Egg Safety and *Salmonella Enteritidis* Control

April 2, 2014

Iowa Governor’s Conference on Public Health

Sponsored by

**NPE**

*NATIONAL PASTEURIZED EGGS, INC.*
Objectives:

Egg Industry & Regulations

The Who & What of Eggs

The Problem: Salmonella

Utensils

Food

Facility
Egg Safety

Kitchen

Guests

Staff

Utensils

Food

Facility
Egg Safety

Kitchen

Guests

Staff

Utensils

Food

Facility
Egg Industry

Egg
Chick
Pullet
Layer Hen
Farm
House
Egg Industry

- 99% are small businesses
- 75 billion eggs produced annually
- 47 billion shell eggs consumed annually as table eggs
Goal: Salmonella free

- Pullet (<20 weeks), weight 3 lbs
- Hen peak sexual maturity < 29-32 weeks
Egg Production System

Farms:
California
Ohio
Indiana
Iowa
Pennsylvania
Minnesota
Georgia
Compliance Date Based on Size

July 9, 2010:
- 29%  50,000 – 99,999 layers
- 20%  100,000 – 199,999 layers
- 17%  200,000+ layers

July 9, 2012:
- 24%: houses w/ < 50,000 layers
Egg Essentials

Chicken

Egg

Restricted

Grade

Candling

Air Cell

Blood Spot
Egg Grading

**Grade AA eggs:** thick whites; yolks are high and firm; practically free from defects

**Grade A eggs:** have characteristics of Grade AA eggs except that the whites are "reasonably" firm. This is the quality most often sold in stores.

**U.S. Grade B eggs:** whites thinner; yolks that may be wider and flatter

- USDA

Image source: CO Dept. of Agriculture
Egg Candling

using light to determine egg quality

Image source: NM Dept. of Agriculture
What’s the Problem?

This sounds like a good restaurant. The reviewer says he’s been back ten times!

That’s actually a report from the city health inspector.

So salmonella isn’t an entree?
Understanding Salmonella

- **Salmonella bacteria** live in the intestines of most food animals. *Salmonella* cannot be detected by the taste, smell, texture or appearance of food.

- Nearly 600 *Salmonella* species are **pathogenic to humans** and a leading cause of foodborne illnesses.

- **Salmonellosis** illness results from live *Salmonella* bacteria causing an infection.
Understanding Salmonella

- *Salmonella* Enteritidis (SE) *bacteria live* in the intestines of birds.
- Chickens readily and frequently infected
- SE egg shell contamination from environment and the intestinal tract of the chicken
- SE egg contamination from trans-ovarian infection & transfer into the developing egg
- SE-caused illnesses continue to be a leading serotype of all salmonellosis infections
Foodborne Illnesses - 2011

- **Salmonella**
  - Top bacterial pathogen
  - 1,027,561 cases per year
  - 19,336 hospitalizations
  - 378 deaths

Source: CDC, 2011
Among all foodborne pathogens, Salmonella illnesses cause the highest number of hospitalizations and deaths.

Eggs raw or undercooked eggs responsible for about 4 out of 5 Salmonella illnesses

Sources: CDC (2011), USDA
Impact: Public Health

By 2008 the incidence of SE increased by 19% since implementation of 2001 measures.

Healthy People 2020:
15.2 cases on average of laboratory-confirmed *Salmonella* species infections per 100,000 population per year (2006-08)

*Goal:* improve by 25%
Outbreaks & Recalls


*Salmonella* Enteritidis Multistate Outbreak  May–September 2010 ■ 1519 Illnesses

Nationwide Egg Recall – 500 million eggs
2010 Egg Recall

Nationwide Egg Recall – 500 million eggs
August 13, 2010  Wright County Egg of Galt, Iowa

States – CA, IL, MO, CO, NE, MN, WI, IA

Brands – Albertsons, Mountain Dairy, Ralph’s, Boomsma’s, Sunshine, Hillandale, Trafficanda, Farm Fresh, Shoreland, Lund, Kemps, and more
2010 Egg Recall: Findings

Galt, Clarion, Dows Iowa
Five plant/layer facilities, one feed mill

*Inspection observations:*

- **Pest control** - frogs, birds (non-chickens) mice, flies & maggots too numerous to count
- **Abandoned structures**, high vegetation, large structural openings & defects, rodent burrows
- **Sanitation** – 4 to 8 feet of manure, structural damage, liquid manure pooling, standing water
Problem: “_______” Happens!

USDA – report ? routine conditions?

