Multistate Outbreak of *Campylobacter jejuni* Infections Associated with Undercooked Chicken Livers - 2012

2013 InFORM Meeting
November 21st, 2013

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Co-Investigators

**Vermont Department of Health**
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- Brant Goode*

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- Steffany Cavallo

**Centers for Disease Control & Prevention**
- Collette Fitzgerald
- Katherine Heiman
- Barbara Mahon
- Steven Stroika

**United States Department of Agriculture – Food Safety & Inspection Service**
- Latasha Allen
- Paul Brinig

*CDC Career Epidemiology Field Officer assigned to VDH
Campylobacteriosis in Context

Nationwide
- 3rd leading cause of bacterial foodborne disease
- Documented outbreaks are relatively rare
  - 1.9% of outbreaks in NORS

Vermont
- Leading cause of reportable bacterial foodborne disease
- High incidence
  - 2012 VT = 27.0
  - 2012 FoodNet Average = 14.3
- VDH interviews and pulses every Campylobacter isolate
VDHL identified a PFGE match between 2 patients

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<th>Specimen Collection Date</th>
<th>Initial Interview Notes</th>
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<td>Patient #1</td>
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<tr>
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Patients #1 and #3 reported same exact meal at Restaurant A

- Charcuterie of pate de campagne, duck rillete, chicken liver mousse, compote, Fiddlehead beer mustard & crostini
- Braised rabbit with pasta, carrots, brussel sprouts & cheddar
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Connecting Patient #2

Local is growing

BUY FRESH BUY LOCAL

think local food

EATING LOCALLY THINKING GLOBALLY

Eat LOCAL
Connecting Patient #2

Pitchfork Farm Beets & Chevre  $7
Does’ Leap chevre, scallions, sherry vinegar

Adams Farm Chicken & Rice  $5

Glean Salad  $8
Jericho Settlers’ Farm arugula, shaved red onion, toasted farro, roasted local veggies, cider vinaigrette
*add Does’ Leap feta  $1.5

Steak Tartare  $14
LaPlatte River Farm beef, house potato chips

LaPlatte River Angus Farm Beef  $15
Landaff Creamery “Landaff” cheese, local bacon, pickled red onions

Jasper Hill Bayley Hazen Blue (Greensboro)
raw cow’s milk, semi-firm, natural rind

Patient # 1
Restaurant A
dined on chicken liver at
supplied chicken liver to
worked at
Patient # 3

Establishment A
Patient # 2

Patient # 1
Patient # # 3
1. **Retrospective cohort study of patrons**

- Diners who ate at Restaurant A within 2 days of patient #1 or #2
- Contact information from reservation list
- 43 diners were reached
  - 1 declined to participate
- Interviewed regarding
  - Details of meal (19 menu items)
  - Subsequent diarrheal illness
    - No probable cases identified
- Two menu items showed statistically significant relative risks
  - Charcuterie (RR = 52.5, 95% CI = 3.0-914.8)
  - Rabbit (RR = 33.3, 95% CI = 1.8 – 613.5)
2. Food & Lodging Inspection
   - Restaurant passed with no critical violations
   - Stool from all 8 food handlers was collected
     - All tested negative for *Campylobacter*
   - “Grilled” the chef over cooking techniques for charcuterie and rabbit dishes
     - Chicken livers were cooked medium rare
   - Collected frozen livers from restaurant
     - Screened positive by immunoassay for *Campylobacter*
     - Pathogen could not be cultured
The Quest for Unfrozen Livers

- Get our hands on some unfrozen livers
  - Restaurant A stopped serving chicken liver mousse menu
  - Reach out to Establishment A
VDH laboratory cultured *C. jejuni* from fresh livers

Found the outbreak strain
The Search for Additional Cases

- PulseNet found 2 matches from last 6 months
  1. Vermont resident
  2. New Hampshire resident

- Vermont Case
  - Onset occurred in June 2012
  - Re-interview revealed chicken liver consumption in June at Restaurant B
  - Restaurant B inspection
    1. Chicken livers came from Establishment A
    2. Chicken livers were cooked medium rare
The Search for Additional Cases

- **New Hampshire Case**
  - Onset in April, 2012
    - Cooked chicken livers at home for family
    - Cooked livers medium rare
    - Purchased livers from NH co-op
      - Livers purchased were from Establishment A in Vermont

- **New York State Case**
  - Daughter of New Hampshire Case
    - Hospitalized in New York in April
    - NYS located isolate, pulsed it, found match to outbreak strain
Patient Characteristics

- 6 confirmed cases
  - 4 Vermont residents
  - 1 New Hampshire resident
  - 1 New York resident
- Onset dates: April 17 – September 20
- Age range: 19 years to 87 (median = 53.5)
- 50% were female
- 33% of patients were hospitalized
- No deaths reported
Investigation Aftermath

- **November 9th**
  - Notify Establishment A of investigation results
  - Establishment A voluntarily ceases all chicken liver production

- Chicken Liver Pate and Pickled Half Pint Farm Vegetables and Red Hen Bread
  - Pan Fried Chicken Livers, sweet and spicy peppers… $10

- Chicken Liver Pâté 10
  - with apple brandy braised shallots, gherkins, whole grain mustard and lavash

- Chicken Liver Paté 7.95
  - with Crostini, Cornichons, & Pickled Red Onion

- Potted Farm Chicken Livers $10
  - roasted shallot mostarda, grilled bread
Chicken Livers Are A Problem

Location of *Campylobacter jejuni* in Infected Chicken Livers

Isolation of thermotolerant species of *Campylobacter* from commercial chicken livers

Incidence and Antimicrobial Resistance Profiling of *Campylobacter* in Retail Chicken Livers and Gizzards

A continuous common-source outbreak of campylobacteriosis associated with changes to the preparation of chicken liver pâté

Food-borne *Campylobacter* outbreak in Liverpool associated with cross-contamination from chicken liver parfait: Implications for investigation of similar outbreaks

SHORT REPORT
A recipe for disaster: outbreaks of campylobacteriosis associated with poultry liver pâté in England and Wales

Source attribution, prevalence and enumeration of *Campylobacter* spp. from retail liver

Cohort study of a campylobacteriosis outbreak associated with chicken liver parfait, United Kingdom, June 2010

*Campylobacter* in chicken livers and their destruction by pan frying
“Sauté. stiffened but still rosy inside.”

Be sure to keep heat relatively high so that the outside of livers sears and inside stays pink.

“Can someone explain why chicken liver cooked medium rare is ok, but rest of bird must be cooked well done? #nonsensical”
Many Vermont restaurants still serve chicken livers

Chicken Liver Pate, House Mustard, Pickles, Grilled Red Hen Bread

$9

Chicken Liver Mousse $12

Chicken Liver Pâté

with tart cherries, assorted pickled veggies, sliced baguette

September 2013: C. jejuni case reports chicken liver consumption

Three different species of Campylobacter from liver

Five different PFGE patterns
Wrap Up & Conclusions

Follow-Up
- USDA-FSIS inspection found no major violations at Establishment A
- NARMS testing found outbreak strain resistant to tetracycline

Wrap-Up
- 1st multi-state outbreak of *C. jejuni* tied to chicken livers
- 1st investigation to recover *C. jejuni* from livers

Conclusions
- Chicken livers are an inherently hazardous food product
  - Frequently contaminated + traditionally undercooked
Thank You

Questions?