

# The Cheese Stood Alone

Michigan Multi-jurisdictional Investigation of a  
STEC Cluster associated with Artisan Cheese



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# Overview

- Setting the Table
- The Good
- The Bad and the Ugly
- Back to the Good

**Compliment** →

**Criticism** →

**Compliment** →



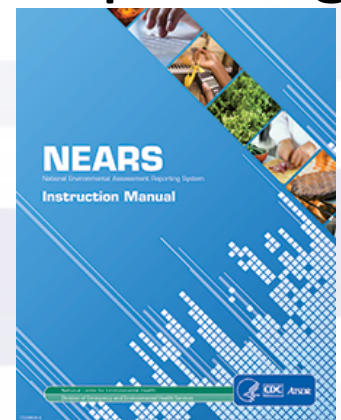


# Setting the Table



# OutbreakNet Enhanced Program

- Centralized interview support
  - OBNE Coordinator, student interview team
  - Routine or outbreak-specific
    - Salmonella, STEC, and Listeria (SSL)
- Multidisciplinary collaboration
- National Environmental Assessment Reporting System (NEARS) participation
  - MDARD & LHD involvement





# Shiga toxin-producing *E. coli*

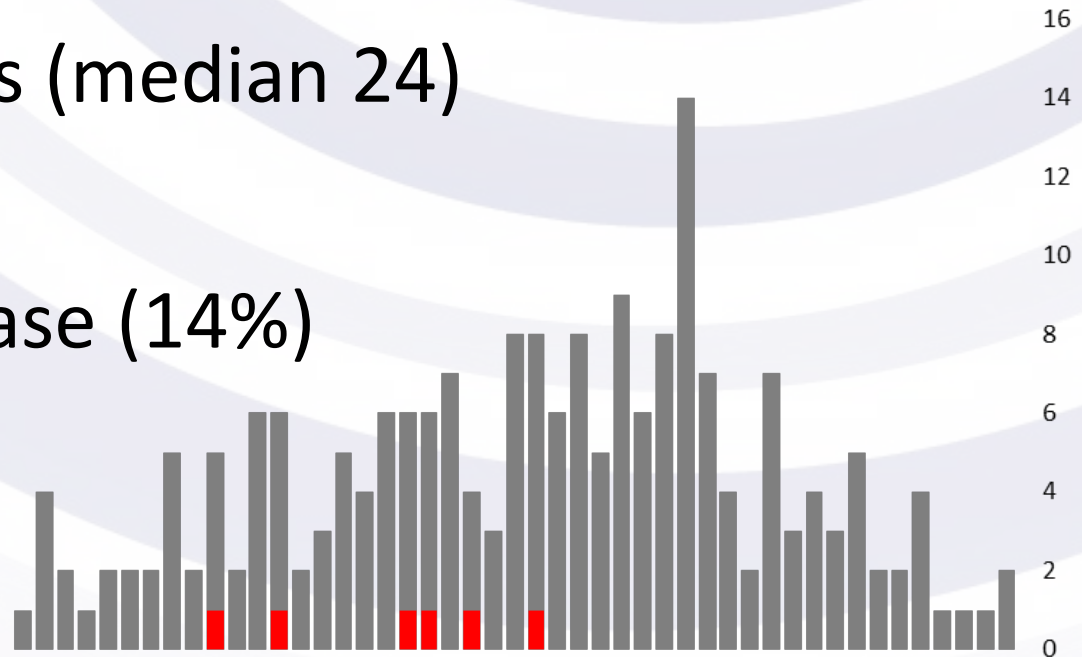
- 150-200 cases/yr in Michigan
  - Routinely interviewed by LHDs
  - All isolates routinely typed via PFGE
    - STEC Non-O157 isolates typed via WGS
    - STEC O157 isolates typed via MLVA
- Outbreak strain: STEC O5:NM STX1 positive
  - Rare serotype (5 cases in MI since 2010)
    - Not one of the serotypes on MDHHS lab panel
    - CDC PFGE pattern names assigned after serotyping