- Bio-security – animal and human cross contamination
- Chickens loose and able to roam throughout plant facilities
- Records Lacking for: Pest Control, Sanitation
Oct 2009 – “10 Riskiest Foods”:
Eggs are #1 in documented outbreaks past 15 years

Il Fornaio Settles Tiramisu Lawsuit:
"Il Fornaio could have taken some very simple steps to preventing illness among its customers, starting with using pasteurized shell eggs in recipes that call for raw or undercooked eggs."

William Marler
Why the Fuss?!

Billions spent on medical, litigation, settlements, insurance 

**FDA warning:** *Cook yolk and white until hard to ensure no *Salmonella*

**Salmonella** is found **inside** eggs

2.3 million contaminated eggs reach the supply chain

80% of *Salmonella* illnesses sourced to eggs

30% of population is highly susceptible

A single egg can **Cross Contaminate** an entire kitchen

63% of outbreaks are sourced to restaurants

Sources: CDC, FDA & FSIS SHELL EGG RISK ASSESSMENT
Economic Impact

Annual Health-Related Costs of Foodborne Illness for Each State

SELECT A CATEGORY BELOW →

Medical Costs

Quality of Life Costs

Lost Life Expectancy

Total Cost

New Jersey - $4,595,000,000

Cost per Case

Cost per Capita

New Jersey - Total Cost compared to other U.S. States and the District of Columbia
The annual economic cost of Salmonella illness:

$2,649,413,401

Source: USDA ERS (2009)
Solution: Multi-Tiered Approach!

New FDA Final Rule

+ Food Code Adoptions & Requirements

+ Pasteurization
Salmonella Concerns at the Farm

- *Salmonella* is common in the **digestive tract** of animals
- Trans Ovarian infection is primary source of *(SE)* in eggs
- **Molting** causes stress
- **Stress** of hen increases SE release
- **8.6% of eggs** laid by infected hens will contain SE
Salmonella Concerns at the Farm

- Egg farms have SE (>9%)
- Feed and feed mills are **not SE free**
- Feather and manure dust create **airborne** movement of bacteria
- Positive **SE manure** often maintained in hen houses
- 30% of farms have a moderate to severe **rodent / fly problem**
Salmonella Concerns at the Farm

**Sanitation:** Failure to clean and disinfect between flocks

**Testing:** Most farms do not test hens, environment and/or eggs for SE

**Control:** Egg quality assurance programs on farms are voluntary
Salmonella: Anatomy of an Illness

Sources: CDC, FSIS, FDA
FDA Final Rule

- Mandatory on farm written SE plan (24 hrs)
- Mandatory program for SE Clean Pullets
- Bio-security & Refrigeration controls
- Documenting of rodent / fly program
- Disinfecting between flocks
- Environmental and shell egg testing if positive SE
- SE egg diversion programs
Solution: Multi-Tiered Approach

**When Pullets Reach 14 - 16 weeks**

- Test results are **Negative** for Se

**When Hens Reach 40-45 weeks**

- Test environment & manure
  - Test results are **Positive for Se**
  - **ACTION:**
    - Egg Testing Begins
    - 1000 eggs / every 2 wks for 8 weeks / for each positive Se house

**When Hens are 4-6 weeks out of molt**

- **ACTIONS:**
  - Hold eggs from same lots awaiting test results (@12 days)
  - Remove all manure from house
  - Divert all eggs to pasteurization (or) Destroy eggs

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**When Hens are 4-6 weeks out of molt**

- **ACTIONS:**
  - Remove all manure from house
  - Clean and disinfect hen house
  - Destroy birds (or) divert eggs to Pasteurization for life of flock
  - Option - continue to test monthly for life of flock
  - Revise Se Farm Plan
Food Code Adoption & Requirements

- 40+ states have adopted significant egg controls and rules.
- Enforcement significantly lags in all but a handful of states.
- Education still major priority for solution understanding.
- Focused on highly susceptible individuals raw and undercooked.
Eggs left out at room temperature
Raw EGGS shall be received in refrigerated equipment that maintains an ambient air temperature of 7°C (45° F) or less.

**Priority item** FDA Food Code 2013, 3.202.11

Cooking eggs to less than required time and temperatures
145° F for 15 seconds (Internal) Immediate
155° F for 15 seconds (Internal) Hot Holding

**Priority item** FDA Food Code 2013, 3.401.11
What is Safe?

Guess the internal temperature!
### Which Culinary Style Destroys Salmonella?

