Crawfish Tail Meat Peeling and Packaging

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Outline

- Background
- How cooking affects drip loss
- How vacuum packing affects drip loss
- How freezing and thawing affect drip loss
- Research findings
  - Fat on fresh crawfish tail meat
  - Drip loss of frozen tail meat
- Recommendations
- ROP guidance
Fat on crawfish tail meat

- Crawfish tail meat is usually sold in 12 or 16 oz. bags with the fat remaining.
- Louisiana Administrative Code allows naturally adhering fat content on peeled crawfish up to 10% of the net weight of the crawfish in the package (LDAF, 1993).
- Fat on fresh crawfish tail meat can be measured by a gravimetric method (difference between net weight & washed tail meat weight).
Fat on crawfish tail meat

- Crawfish industry in the 90’s
  - Most processors hot peeled
  - Most product sold fresh

- Crawfish industry in 2019.
  - Most processors cold peeled
  - Large percentage is sold frozen
How cooking affects drip loss

- Proper cooking deactivates proteolytic enzyme in hepatopancreas.

- Gelatin Test.
How vacuum packing affects drip loss
<table>
<thead>
<tr>
<th>VP %</th>
<th>DL %</th>
<th>Crab meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>4%</td>
<td>100%</td>
</tr>
<tr>
<td>95%</td>
<td>1.5%</td>
<td>95%</td>
</tr>
<tr>
<td>90%</td>
<td>1.5%</td>
<td>90%</td>
</tr>
<tr>
<td>85%</td>
<td>1.5%</td>
<td>85%</td>
</tr>
<tr>
<td>75%</td>
<td>1.5%</td>
<td>75%</td>
</tr>
</tbody>
</table>

How **Vacuum Packing** affects **Drip Loss**

- **VP %** (% Vacuum Packing)
- **DL %** (% Drip Loss)

*Crab meat*
How freezing and thawing affect drip loss
Freezing

- Fishery preservation method, which allows a longer shelf life of fishery products.
- Is the process of removing heat to lower the product temperature to -0.4°F (-18°C) or below.
- Reduces microbial and enzymatic activity.
Freezing

- Freezing is the most effective method to preserve the original quality of fish for longer periods.
- To maintain the benefit of freezing, the frozen state must be kept. Cold chain should not be broken.
- Thawing is also a very important process for frozen seafood.
Recrystallization

- Is the change in number, size, shape and orientation of the ice-crystals during storage.
- Small crystals disappearing, large crystals growing, and crystal fusing together.
- Fluctuating temperatures greatly enhance the process of recrystallization.
Recrystallization

- Recrystallization can be minimized by maintaining a low and constant storage temperature.
- Can happen during thawing. Thawing process should be done rapidly to avoid undesirable effects of recrystallization.
Freezing zone or critical zone

- 70.0°F
- 40.0°F
- 32.0°F
- 30.2°F
- 25.0°F
- -0.4°F
- -13.0°F

- Refrigeration
- Water freezes
- Seafood starts to freeze
- 90-95% of water in seafood is frozen

Seafood starts to freeze at 30.2°F and 90-95% of water in seafood is frozen at -13.0°F.

Water freezes at 32.0°F.
Research findings
Fat on fresh crawfish tail meat study

**Hot Peeled** (Average 1.68%, Range -0.80-8.62%)

**Cold Peeled** (Average 3.02%, Range -0.39-6.47%)
Thawing methods (Drip loss & Fat on tail)

**Hot Water Bath (100°F)**
- Average: 10.08%

**Cold Water Bath (50°F)**
- Average: 6.04%
- Range: 2.97-12.45%, S.D.: 2.91%

**Refrigeration (38°F)**
- Average: 6.84%
- Range: 5.7-8.37%, S.D.: 0.82%
Three-month frozen (Fat on tail & Drip loss)

**Hot Peeled** (Average **5.57%**, Range **1.77-10.40%**, S.D. **2.42%**)  
**Cold Peeled** (Average **7.87%**, Range **5.68-11.37%**, S.D. **1.38%**)
Six-month frozen (Fat on tail & Drip loss)

**Hot Peeled** (Average **5.18%**, Range **1.76-10.02%**, S.D. **2.23%**)

**Cold Peeled** (Average **8.15%**, Range **3.89-11.96%**, S.D. **2.00%**)

% fat on tail & drip loss
## Results LDAF vs. LSU AgCenter

<table>
<thead>
<tr>
<th>Days of Frozen Storage</th>
<th>LDAF&lt;sup&gt;a&lt;/sup&gt;</th>
<th>LSU AgCenter&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-day</td>
<td>Range 8.04 to 12.59%</td>
<td>Average 10.43%</td>
</tr>
<tr>
<td>60-day</td>
<td>Range 12.15 to 16.10%</td>
<td>Average 13.15%</td>
</tr>
<tr>
<td>90-day</td>
<td>Range 8.49-14.90%</td>
<td>Average 11.46%</td>
</tr>
<tr>
<td></td>
<td>1.77 to 11.37 %</td>
<td>6.72%</td>
</tr>
<tr>
<td>120-day</td>
<td>Range 4.84 to 15.39%</td>
<td>Average 11.18%</td>
</tr>
<tr>
<td>150-day</td>
<td>Range 9.50 to 11.73%</td>
<td>Average 10.81%</td>
</tr>
<tr>
<td></td>
<td>1.76 to 11.96%</td>
<td>6.67%</td>
</tr>
<tr>
<td>365-day</td>
<td>Will be available Summer 2019</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Samples from 5 facilities, peeling temperature information not available.

<sup>b</sup> Samples from 6 facilities, half samples cold peeled, half hot peeled. Samples thawed in refrigeration.
Recommendations
Appropriate cooking time and temperature to ensure proteolytic enzyme deactivation (Gelatin test).

Zero scale or tare after placing empty bag on scale.

Add an additional 1 to 2% of tail meat to each package.

Using 85 to 90% of vacuum during packaging will reduce muscle disruption.
Processing recommendations

- Freeze packages in separate layers for a faster freezing process.
- Avoid temperature fluctuations during storage to prevent recrystallization.
- Recommend to thaw under refrigeration to prevent muscle disruption.
Recommendation moving forward

- Establish a “Crawfish tail meat review committee” including representation from the industry, consumers, and regulatory agencies.

- Committee tasks:
  - Review the current crawfish tail meat standard and evaluation procedure to provide recommendations to LDAF for updated standard(s) and procedure(s) for the evaluation of fresh and frozen crawfish tail meat.
  - Develop Good Processing Practices for crawfish tail meat.
Acknowledgment

- Crawfish Processors Alliance, Inc.
- Crawfish processing facilities
- LDAF/Weight & Measures
- Louisiana Sea Grant & LSU AgCenter
Reduce Oxygen Packaging Guidance
Thanks!!!

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