# Descriptive Epidemiology

- 7 confirmed cases
  - 5 Michigan counties, Wisconsin
- Onset range: 3/13-7/13/16
- Ages: 15-37 years (median 24)
- Sex: **71% female**
- Hospitalized: 1 case (14%)





# Epi Investigation Strategies

- Standardized questionnaire
  - NHGQ 2016, starting with case #3
- Centralized interviewing
  - Regional Epidemiologist
  - OBNE Coordinator
- Dynamic model (recursive)
- Shopper card records



Figure 1. Dynamic Cluster Investigation Model



# Epidemiological Challenges

- Protracted outbreak, widespread
  - Earliest cases were **3 months post onset**
- Small number of cases
  - 1 lost to follow-up
- Exposure characteristics
  - Used and perceived as an ingredient
    - Brand/source not apparent to the consumer
  - Multiple non-chain restaurants implicated
  - Multiple varieties of cheese implicated





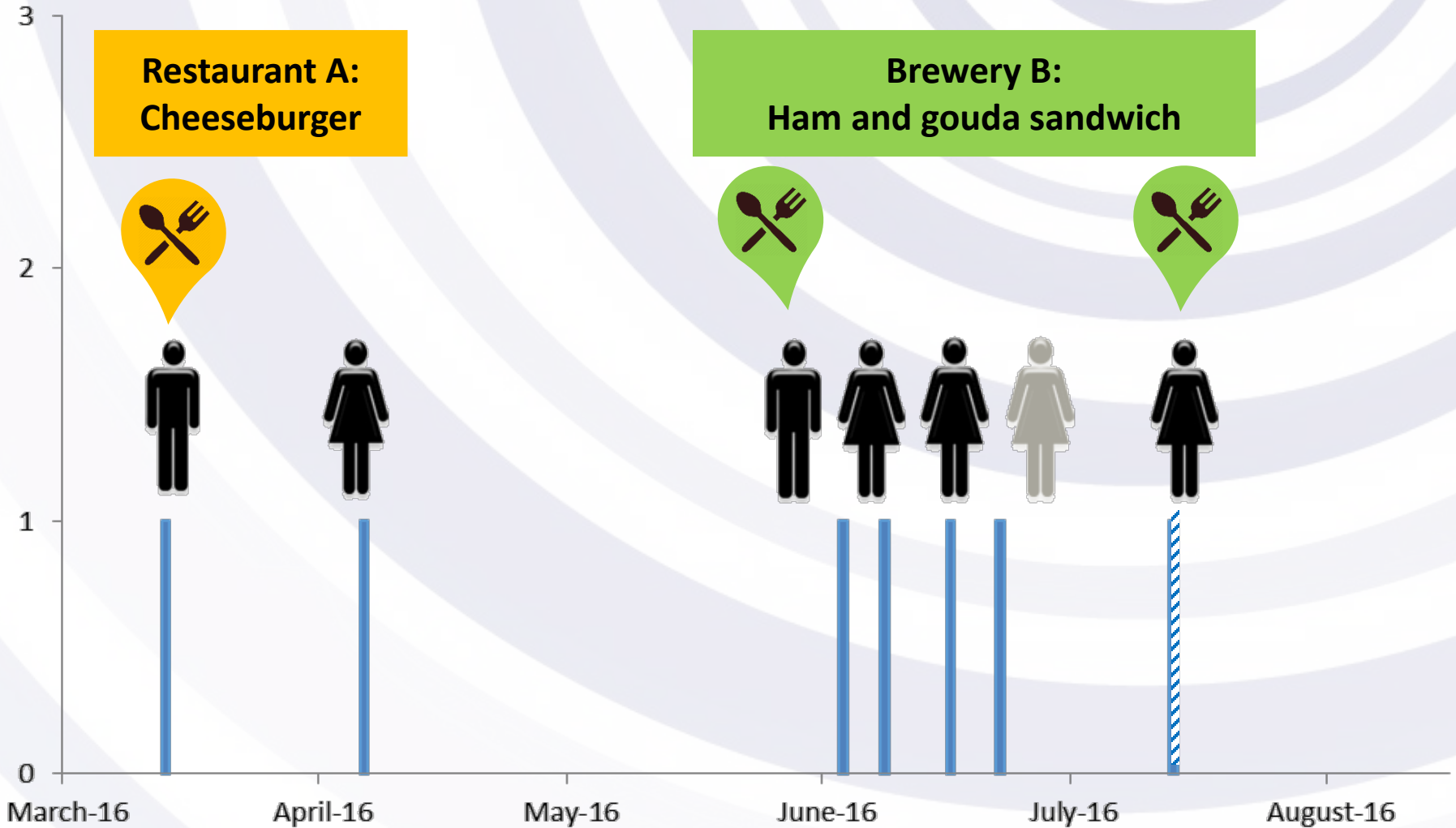
## Finally, a Hypothesis

- Routine interview of suspect STEC case
  - LHD interviewer
  - Within 24 hours of referral
- Exposure of interest: Brewery B
  - Also reported by 1 outbreak case
  - Same meal: ham & gouda sandwich
- Same **artisan cheese producer** named on menu
  - Brewery B and Restaurant A



