FLOUR-RELATED FOOD SAFETY RISKS
Understanding the Milling Process, Risk Factors and Potential Solutions
Kent Juliott
VP, Research, Quality and Technical

Deann Akins-Lewenthal
Director of Food Safety & Microbiology
• Less than 3 years old
• Formed by merging ConAgra Mills and Horizon Milling
• 42 Mills, blending facilities and one bakery
• Headquarters in Denver, CO including Ardent Mills Innovation Center
• Ownership: 44% Conagra Brands, 44% Cargill, 12% Cenex Harvest States (CHS)
VISION AND VALUES

OUR VISION:
Ardent Mills is the TRUSTED partner in nurturing our customers, consumers and communities through innovative and nutritious grain-based solutions.

OUR VALUES:
We will make a positive impact with our employees, customers, communities and partners by:

- SERVING others with understanding, respect and care.
- TRUST: Working to earn TRUST every day, always operating with reliability and integrity.
- POSITIVE IMPACT: Operating with SIMPLICITY, clarity and transparency, removing barriers and letting people do what they do best.
- SAFETY: Ensuring the SAFETY of our products and people; doing what's best to create the safest environment now and for the future.
- SIMPLICITY: Serving others with understanding, respect and care.

OUR MISSION:
Enhancing the quality of life and standard of health.

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The Conagra Way: Vision, Mission & Values

Vision
Conagra has the most-energized, highest-impact culture in food. Our people persistently challenge and disrupt marketplace/business conventions and we are respected for our great brands, great food, great margins and consistent results.

Mission
Conagra has the most-energized, highest-impact culture in food. Our people persistently challenge and disrupt marketplace/business conventions and we are respected for our great brands, great food, great margins and consistent results.

Values
Integrity – doing the right things and doing things right
External Focus – centering on the consumer, customer, competitor, and investor
Broad-mindedness – rejecting silos and embracing disciplined curiosity
Agility – converting insights into action with the speed of an entrepreneur
Leadership – simplifying, making decisions, inspiring others, and acting like an owner
Results – leveraging a “refuse-to-lose” obsession with impact and value creation

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Conagra Manufacturing Facilities
Ardent Mills Innovation Center

Flour Research

Bake Lab

Analytical Lab

Culinary Center

R&D Lab
All agricultural food ingredients carry food safety risks that need to be understood and mitigated.
<table>
<thead>
<tr>
<th>HAZARD TYPES</th>
<th>HAZARD ANALYSIS RISK BASED PREVENTIVE CONTROL</th>
</tr>
</thead>
</table>
| **Physical** | • Foreign Material  
• Wood  
• Plastic  
• Cob  
• Metal |
| **Biological** | • Parasites  
• Insects  
• Rodents  
• Mold |
| **Chemical** | • Pesticides  
• Allergens  
• Mycotoxins  
• Herbicides |
| **Other**    | • Radiological  
• Intentional  
• Economically Motivated Adulteration (EMA) |

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FDA’s PCs vs Conagra’s Food Safety Plan

Food Safety Plan
Including procedures for monitoring, corrective action and verification

- Process Control
- Supply-chain Program
- Allergen Control
- Sanitation Control
- Hazard Analysis

GMPs and Other Prerequisite Programs

- CCP
- oPP
- PP
- Recall Plan
MILLING IS FOOD MANUFACTURING

Auditing

Food Safety

Good Manufacturing Processes

Handwashing

EE Training

Water Testing

Hair & Beard Nets

Environmental Monitoring Program (EMP)
FARM TO FLOUR
Control Physical Hazards
THE MILLING PROCESS SIMPLIFIED

Pre-Milling

Wheat Receiving

Wheat Cleaning

Tempering

Break

Milling

Sizing

Reduction
PRE-MILLING: WHEAT RECEIVING

QUALITY CHECK: MECHANICAL PROBING

Wheat Truck

Sample Quality Testing
PRE-MILLING: WHEAT CLEANING
ELIMINATING UNWANTED MATERIAL

• Magnetic Properties
• Size and Dimensions
• Shape
• Specific Gravity
• Behavior in Air Currents

• Electrostatic Properties
• Surface Friction
• Friability
• Color Differences
FARM TO FLOUR

Control of Some Biological Hazards
BIOLOGICAL HAZARDS CONTROLLED

• Pest via Integrated Pest Management programs

• Proper grain storage programs
  – Infrastructure
  – Aeration
  – Rotation
  – Avoiding ground storage
THE MILLING PROCESS SIMPLIFIED

Pre-Milling

Wheat Receiving
Wheat Cleaning
Tempering

Milling

Break
Sizing
Reduction
MICROBIOLOGICAL RISKS TO WHEAT

- Wheat is grown in varying conditions and may become contaminated with pathogens.
- The vector of contamination can be surface and potentially internal.
Risk Mitigation

- Risk Assessment of Product
- Intended Use of Product
- Known Use of Product
- Validated lethality treatment
  - Ingredient or Final product?
- Log reduction of pathogens of interest
  - What is appropriate?
- Environmental Monitoring Program
- Hygienic Restoration
Statistics Behind Testing

- Assumptions of homogeneity vs. reality

5%

1%
Statistics Behind Testing

- Probability of acceptance based on incidence rate (2-class sampling plans)

<table>
<thead>
<tr>
<th>n</th>
<th>For lots with = .05 (5% of samples are contaminated)</th>
<th>For lots with = .01 (1% of samples are contaminated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Probability of Acceptance of lot</td>
<td>Probability of Rejection of lot</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>0.95</td>
<td>0.05</td>
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<tr>
<td>5</td>
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<td>0.95</td>
</tr>
<tr>
<td>300</td>
<td>&lt;.005</td>
<td>&gt;.995</td>
</tr>
</tbody>
</table>

Find it?…
Nope.
HAS YOUR BAKING PROCESS BEEN VALIDATED?

Baking Process Kill Step Calculators available from AIB
SAFEGUARD FOR READY TO EAT APPLICATIONS

• Patented heat treated process
• Up to 4 log reduction
• Supports ready to eat applications
FARM TO FLOUR
Control of Chemical Hazards
Primary mycotoxin of concern in wheat
- Deoxynivalenol (DON or Vomitoxin)
Controlled via source testing, acceptance testing
Reduced via cleaning and color sorting

Pesticides and Herbicides
Grain sourced from North American Sources
Highly regulated
Public opinion different than regulations
Allergens
Peanut is focal area for 2016
Broader Scope Focal Areas

- Peanut Oil
- Enzymes
- Derivatives
- Peanut Meal
- Peanut Shells
- Raw Peanuts
- Processed
Ardent Mills Assembled Diverse to Address Industry Issue
(Note: Ardent Mills was not involved in allergen related recalls)

August 8 & 9 Summit

Assembled the following representatives:

- Food Allergen Research and Resource Program (FARRP), University of Nebraska, Lincoln
- Grocery Manufacturing Association and task force members
- North American Milling Association
- International Association of Operative Millers
- Trucking
- Railroads
- Grain origination
- Peanut industry Assoc. Association
- Georgia Department of Agriculture, University of Georgia
- Milling industry equipment providers
- Allergen detection supplier
QUESTIONS?

FLOUR-RELATED FOOD SAFETY RISKS