No Kidding: Connecticut’s Largest Outbreak of Human E.coli O157 Infections Linked to a Goat Dairy Farm

Kelly Gambino-Shirley, DVM, MPH
Epidemic Intelligence Service Officer
Enteric Zoonoses Activity, Outbreak Response and Prevention Branch
Division of Foodborne, Waterborne, and Environmental Diseases
Centers for Disease Control and Prevention

USAHA / AAVLD Annual Meeting
October 18, 2016
**E. coli O157**

- Fecal-oral route: contact with animals or environment
- Healthy goats: animal reservoir
- Survived 42 weeks in environment
- Estimated 95,000 illnesses and 30 deaths each year

**E. coli O157**

- Incubation period: 2–10 days
- Symptoms: abdominal cramps, diarrhea (often bloody), vomiting
- ~5–10% develop hemolytic uremic syndrome (HUS)
  - Severe condition
  - Children at higher risk
Outbreak Detection

- March 24, 2016 — Connecticut Department of Public Health (DPH) identified 7 ill persons infected with *E. coli* O157; 2 children developed HUS
- Visited a goat dairy farm
Outbreak Detection

- March 24, 2016 — Connecticut Department of Public Health (DPH) identified 7 ill persons infected with *E. coli* O157; 2 children developed hemolytic uremic syndrome (HUS)
- Visited a goat dairy farm
- Closed to the public
Outbreak Investigation

March 24
DPH press release and asked public to contact them

March 24
Farm closed to public

March 24
7 ill; 2 developed HUS
Outbreak Investigation

- March 24: DPH press release and asked public to contact them
- March 24: Farm closed to public
- March 24: 7 ill; 2 developed HUS
- March 28: CDC team joined investigation
Objectives

- Determine the magnitude of the outbreak
- Identify risk factors and potential sources for *E. coli* O157 infection among visitors to goat dairy farm X
- Develop public health recommendations to prevent future outbreaks
Methods

- Molecular subtyping to determine outbreak strains
  - Pulsed-field Gel Electrophoresis (PFGE) pattern = unique DNA fingerprint
  - Isolates with indistinguishable PFGE patterns more likely to share a common source
- Joint farm visit with the Connecticut Department of Agriculture and Local Health Director
  - Talked with the owner
  - Conducted environmental and animal sampling
Outbreak Case Definition

- Laboratory-confirmed *E.coli* O157 infection with outbreak strains **OR** physician-diagnosed HUS during March–April 2016
  **AND**
- An epidemiologic link to goat dairy farm X
Goat Dairy Farm X

- Family owned farm in rural Connecticut
  - Milking herd of 120
  - >500 gallons of milk per week at peak
- Produce cheeses, soaps, caramel candies, and milk
  - Sold at farm store, farmers’ markets, or small country stores
  - Licensed to sell raw milk
Farm Activities

- Open house during kidding season
  - Started March 5th
  - Allowed to tour the farm, visit with the kids, and sample/buy products
  - Estimated 500 visitors a day
- Goat keeping 101 class on March 12\textsuperscript{th}
- Kids sold as pets or for meat
Farm Practices

- No changes to operations/practices
- Bedding in kid barn not routinely changed
  - Piled new bedding on top of old
- Bedding and birthing by-products
  - Raked into pits in front of pens
  - Removed and added to compost pile
No Signs or Handwashing Facilities
Farm Layout

- Milking Parlor
- Doe Barn
- Kid Barn
- Compost Pile
- Soap and Caramel Cheese Production
- Farm Store
- Entrance
- Parking
- Picnic Table
- Buck Pens
Environmental Sampling

- CDC Team collected 63 specimens
- Locations: kid barn, doe barn, farm store, and farm grounds
- Surfaces: pens, hay bales, floor, rafters, and handrails
- Samples: bedding, fresh stool and water runoff from compost pile
Animal and Food Sampling

- CT Department of Agriculture collected 15 fecal samples and rectal swabs
- Food samples: cheeses and unpasteurized milk
- Pasteurization process inspected
Outbreak Investigation Results

- Identified 50 cases: 49 lab-confirmed, 1 physician-diagnosed HUS
  - Hospitalized: 11 (22%)
  - Developed HUS: 3 (6%)
- Median Age: 5 years (range: <1–50 years)
  - <5 years: 23 (47%)
- Female: 25 (51%)
Number of Ill Persons by Illness Onset Date — Connecticut, 2016 (n=50)

Farm visits: Mar 6–Mar 21
Sample Results: Kid Barn

- Birthing Pen 1
- Doe Pen
- Hand sanitizer
- Birth cleaning area
- Goat s under heat