# Timeline/Epi Curve

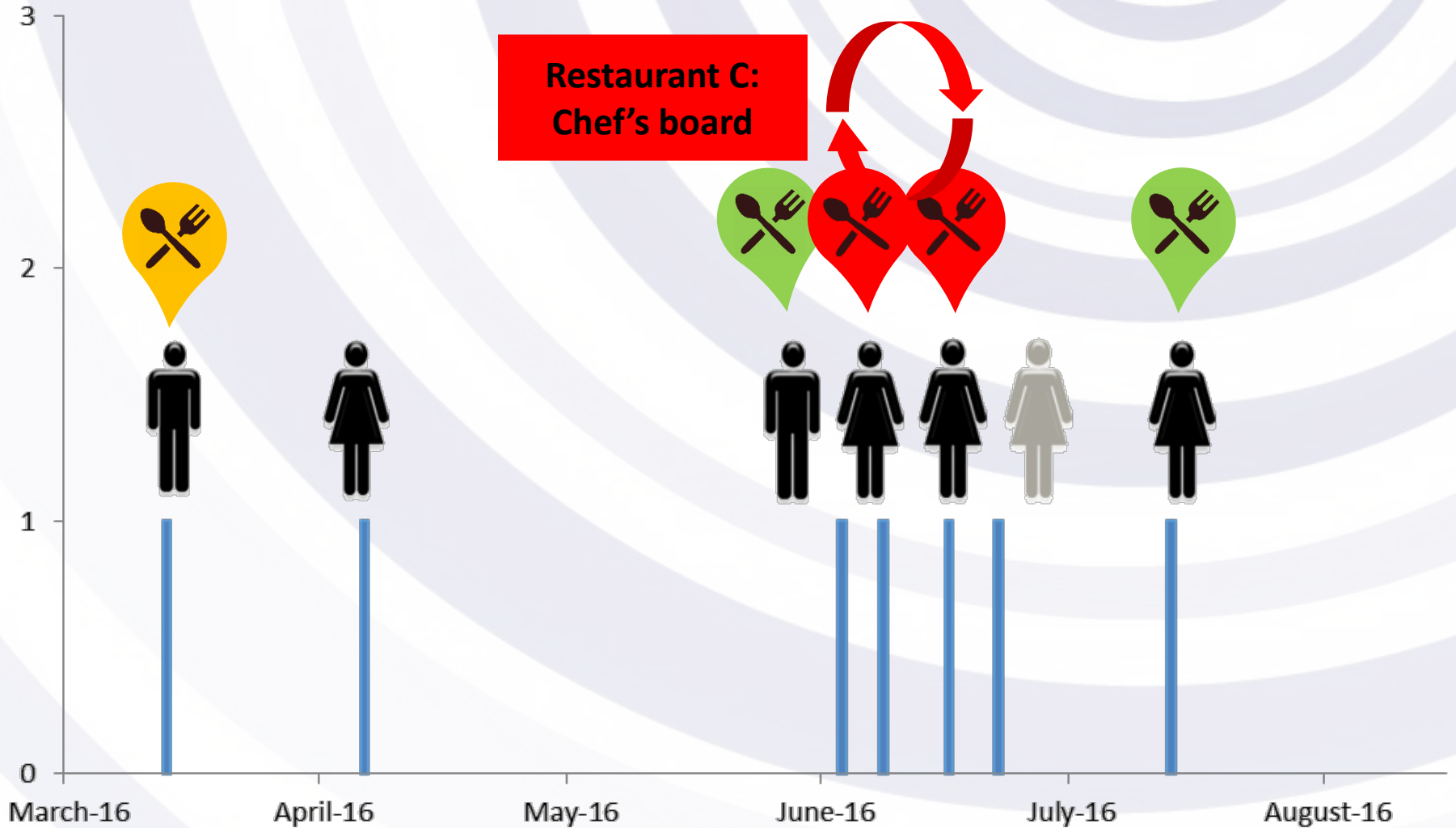
As of July 21





# Timeline/Epi Curve

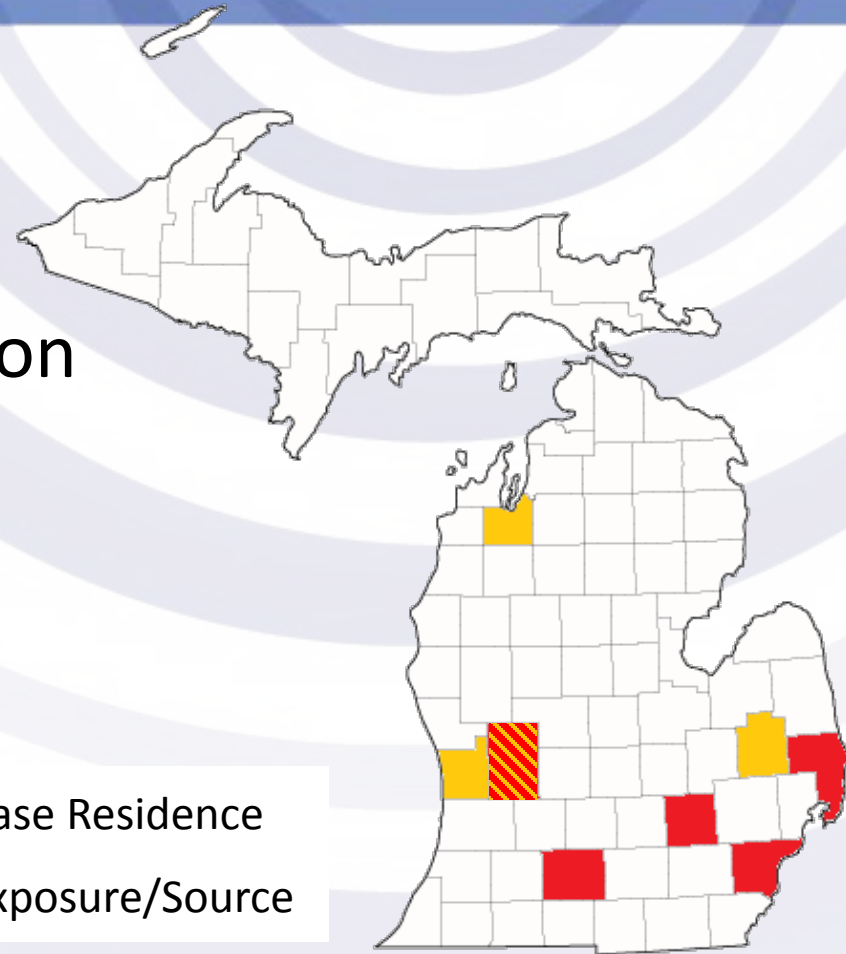
Final





# Extreme Coordination

- Case Residence
  - St Clair, Livingston, Wayne, Kent, Calhoun, Wisconsin
- Exposure/Source Jurisdiction
  - Grand Traverse, Lapeer, Ottawa, Kent
- Regulatory Authority
  - Local (LHD)
  - State (MDARD)
    - Food
    - Dairy
  - Federal (FDA)





# MDARD Involvement

- July 21 – The Meeting
  - New weekly foodborne epi meeting at MDHHS w/MDARD representative
  - 6th epidemiologist sense: maybe it's the cheese? Let's look into it...





