2018. The general plan for the two-day meeting was as follows:

Day 1—Tour two catfish processing plants in Mississippi to familiarize researchers with current methods and technologies used in catfish processing;

Day 2—Provide formal presentations by experts in seafood processing and poultry processing to provide catfish processors an opportunity to see how problems and inefficiencies have been addressed in their industries, followed by a general roundtable discussion among processors and researchers to identify researchable topics for future program development.

A summary of the potential research topics identified in the roundtable discussion follows on the next two pages. A list of attendees and the full agenda follows the summary of researchable topics.

Utilizing Advanced Processing Technologies in Catfish: Potential Areas of Research

Summary of a Joint ARS-MSU Processors' Workshop, April 9-10, 2018

FILLET PROCESSING

1. Improve fillet processing operations to reduce trim and increase fillet yield.

   Adapt processing equipment used in other fisheries, poultry and meat operations for catfish processing. Work with equipment manufactures to adapt and modify fillet machines that automatically adjust to catfish fish size and evaluate imaging systems to optimize catfish fillet cuts.

2. Reduce fillet trimming labor and turnover by developing improved trimming systems and ergonomics

3. Develop pre-fillet equipment to removed fin bones

Researchable Area: Develop new techniques to improve fillet processing by reducing trim and increasing yield through advanced engineering tools, methods, and processes.

SHELF LIFE EXTENSION AND PRODUCT QUALITY

1. Improve Shelf-life extension of fresh products beyond 12 days by evaluating microbiology and quality characteristics.

   a. Evaluate effects of seasonality and pre-harvesting stress on muscle characteristics.
   b. Investigate processing operations and temperature controls to reduce the initial microbial load.
   c. Develop novel packaging systems to improve shelf life.
   d. Develop coatings and glazes of catfish products to improve shelf life.

2. Improve the Shelf life extension of frozen product beyond 6 months for further processed products such as batter and breaded fillets by evaluation of quality characteristics.

   a. Evaluate seasonality and pre-harvesting stress on muscle characteristics
   b. Evaluate additives, coatings and glazes that can be added prior to freezing to improve the quality of frozen product during storage.
   c. Develop novel packaging systems to improve shelf life.
   d. Optimize frozen storage conditions for quality of major products.

Researchable Area: Develop better understandings of processes, properties, and methods to extend catfish shelf life of fresh and frozen products while maintaining product quality.

CATFISH MINCE (TRIM)

1. Develop different types (grades) of catfish mince for different end uses.

2. Develop new and/or improved products from catfish mince.

    a. Develop processes and methods to optimize the quality of catfish mince and storage stability.
    b. Develop processes and methods to improve mince recovery, such as from frames and heads.

3. Develop filleting procedures that can improve the quality of mince such as reducing the content of skin in mince)

Researchable Area: Develop processing methods and procedures to remove more mince from catfish frames and heads, increase quality of catfish mince (less skin), and develop new products/markets for catfish mince.

VALUE-ADDED PRODUCTS

1. Creating new value-added products for growing markets such as consumers groups that look for convenience and healthy choices.

2. Add value to big fish fillet products by further processing and evaluate real-time filleting machines.

3. Develop process and products that utilize commercially available by-products (heads, skin, frames and viscera components) to produce human foods, pet foods and animal feeds.

Researchable Area: Develop new value-added products for human consumption, pet foods, or animal feeds.

OTHER RESEARCHABLE TOPICS RELATED TO CATFISH PROCESSING

1. Determine environmental, genetic, processing, and management factors that affect product quality including flavor, color, and texture characteristics.

2. Develop new technologies to measure off-flavor that are economical, rapid, and reliable.

3. Evaluate alternatives to hauling ice for keeping fish cool during transport.

Catfish Processors Workshop Attendance List, April 10, 2018

Name	Affiliation
Catfish Processors	
Bill Battle	Pride of the Pond, Mississippi
Bob Biles	Pride of the Pond, Mississippi
Bill Gidden	Pride of the Pond, Mississippi
Mike Miller	SouthFresh Aquaculture, Alabama
Andy Prosser	Simmons Catfish, Mississippi
Earl Lake	Lake's Catfish, Mississippi
Keith Miller	Superior Catfish Products, Mississippi
Stuart Kinard	Superior Catfish Products, Mississippi
Russ McPherson	Harvest Select, Mississippi
Lee Stewart	Harvest Select, Mississippi
Steve Henderson	Harvest Select, Mississippi
Jon Henderson	Harvest Select, Mississippi
Mart Massey	America's Catch, Mississippi
David Farmer	Freshwater Farms, Mississippi
David Allen	Country Select Catfish, Mississippi
Frank Davis	Country Select Catfish, Mississippi
Research and Administration	
Peter Bechtel	ARS-Southern Regional Research Center, New Orleans
John Bland	ARS-Southern Regional Research Center, New Orleans
Casey Grimm	ARS-Southern Regional Research Center, New Orleans
Craig Tucker	ARS-Warmwater Aquacultre Research Unit, Stoneville
Brian Bosworth	ARS-Warmwater Aquacultre Research Unit, Stoneville
Brian Ott	ARS-Warmwater Aquacultre Research Unit, Stoneville
Jeff Buhr	ARS-National Poultry Research Center, Athens
Brian Bowker	ARS-National Poultry Research Center, Athens
Carl Webster	ARS-Stuttgart National Aquaculture Research Center, Stuttgart
Archie Tucker	ARS-Southeast Area
Kurt Lawrence	ARS-Southeast Area
Jeff Silverstein	ARS-National Program Staff
Gene Lester	ARS-National Program Staff
Jimmy Avery	MSU-National Warmwater Aquaculture Center, Stoneville
Sam Chang	MSU- Food Science, Nutrition, and Health Promotion
James Henderson	MSU- Food Science, Nutrition, and Health Promotion
Yang Zhao	MSU-Agricultural and Biological Engineering
Wes Burger	MSU-Mississippi Agricultural and Forestry Experiment Station
Kari Reeves	MSU-Bagley College of Engineering
Chip Morgan	Delta Council
Mike McCall	Catfish Farmers of America

Chris Sannito — University of Alaska Seafood Lab, Kodiak
Doug Britton — Georgia Tech Research Institute, Atlanta

AGENDA

Advanced Processing Technologies for Catfish

MSU-DREC Capps Center; Stoneville, MS

April 9 – 10, 2018

Day 1: April 9, 2018

9:30 a.m. Depart from MSU-DREC Capps Center
11:00 a.m. Tour Processing Plant #1 (Location TBA)
12:00 p.m. Lunch on the Road
2:00 p.m. Tour Processing Plant #2 (Location TBA)
3:45 p.m. Return to MSU-DREC Capps Center

Day 2: April 10, 2018

9:30 a.m. – 12:00 p.m MSU-DREC Capps Center

Welcome and Goals for the Meeting

Moderator – Craig Tucker, Research Leader, USDA-ARS Warmwater Aquaculture Research Unit

Seafood Processing Technologies

Chris Sannito – Seafood Processing Specialist, Univ. Alaska - Fairbanks Seafood Lab

Poultry Processing Technologies

Doug Britton – Georgia Tech University Research Institute, Agricultural Technology Research Program

USDA Programs and Capabilities

Jeff Silverstein – National Program Leader, Animal Production and Protection

MSU Programs and Capabilities

Wes Burger – Associate Director and Professor, MSU MAFES and Director, MSU Forestry and Wildlife Research Center

Roundtable Discussion – Where do we go from here?