- E.coli outbreak strain isolated
- No E.coli isolated

- Slack
- Belch
- Kneel
- Smile
- Greet

- Holding Pen 5
- Holding Pen 6
- Holding Pen 7
- Holding Pen 8
- Extra Storage/pens
- Rabbits
- Chickens
Doe Barn and Food Store Sample Results

- Three pooled samples from the doe barn positive for the outbreak strain
- Food samples negative for *E. coli*
- No issues with pasteurization equipment or process
Conclusions

- Epidemiologic and laboratory evidence for an outbreak of *E. coli* O157 infections
  - Exposure to goats
  - Widespread contamination in the environment
- Lack of awareness of risks
- No hand-washing facilities
- Availability of hand sanitizer ineffective in preventing large outbreak
Agritourism and Prevention

- Growing in popularity and working farms connecting with the community
- Eliminating all risk from animal contact might not be achievable
- Preventing and minimizing disease and injury is the goal
- Providing standardized recommendations

Public Veterinary Medicine: Public Health

Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2013

National Association of State Public Health Veterinarians Animal Contact Compendium Committee 2013

http://nasphv.org/documentsCompendiumAnimals.html
Recommendations for Local, State, and Federal Agencies

- Disseminate the compendium
- Provide educational and training material
- Encourage or require oversight at animal contact venues
Partnerships

- Informational webinar, workshop or conference
- Handwashing campaigns
- Portable handwashing stations

SAVE THE DATE

Wednesday August 24th, 2016

9:00 am – 3:00 pm @ the Legislative Office Building Room 2C, 300 Capitol Avenue, Hartford, CT

“Agritourism – Protecting Public Health, Animal Health, and Your Farm”

This one day conference will include experts from the U.S. Centers for Disease Control and Prevention (CDC), Department of Agriculture, Department of Public Health, UConn Extension, USDA APHIS Veterinary Services and others who will be addressing risk management when visitors come to your farm. Be sure to watch for further details via email.
Recommendations for Handwashing

- Ensure access to handwashing stations
- Provide verbal hand hygiene reminders
- Use signs that outline proper protocols
- Ensure compliance with handwashing, especially young children
Recommendations for Animal Areas and Facility Design

- Promote unidirectional visitor flow and handwashing stations at the exit
- Do not allow food, beverages, toys, pacifiers, spill-proof cups, baby bottles, or strollers
- Feed animals only if contact is controlled (e.g., barriers)
Recommendations for Cleaning

- Adopt standard procedures for cleaning to minimize risk of exposure
- Restrict access to areas contaminated with manure or birthing by-products
- Maintain proper waste management and promptly remove manure, soiled animal bedding and birthing products
Hand Sanitation Laws and Staying Healthy at Animal Contact Exhibits

Stay Healthy at Animal Exhibits

There are many ways to explore the animal world. Follow these tips to help prevent illness when visiting animal exhibits like petting zoos.

From watching calf roping at the rodeo to petting goats at the county fair, there are many ways to explore the animal world. Exhibits such as petting zoos and fairs allow children to experience coming face-to-face with animals. This interaction allows people to learn more about animals and helps to build important human-animal bonds.

http://www.cdc.gov/features/animalexhibits/
Acknowledgements

Connecticut Department of Public Health
Matthew Carter, MD, MPH
Jafar Razeq, PhD., HCLD (ABB)
Quyen Phan, MPH
Anthony Muyombwe, PhD., HCLD (ABB)
Kimberly Holmes-Talbot, MS
Paul Gacek, MPH, CPH
Randall Nelson, DVM, MPH
Jocelyn Mullins, DVM, MPH, PhD.
Jessica Brockmeyer, MPH
Maura Downes, MPA
Yale EIP students

UNCAS Health District
Patrick McCormack, MPH

Connecticut Department of Agriculture
Bruce Sherman, DVM, MPH
Mary Jane Lis, MS, DVM, PhD.
Wayne Kasacek, RS

Investigative Team-CDC
Mark Laughlin, DVM, MPH-VPH
Lauren Stevenson, MHS
Alexandra Mercante, PhD

Outbreak Response and Prevention Branch-CDC
Megin Nichols, DVM, MPH, DACVPM
Ian Williams, MS, PhD.
Matt Wise, MPH, PhD.
Karen Neil, MD, MSPH
Anna Blackstock, PhD.
Laura Burnworth, MPH
Emory SORT

Enteric Diseases Laboratory Branch-CDC
Collette Leaumont, PhD. Efrain Ribot, PhD.
Nancy Strockbine Kelley Hise, MPH
Haley Martin Samantha Olson
Rachael Aubert, PhD. Morgan Schroeder, MPH
Thank you

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.