# Regulatory Actions

- July 25-29
  - Menu research and restaurant follow-up
    - Artisan Raw Milk Cheese manufactured in MI was mentioned at one venue
    - Through LHDs, asking other potential restaurants
  - MDARD site visit to implicated restaurant
    - Traceback document collection
    - Sample collection (gouda) – screened positive for *stx1*
  - 6<sup>th</sup> and 7<sup>th</sup> cases reported
  - Visit to another gastropub venue – case #1
    - Sample collection and traceback with LHD



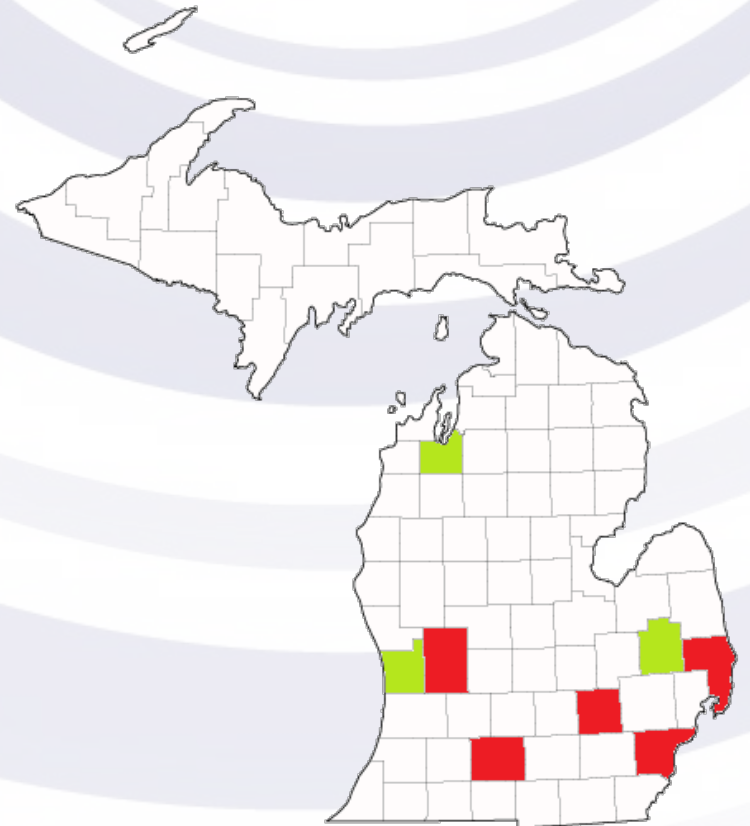
# Regulatory Actions

- August 1-2
  - Joint environmental assessment and sample collection at manufacturer
    - Observations
    - Seizure and summary suspension of dairy license
  - Retail samples screen positive from 2<sup>nd</sup> venue
  - Discussion with firm of recall scope vs. MDARD health alert/consumer advisory
- August 3
  - Voluntary recall by firm
- August 4
  - Initial retail sample PFGE results confirm match to outbreak strain



# Cheese Sample Summary

- Total of 17 cheese samples collected
  - 3 restaurants
  - manufacturer
- 6 positives
- 5 matching OB strain

