



## RESEARCH

### SEASONAL CHANGES OF PROXIMATE COMPOSITION AND FATTY ACIDS OF POND RED SWAMP CRAWFISH (*Procambarus clarkia*)

The crawfish industry is the second largest seafood industry in the state of Louisiana, which has significantly grown and changed in the last three decades. In 2017, farm-raised crawfish represented 54% of the total gross farm value generated within aquaculture enterprises. The demand has increased both within the state and regionally, resulting in increased acreage and production. In addition, low rice prices have motivated people to increase crawfish farming operations. In 2017, farm-raised crawfish production occupied approximately 222,259 acres, with a total gross value of \$172.1 million.

A 2008 survey showed that there are six major production systems: (1) single-crop crawfish with rice forage (45%), (2) double-crop with rice forage (rice-crawfish) (28%), (3) fallow rotation (rice-crawfish/2-year rotation) (27%), (4) single-crop crawfish with non-planted forage crop (27%), (5) single-crop crawfish with other planted forage (11%), and (6) rice-crawfish-soybean rotation (2-year rotation) (7%). Farm-raised crawfish are grown in fields also known as ponds. Pond size varies from 10 to 40 acres and 8 to 24 inches deep. A field is divided in cuts. Growing conditions for crawfish production are based on temperature. Red swamp and white river crawfish can tolerate cold winter conditions, and they have a short life span (2 years or less). Red swamp crawfish has the ability to spawn year-round, and there is evidence that some females are able to reproduce more than once a year. Male crawfish are found in two reproductive forms, form I and form II. Form I is considered a reproductive stage; form II is a non-reproductive stage. In some cases, smaller sizes of mature crawfish can be found due to environmental stresses such as poor water quality, water level fluctuations, and insufficient forage. The reproduction of the crawfish starts when the mature male stores the sperm in female special receptacle, then the female retreats to a burrow, where she will spawn. Burrowing activity usually occurs in late spring/early



Figure 1. Sorting crawfish by sex and maturity. Photo Evelyn Watts

summer; however, it can occur any time of the year. Each female can produce more than 500 eggs, and the time for hatching (approximately 3 weeks) varies based on temperature. Crawfish of all ages and sizes will hide into burrows to survive dry periods. When the ponds are flooded or rainfall is heavy, the female is encouraged to emerge with its offspring or eggs. Since crawfish are crustaceans, they need to molt (or shed) their exoskeleton in order to increase in size. Several factors such as temperature, population density, oxygen levels, food quality, and food quantity affect the growth of crawfish.

The objective of this study is to evaluate seasonal changes of nutritional composition and fatty acid profile of crawfish tail meat and compare differences between sex, maturity, and farm production systems. Every 3 week during the spring of 2019, live crawfish samples were collected from fields using single-crop crawfish with rice forage (rice forage) and one using single-crop crawfish with non-planted forage crop (volunteer forage). Meat yield was evaluated and samples were prepared for physical/chemical, nutritional composition, mineral, and fatty acid analyses.

### EFFECT OF LACTIC ACID ON SHELF LIFE OF FRESH CRAWFISH TAIL MEAT

The crawfish industry has significantly grown and changed in the last three decades. In the 1990s, crawfish was hot peeled; however, this has changed in the last decade. Currently, more than 60% of crawfish processors in Louisiana chill crawfish after cooking and before peeling. Under current processing conditions, fresh crawfish tail meat has a shelf life of six days.

Lactic acid has been recognized for its antimicrobial properties, including gram positive and gram negative bacteria. Lactic acid antimicrobial activity was studied in vitro against pathogenic and spoilage microorganisms with a minimal inhibitory concentration for bacteria of  $\geq 1.25\text{mg}/\text{ml}$ . The application of lactic acid resulted in the reduction of *Listeria monocytogenes* growth on crawfish.

A combination of sodium chloride and an organic acid is the only antimicrobial solution approved by the US Food and Drug Administration (FDA) for use on finfish and crustaceans. The application of an acidified sodium chlorite solution during the crawfish chilling step can improve shelf life of fresh crawfish tail meat.

In 2019, Louisiana Sea Grant (LA SG) funded the research proposal: *Effect of lactic acid on shelf life of fresh crawfish tail meat*. The objective of this study is to determine the effect of 0 to 2% lactic acid on the shelf life of fresh crawfish tail meat (Figure 2 & 3).



