Welcome to
Florida Small Farms and Alternative Enterprises Conference
On-Farm Poultry Processing: Food Safety and Food Quality Considerations
The 2014 Educational Program Committee is pleased to share conference educational materials with you under the condition that they are used without alteration for educational and non-commercial use only. All materials are protected by copyright law. The authors kindly request their work is properly cited, including the date of publication.

For more information on Small Farms, visit our website at: http://smallfarms.ifas.ufl.edu/ or contact your local County Extension Agent.

For inquiries about this topic, please contact:
Danielle Treadwell, Educational Program Chair.
Phone: (352) 273-4775
Email: ddtreadw@ufl.edu

Suggested Citation: Author Full Name. Title of Presentation or Handout. 2014 University of Florida-IFAS and Florida Agricultural and Mechanical University-CAFS Florida Small Farms and Alternative Enterprises Conference. August 1-2, Kissimmee, FL.
On-Farm Poultry Processing: Food Safety and Food Quality Considerations

S. K. Williams, Ph.D.
Department of Animal Sciences
Small Farm Conference, Orlando, FL
University of Florida/IFAS, Gainesville, FL
August 1, 2014
Pastured Poultry: A Collaborative Effort
Objectives

- Discuss Pastured Poultry Process from Farm to Ready-to-Cook Carcass
- Discuss Food safety concerns in poultry processing
- Provide interactive dialogue for participants
Pastured Poultry
Pastured poultry

- A sustainable agricultural production system
- Raising chickens or other poultry on pasture
- Employs bottomless cages or brooder houses
Food Safety

Food safety education
Food safety training
Pre- and Postharvest
for farmers, industry, and for retail, including small farm direct-food-sales vendors and processors.
Preharvest Food Safety Concerns?

- Feed
- Water
- Grazing Practices
- Environmental Attributes
- Animal
Grass and Forage Fed

- Bahiagrass pasture
- Legume pasture
- alfalfa
- Other forage grown by producer
Pathogens of Concern

- Most commonly recognized
  - *Salmonella*
  - *Campylobacter*
  - *Listeria monocytogenes*
  - *Staphylococcus aureus*
Postharvest Food Safety Concerns

- Conditions and cleanliness of processing
- Equipment
- Scald tank water
- Chill tank water
- Workers hygiene
- Storage temperature of carcasses
Housing Facilities for Pastured Poultry at Florida A & M University Research & Extension Facility Quincy, FL
Housing: Bottomless Field Pen

- 1 bird to 1.5 sq. ft. of space
- 25 one-day old chicks/pen
- Pens are moved daily
- Birds raised for approximately 7 to 8 weeks
Housing: Bottomless Field Pen
Housing: Bottomless Field Pen

- Houses are moved daily to:
  - Provide fresh grass
  - Prevent manure accumulation
  - Provide even distribution of manure for fertilization of pasture
Housing: Brooder Houses
Brooder Houses

- Houses should be cleaned
- Sanitized

- Litter removed
- Replenish with fresh litter (wood shavings or saw dust)
Food Safety Considerations

- Potable water
  - All aspects of processing
- Sanitizers for equipment and surfaces
  - 100 ppm chlorine, or 50 ppm Iodine (recommended)
- Employee hygiene
  - Handwashing
  - Clothing
  - Bandaids and gloves if injuries on hands
Food Safety Considerations

- Feed withdrawal
  - 8 to 12 hours to empty crop
- Scald Temperature
  - 125-135°F for industry birds
  - 145°F/45 sec. for Field slaughter (recommended)
- Chilling temperature
  - 40°F within 3 hours
- Storage of broiler carcasses
Harvesting
Florida A & M University
Tallahassee, FL
Collection of Birds
Scale for Weighing Birds
Automated table picker/defeatherer (a), Five-gallon propane thermostatically controlled scalding kettle (b), Harvesting Funnel (c), and Evisceration table (d)
http://www.cornerstone-farm.com/mpu1.htm
Mini Mobile Processing Unit being towed by a PT (Poultry Truckin!) Cruiser!

http://www.cornerstone-farm.com/mpul.htm

(MMPPU estimated at approx. $10,000.00) + cost of automobile
Least Expensive System
Bleeding

- Bleeding may take 1 to 3 minutes
- Complete bleeding produces desired meat color in dressed bird.
Scalding temperatures

- Semi-scald: 123 to 130°F / 90 to 120 seconds
- Sub-scald: 138 to 140°F for 30 to 75 seconds
Defeathering
Evisceration
Rinse carcass (a), vat for that serves as chiller (b).
Rapidly chill carcasses, in 50 gallon vat (b) containing ice water slush, from approx. 35°C to 40°F in 3 hours.
Packaging
Quality Considerations
Packaging → Aging

- Tenderness is directly related to aging
- Age Poultry at 4°C or refrigeration for at least 4 hours before it is eaten or frozen
- No aging produces tough meat
- Toughening is due to incomplete rigor mortis - a temporary stiffening/contraction of muscles.
Rigor Mortis and Tenderness

- Rigor is not fully complete for 24 hours
- Tenderization is complete:
  - 4 hours in chickens
  - 6 to 8 hours in turkeys
Effects of Chilling (3±1°C) on Tenderness

Santos et al., 2004

Table 1 - Variations of Sensorial Tenderness of Chicken Breast Fillets With Carcass Aging.