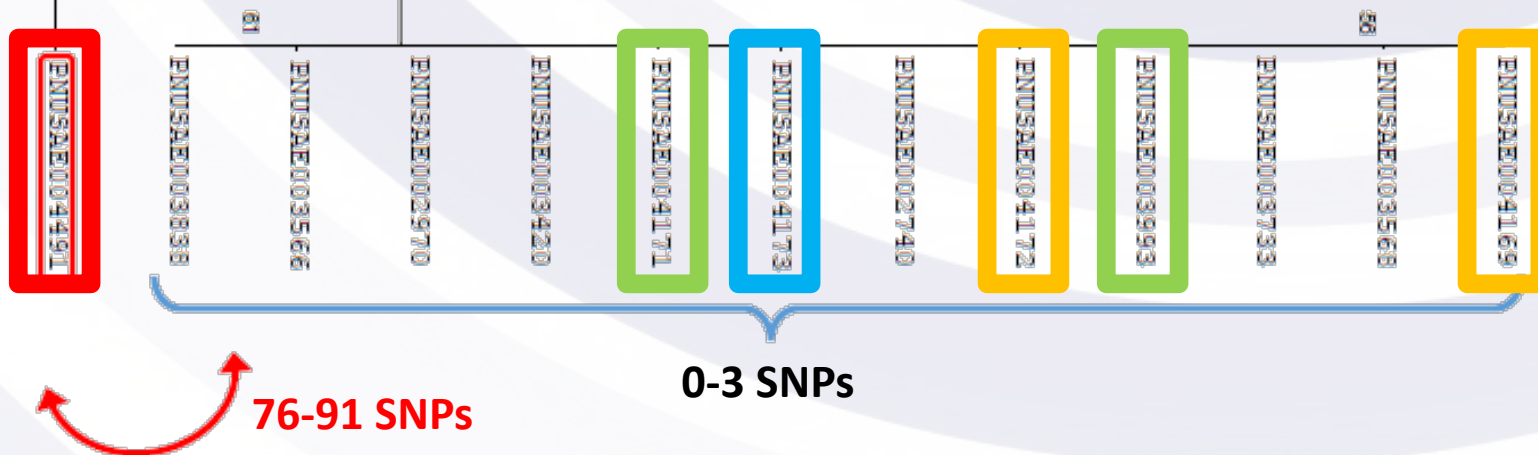






# Whole Genome Sequencing

- Highly related:
  - 7 case isolates (MI & WI)
  - 5 cheese isolates
- Not related:
  - 1 case isolate (NY)





## Postscript

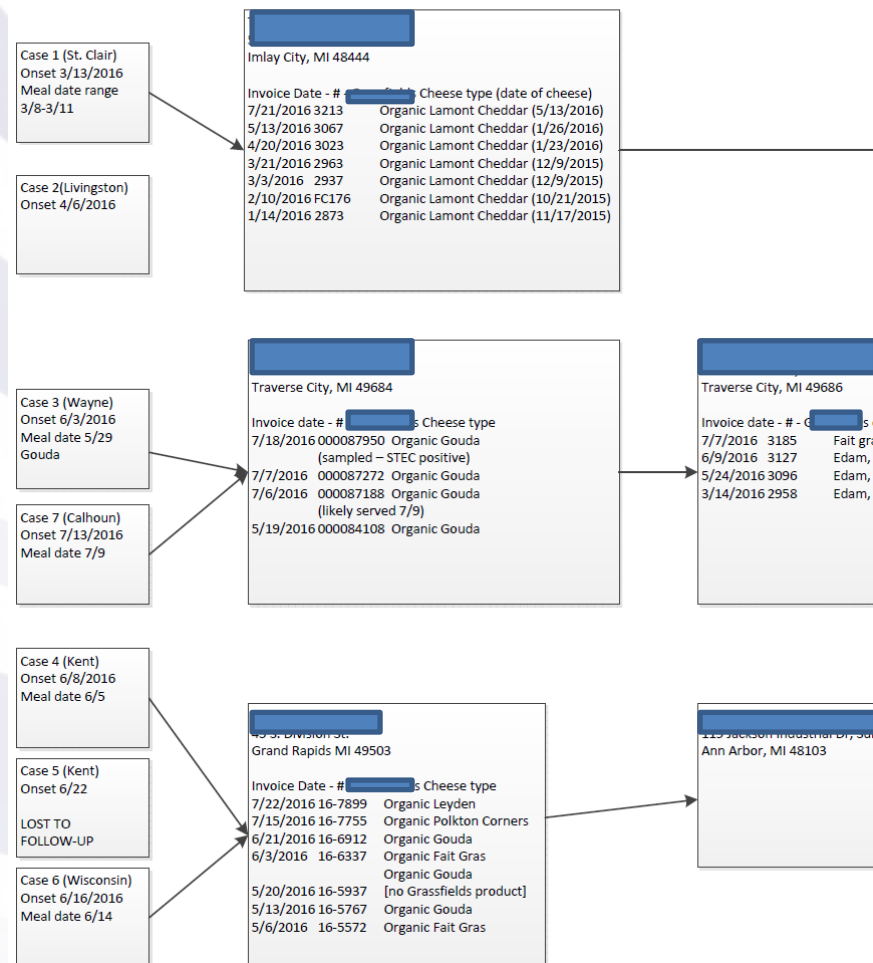
- New York resident case
  - PFGE match reported on 9/15/16
    - Day of After Action meeting
- Concerns
  - Product recalled in early August
  - Interstate distribution, long shelf life
- Epidemiology
  - 2 y.o male with onset 7/15/16
    - No travel to Michigan reported
    - No implicated cheese exposures reported