Figure 2. Preparation of ice slurry with lactic acid. Photo Evelyn Watts



Figure 3. Juan Touza is the recipient of LA SG funds. Photo Evelyn Watts



## EXTENSION

### BEYOND THE BOAT – SEAFOOD PROCESSORS CONFERENCE



Figure 4. Beyond The Boat – Seafood Processors Conference. Photo Brookes Washington.

Louisiana Direct Seafood’s inaugural Beyond the Boat – Seafood Processors Conference enriched Louisiana’s thriving seafood processing industry with a day of education, hands-on demonstrations and networking (Figure 4).

Held at LSU’s Baton Rouge campus, the conference brought together longtime fishermen and other professionals from Louisiana’s commercial seafood industry, packaging and processing specialists, government and non-governmental representatives, researchers, and entrepreneurs. By

every measure – attendance, industry involvement, information provided, networking opportunities, and enthusiasm – the conference exceeded expectations. The event was hosted on January 30, 2019, at the LSU AgCenter 4-H Minifarm. There were nine speakers and panelists, 11-equipment demos, and 12 vendor and agency booths. Over 100 people were registered for the conference. The Office of Community Development (through the Louisiana Seafood Industry Sustainability Initiative), the LSU AgCenter, and Louisiana Sea Grant sponsored the event. The planning team included Thomas Hymel, Dr. Evelyn Watts, Dr. Julie Lively, Anne Dugas and Leslie Davis. Watch the Seafood processor’s conference video recap [here](#).

### CRAWFISH TAIL MEAT – PEELING AND PACKAGING

The LSU AgCenter hosted crawfish tail meat packaging meetings on Feb. 11 and Feb. 12 in southwest Louisiana (Figure 5). The workshops were tailored to benefit the crawfish peeling and packaging industry. It provided recommendations on best peeling and packaging practices. Meetings were at the LSU AgCenter Cooperative Extension Service office in Crowley and the LSU AgCenter Cooperative Extension Service office in Breaux Bridge.



Figure 5. Crawfish tail meat – Peeling and Packaging meeting, Breaux Bridge, LA. Photo Brookes Washington.

The AgCenter and Louisiana Sea Grant are conducting a study to evaluate fat on tail and drip loss—the liquid that a muscle loses after freezing and thawing—in fresh and frozen crawfish tail meat under current processing practices. The LSU AgCenter & Louisiana Sea Grant Seafood Extension Specialist discussed how processing practices affect the amount of fat on tail meat and drip loss and presented findings from this research. There was participation of the FDA, the Louisiana Department of Agriculture and Forestry, and the Louisiana Department of Health (LDH). Forty crawfish processors participated in the two meetings.

#### SEAFOOD CONTROL PROCEDURES (SCP) AND BASIC SEAFOOD HACCP

The LSU AgCenter and Louisiana Sea Grant hosted a SCP and a Basic Seafood HACCP in spring 2019. Thirty-two seafood processors from in and out-of-state attended the workshops. Based on an impact survey completed by attendees, all attendees felt their knowledge of the covered material increased 49% and their confidence in completing duties associated with the presented material increased 68%. The workshops were on January 22-25 in Efferson Hall on LSU's Baton Rouge campus.

#### REDUCED OXYGEN PACKAGING (ROP) HACCP & SPECIALIZED PROCESSING METHODS

In collaboration with the LDH, the LSU AgCenter hosted a two-day workshop oriented to LDH supervisors and sanitarians. This workshop provided information regarding food safety hazards, 7 principles of HACCP, federal and state requirements for ROP, and specialized processing methods. Twenty-eight LDH sanitarians and area supervisors attended the workshop. The training was on April 23 & 24 in the LDH offices in Baton Rouge.

#### TEACHING

In the spring 2019 semester, I participated as guest lecturer in Foods of Animal Origin class (ANSC 2053) presenting three one-hour lecture on "Principles of HACCP." Drs. Evelyn Watts and Wenqing Xu prepared and participated in the lecture and group discussion.

#### UPCOMING EVENTS

##### AFDO Sanitation Control Procedures (SCP) For Fish and Fishery Products

July 29, 2019

Efferson Hall 212

##### AFDO Basic Seafood HACCP

July 30 to August 1, 2019

Efferson Hall 212

##### USDA/FSIS Catfish Compliance Workshop

August 1, 2019

Efferson Hall 212

##### Meat & Poultry HACCP

August 27-29, 2019

204 Animal and Food Sciences Laboratories

*Evelyn Watts*

*Assistant Professor – Seafood Extension Specialist*

*School of Nutrition and Food Sciences*

*LSU AgCenter & LA Sea Grant*

Website: <https://www.lsu.edu/departments/nfs/Seafood-Quality/index.htm>