<table>
<thead>
<tr>
<th>Carcass Aging Time (h)</th>
<th>Sensorial Tenderness Scores for Chicken Breast Fillets (Carcasses with 1.0 +/-0.1 kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.75&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>2</td>
<td>2.65&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>4</td>
<td>3.06&lt;sup&gt;bc&lt;/sup&gt;</td>
</tr>
<tr>
<td>8</td>
<td>3.69&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>12</td>
<td>4.00&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>24</td>
<td>4.13&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a-d</sup> Means in each column with no common superscript differ significantly (p<0.05); n=16.
Effects of bird age at slaughter and aging on WBS of cooked chicken breast meat (Zhuang et al, 2009, UGA)

<table>
<thead>
<tr>
<th>Age (d)</th>
<th>0 h</th>
<th>2 h</th>
<th>4 h</th>
<th>6 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>15.3&lt;sup&gt;a,y&lt;/sup&gt;</td>
<td>11.9&lt;sup&gt;b,y&lt;/sup&gt;</td>
<td>4.0&lt;sup&gt;c,x&lt;/sup&gt;</td>
<td>5.9&lt;sup&gt;c,x&lt;/sup&gt;</td>
</tr>
<tr>
<td>39</td>
<td>14.8&lt;sup&gt;a,y&lt;/sup&gt;</td>
<td>10.1&lt;sup&gt;b,y&lt;/sup&gt;</td>
<td>4.0&lt;sup&gt;c,x&lt;/sup&gt;</td>
<td>3.7&lt;sup&gt;c,x&lt;/sup&gt;</td>
</tr>
<tr>
<td>42</td>
<td>15.1&lt;sup&gt;a,y&lt;/sup&gt;</td>
<td>8.2&lt;sup&gt;b,z&lt;/sup&gt;</td>
<td>4.3&lt;sup&gt;c,x&lt;/sup&gt;</td>
<td>5.7&lt;sup&gt;c,x&lt;/sup&gt;</td>
</tr>
<tr>
<td>44</td>
<td>16.4&lt;sup&gt;a,y&lt;/sup&gt;</td>
<td>7.3&lt;sup&gt;b,z&lt;/sup&gt;</td>
<td>3.7&lt;sup&gt;c,x&lt;/sup&gt;</td>
<td>4.4&lt;sup&gt;c,x&lt;/sup&gt;</td>
</tr>
<tr>
<td>46</td>
<td>17.5&lt;sup&gt;a,x&lt;/sup&gt;</td>
<td>11.0&lt;sup&gt;b,y&lt;/sup&gt;</td>
<td>6.0&lt;sup&gt;c,x&lt;/sup&gt;</td>
<td>4.3&lt;sup&gt;c,x&lt;/sup&gt;</td>
</tr>
<tr>
<td>49</td>
<td>19.8&lt;sup&gt;a,x&lt;/sup&gt;</td>
<td>15.1&lt;sup&gt;b,x&lt;/sup&gt;</td>
<td>4.9&lt;sup&gt;c,x&lt;/sup&gt;</td>
<td>4.4&lt;sup&gt;c,x&lt;/sup&gt;</td>
</tr>
<tr>
<td>51</td>
<td>14.6&lt;sup&gt;a,z&lt;/sup&gt;</td>
<td>14.5&lt;sup&gt;a,x&lt;/sup&gt;</td>
<td>4.8&lt;sup&gt;b,x&lt;/sup&gt;</td>
<td>4.6&lt;sup&gt;b,x&lt;/sup&gt;</td>
</tr>
<tr>
<td>SEM</td>
<td>0.40</td>
<td>0.56</td>
<td>0.22</td>
<td>0.44</td>
</tr>
</tbody>
</table>

<sup>a–c</sup>Means in same row with different superscripts differ significantly (P < 0.05); <sup>x–z</sup>Means in same column with different superscripts (P < 0.05).
Chilling

- Maintains shelf life
- Maintains quality
- Retards growth of bacteria
- Control growth of pathogens
Examples of Currently Marketed Products – White Oak Pastures

http://www.whiteoakpastures.com/pc_combined_results.asp?pc_id=CC063B7DE8704E1AAE07973FDCD6DDAF
Offal Special ($45.00): 12.5 pounds of meat, including: (1) beef liver (1) beef heart (1) beef kidney (1) beef tongue (1) chicken feet (1) chicken gizzard (1) chicken liver (1) lamb heart (1) lamb kidney (1) lamb liver
Future of Pastured Poultry

- Consumer demand drives the industry
  - Health oriented consumers
  - High quality product
  - Visual appealing
  - Consistent product
  - Safe product
Informative Websites

- http://www.free-rangepoultry.com/
- http://www.sevensons.net/about-our-meat.htm
- Read more: http://www.esquire.com/the-side/feature/turkey-slaughter-photos#ixzz15fGZzr7V