# The Good

- Multi-disciplinary
  - Quick and consistent epi-lab-regulatory connections
- Multi-agency
  - MDARD, MDHHS, 3 LHDs, FDA
- Where we cut days off response
  - The Meeting (epi/spidey sense)
  - The Labs!
  - Prompt regulatory response
  - Organization of information

STEC 05 [redacted] Cheese Investigation Traceback Flow Chart





# The Bad

- Challenges with a major incident at a small firm
- Organizing lab and sample information
  - Template data table “pilot”

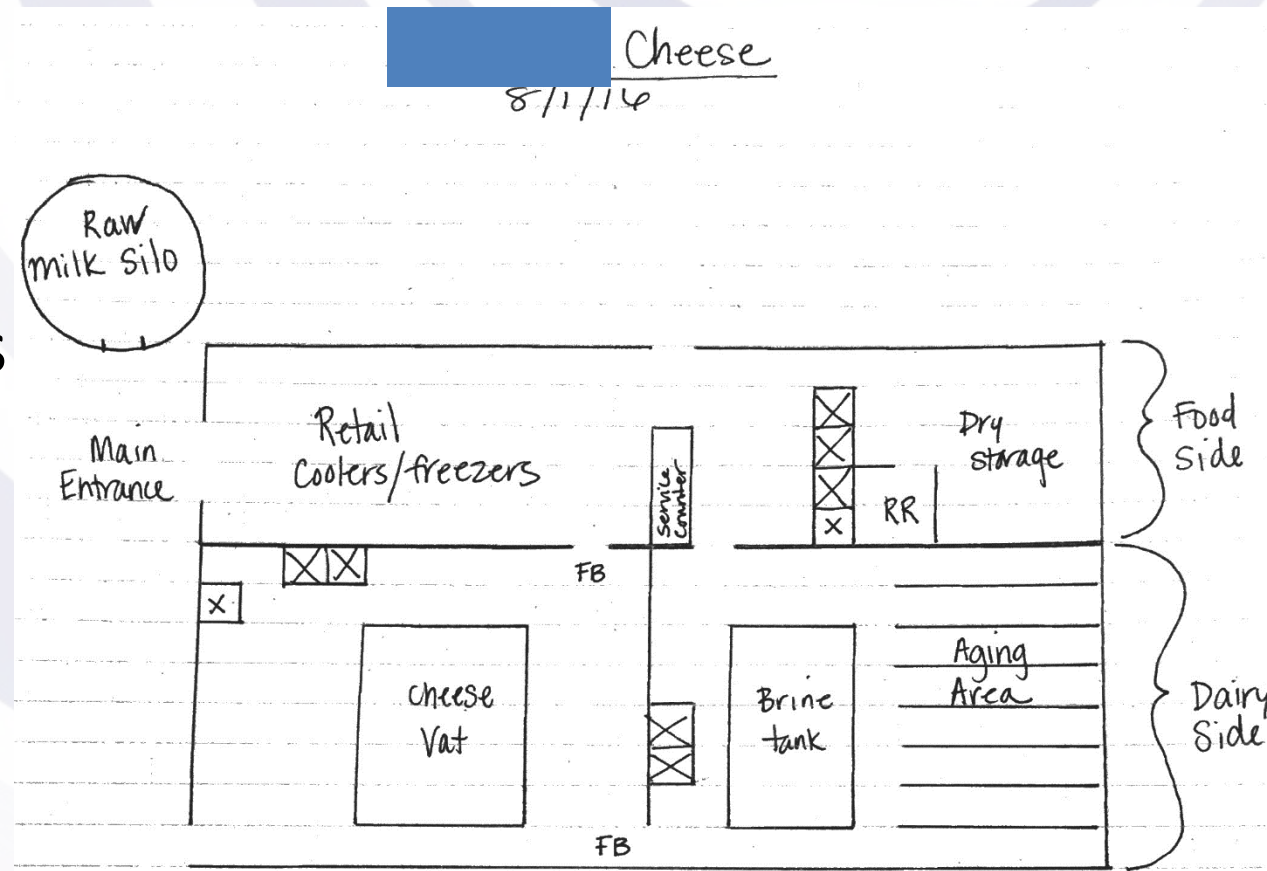
Evidence Info #	Description	Code/ wt.	Collection date & collector initials	Details	Results & date reported	Isolate info (Geagley lab links, BOL specimen numbers)	PFGE info
Sample D332928	Organic Gouda (from [redacted])	2.5 lbs.	07/27/16 KH	Test for E. coli	Pathogenic E.coli, not E.coli O157:H7 detected-8/1/16 Confirmation—sent for PFGE isolate matches the patient isolates (STEC O5)—8/4/16	<b>16FMF0000538</b> <i>CL16-170036</i>	Matches outbreak isolates. Xba1 – 16Ec1Xb.014 Bln1 – 16Ec1Bl.014
Sample D332928	Organic Gouda (from [redacted])	0.64 lbs.	07/27/16 KH	Test for E. coli	None detected-08/01/16		
Sample D329696	Organic Gouda (from [redacted] aging room)	Prod. Date 3/24/16	08/01/16 AR & CK	Test for E. coli	5/10 subs screen positive for stx1 isolated stx1 organism, sent to MDHHS 8/5 Reported out 8/10 from MDHHS	<b>16FMFO000543</b> <i>CL16-170039</i>	Matches outbreak isolates. Xba1 – 16Ec1Xb.014 Bln1 – 16Ec1Bl.014



# The Ugly

## Problems at the manufacturer

- Insanitary conditions
- Insects and pests
- Raw milk cheeses
- Co-located with dairy and retail site



Production Flow





