Salmonella Outbreaks Linked to Poultry – United States

Megin Nichols, DVM, MPH, DACVPM
Enteric Zoonoses Lead
Outbreak Response and Prevention Branch
Division of Foodborne, Waterborne, and Environmental Diseases
Centers for Disease Control and Prevention

NPIP OSA Meeting
May 17, 2017
Outbreak Investigation

- Centers for Disease Control and Prevention Outbreak Response and Prevention Branch
- Multi-state outbreak investigations
  - Foodborne
  - Animal contact
- Coordination with state and federal partners
What is an Outbreak?

- Two or more people with similar illness after contact with a common exposure and epidemiologic analysis implicates the exposure as the source of the illness.
Three “Legs” of Evidence

- Epidemiology
- Traceback
- Laboratory testing
Epidemiologic Evidence

Patterns in where and when people got sick, and past outbreaks caused by the same germ

Interviews with sick people to look for foods or other exposures occurring more often than expected

Discovery of clusters of unrelated sick people who ate at the same restaurant, shopped at the same grocery store, or attended the same event
Traceback Evidence

A common point of contamination in the distribution chain from farm to fork, identified by reviewing records collected from restaurants or stores where sick people ate or shopped.

Inspections in food production facilities, on farms, and in restaurants that identify food safety risks.
Laboratory Evidence

FOOD & ENVIRONMENTAL TESTING

The germ that caused illness is found in a food item collected from a sick person’s home, a retail location, or in the food production environment.

The same DNA fingerprint linking germs found in foods or production environments to germs found in sick people.
Utility of Combining Whole Genome Sequencing with Traditional Investigational Methods To Solve Foodborne Outbreaks of *Salmonella* Infections Associated with Chicken: A New Tool for Tackling This Challenging Food Vehicle

SAMUEL J. CROWE, ALICE GREEN, KIMBERLY HERNANDEZ, VI PERALTA, LYNDSTAY BOTTICHIO, STEPHANIE DEFIBAUGH-CHAVEZ, APHRODITE DOURIS, LAURA GIERALTOWSKI, KELLEY HISE, KAREN LA-PHAM, KAREN P. NEIL, MUSTAFA SIMMONS, GLENN TILLMAN, BETH TOLAR, DARLENE WAGNER, JAMIE WASILENKO, KRISTIN HOLT, EJIA TREES, and MATTHEW E. WISE

1Centers for Disease Control and Prevention, Atlanta, Georgia 30333; 2U.S. Department of Agriculture, Food Safety and Inspection Service, Washington, D.C. 20250; 3Kern County Public Health Services Department, Bakersfield, California 93301; and 4California Department of Public Health, Richmond, California 94804, USA

MS 16-364: Received 6 September 2016/Accepted 14 December 2016/Published Online 15 March 2017
Using Whole Genome Sequencing (WGS) to Solve Salmonellosis Outbreaks linked to Chicken

- Linking chicken to an outbreak can be challenging
  - Common food item
  - Common PFGE patterns
- WGS allows clinical isolates grouped by PFGE patterns to be broken into smaller clusters of illnesses more likely to share common source
- Routine product testing at slaughter and processing facilities provides source of *Salmonella* isolates that can be sequenced and added to phylogenetic trees
Future of Using WGS to Solve Salmonellosis Outbreaks linked to Chicken

- WGS will soon be done routinely for all *Salmonella* isolates
  - We expect to find more outbreaks
  - More success linking outbreaks to food items, including chicken

- More confidence in source of illnesses in outbreaks through combining epidemiologic data, information from slaughter and processing facilities, and WGS data from clinical and food isolates
Current *Salmonella* Illness Outbreaks and Backyard Poultry—May 2017
Outbreaks and Illnesses Linked to Live Poultry—United States, 1990–2016
Multistate *Salmonella* Illness Investigations in 2017

- Six different *Salmonella* serotypes
  - I 4,[5],12:i:-, Hadar, Indiana, Infantis, Mbandaka, Typhimurium
  - *Salmonella* Hadar same strain linked to live poultry in 2015 & 2016
  - *Salmonella* Infantis strain was linked to live poultry in 2016
- Preliminary investigation indicates illnesses mainly linked to chicks and ducklings
- Illnesses among backyard poultry owners and feedstore employees
Salmonella Hadar WGS Analysis

Key
- Green: US human isolates 2017

*Single Nucleotide Polymorphisms*
Need for Collaboration

- Public health
- Animal health
- Retail stores
- Hatcheries
- *Salmonella* experts
- Consumer groups
Thank you

Megin Nichols
gpg6@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Please join the CDC One Health Office on the next Zoonoses and One Health Updates (ZOHU) Call

Contact for monthly conference call:

ZOHUCall@cdc.gov
Wednesday, June 7th
2:00 pm - 3:00 pm ET