<table>
<thead>
<tr>
<th>CULINARY STYLE</th>
<th>FINAL TEMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunny side up</td>
<td>75 - 104°F</td>
</tr>
<tr>
<td>Over easy</td>
<td>94 - 112°F</td>
</tr>
<tr>
<td>Poached</td>
<td>100 - 120°F</td>
</tr>
<tr>
<td>Basted</td>
<td>97 - 118°F</td>
</tr>
<tr>
<td>Over medium</td>
<td>124 - 139°F</td>
</tr>
<tr>
<td>Soft boiled</td>
<td>109 - 140°F</td>
</tr>
<tr>
<td>Over hard</td>
<td>146 - 168°F</td>
</tr>
</tbody>
</table>

Are we at 145°F yet?
Serving potentially hazardous foods (PHF -TCS) to highly susceptible populations

The pooling of eggs – must used pasteurized for HSP

**Pasteurized EGGS or EGG PRODUCTS shall be substituted for raw EGGS** in the preparation of:

1. FOODS such as Caesar salad, hollandaise or Béarnaise sauce, mayonnaise, meringue, EGGnog, ice cream, and EGG-fortified BEVERAGES, and
2. Except as specified in ¶ (F) of this section, recipes in which more than one EGG is broken and the EGGS are combined

*Priority item* FDA Food Code 2013, 3-801.11
Cross Contamination of food contact surfaces and employees  
(almost impossible to crack multiple eggs w/o getting on hands)

where is this of most concern?  
Food prep areas, kiosks,  
omelet stations and ?

1. Eggs  
2. Tools  
3. Vegetables  
4. Cheese  
5. Plate  
6. Sides  
7. Eggs again
Food Code - Violations

Not for immediate service (take out?); not to an individual’s order

**Cooking Raw Animal Foods** (A) (1) (a) Raw EGGS that are broken and prepared in response to a CONSUMER'S order and for immediate service

*Priority item*  FDA Food Code 2013, 3.401.11

Holding raw or undercooked eggs in the danger zone
Buffets, trayline, room service, banquets, kitchen prep
Food prep using multiple uncooked or undercooked eggs (dressings, sauces, desserts)

Pasteurized Eggs, Substitute for Raw Eggs for Certain Recipes. Pasteurized EGGS or EGG PRODUCTS shall be substituted for raw EGGS in the preparation of FOODS such as Caesar salad, hollandaise or Béarnaise sauce, mayonnaise, meringue, eggnog, ice cream, and EGG-fortified BEVERAGES that are not: P (A) Cooked as specified under Subparagraphs 3-401.11(A)(1) or (2); P or (B) Included in ¶ 3-401.11(D). P

Priority item FDA Food Code 2013, 3-302.13
Salmonella inside of eggs / Eliminate *Salmonella* from eggs

Stop *Salmonella* before it enters the kitchen!
Eggs still in their shells which have been heat treated to destroy *Salmonella* Enteritidis to the FDA standard of a 5-log reduction are exempt from the status of a potentially hazardous food because no viable *Salmonella* exist.
Shell Egg Pasteurization

- FSIS 2005 risk assessment recognized pasteurization as the best practice to reduce largest number of illnesses

- In-shell pasteurized eggs now available in all 50 states

- Education and understanding leading to best practice adoption
Pasteurized Shell Eggs: Process

Involves a patented time and precise temperature control (all natural, warm water bath)

Eliminates Salmonella without cooking the egg

Delivers eggs that look, cook and taste like fresh laid eggs

Provides a longer shelf life of up to 60 days
Pasteurized Shell Eggs: Process

USDA Grade AA eggs
Eggs fully submerged in warm water bath
Eggs enter post pasteurization area
Eggs are inspected for product quality and wax coated to prevent cross contamination.
Pasteurized Shell Eggs: Process

Eggs are cooled and dried before stamping and packing
Eggs are stamped with a Circle “P” to identify as pasteurized.
Why Pasteurized Shell Eggs?

Prevention / Eliminate Risk Factors

- **Eliminates** food source risk
- Eliminates **time** and **temperature** issue
- Prevents cross contamination
- Prevents hand **contamination**
- Protects personnel and guests
- **Protects** utensils and equipment
- Stops introduction to facility
Pooling Eggs Multiplies Risk

Pasteurized: No bacteria

Eliminates risk!
Eggs Left in Danger Zone

NPE pasteurized eggs are safe at kitchen temperatures!
No one should eat foods containing raw eggs. This includes shakes made with raw eggs, Caesar salad, Hollandaise sauce...homemade mayonnaise, ice cream, or eggnog made from recipes in which the egg ingredients are not cooked.

However, in-shell pasteurized eggs may be used safely without cooking.
STOP! Cross Contamination

Pasteurized eggs don’t risk multiple points of cross contamination.
“Beat” Egg-Related Salmonella

- Educate on risks and methods of **prevention**
- Challenge - food operators
- Use **pasteurized eggs** in all lightly cooked or raw egg recipes
- Stop Salmonella before it enters the kitchen!
Where are Pasteurized Shell Eggs?
START SAFE  |  FINISH SAFE