# The Ugly





# The Ugly





## The Ugly – Outcomes

- Summary suspension of dairy license
- Seizure of cheeses still on-site (June 2016 to present – 60 day aging)
- Voluntary multistate recall of over 20,000 lbs of cheese
- Cheese Processor ceased raw milk cheese production indefinitely





## Ugly or not?

- Joint environmental assessments performed at restaurants in three counties as well as at the manufacturer
- Decided to pilot NEARS data entry with results after the fact
- Asked inspectors to retroactively fill out applicable sections
- NEARS not applicable for manufacturing



## Back to the Good

- The need to work with small artisan cheese producers in Michigan
  - Lack of awareness of risks
  - Issues with manufacturing processes and facilities
- Workgroup formed including regulators, academia, industry
- Development of self-assessment tool focused on prevention



## Back to the Good

- Roll out of self-assessment tool
  - Goal: initially assist small volume dairy processors in the improvement of prevention efforts
  - limit the number of future outbreaks and recalls associated with these types of products
  - Implementation, education and outreach for the artisan cheese manufacturers across the state
- Aligning with FSMA Preventive Controls
- If successful, expansion to other small food processors



# Back to the Good

- OBNE and RRT Wonder Twins?
  - Better epi, coordinated and rapid response, field level emergency response capacity, NEARS!



# Questions?

## I have questions!



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### Stay connected with MDARD!



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