

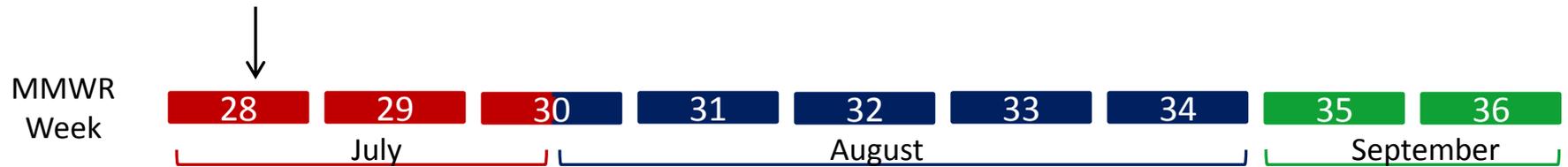
Multistate Outbreak of Salmonella Associated with Cantaloupe Exposure

2013 Epi Rapid Response Team Conference
May 7, 2013

Elizabeth Russell, PhD, MSc
Kentucky Department for Public Health

Timeline

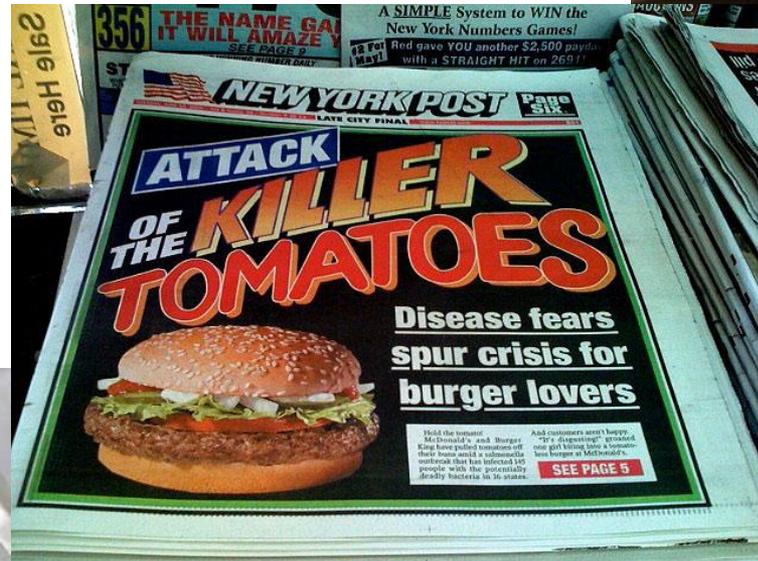
Regional Epidemiologists-
Increase in Salmonellosis Cases



Background

- Salmonella is a genus of bacterium that causes disease in humans
 - Typhoid fever
 - Gastrointestinal illness
- Illness typically associated with eating raw or undercooked food
 - Symptoms appear 12-72 hours after ingestion of a large dose (inoculum)
 - Diarrhea, fever, abdominal cramps lasting 4-7 days
 - Illness most severe in infants/children and older adults

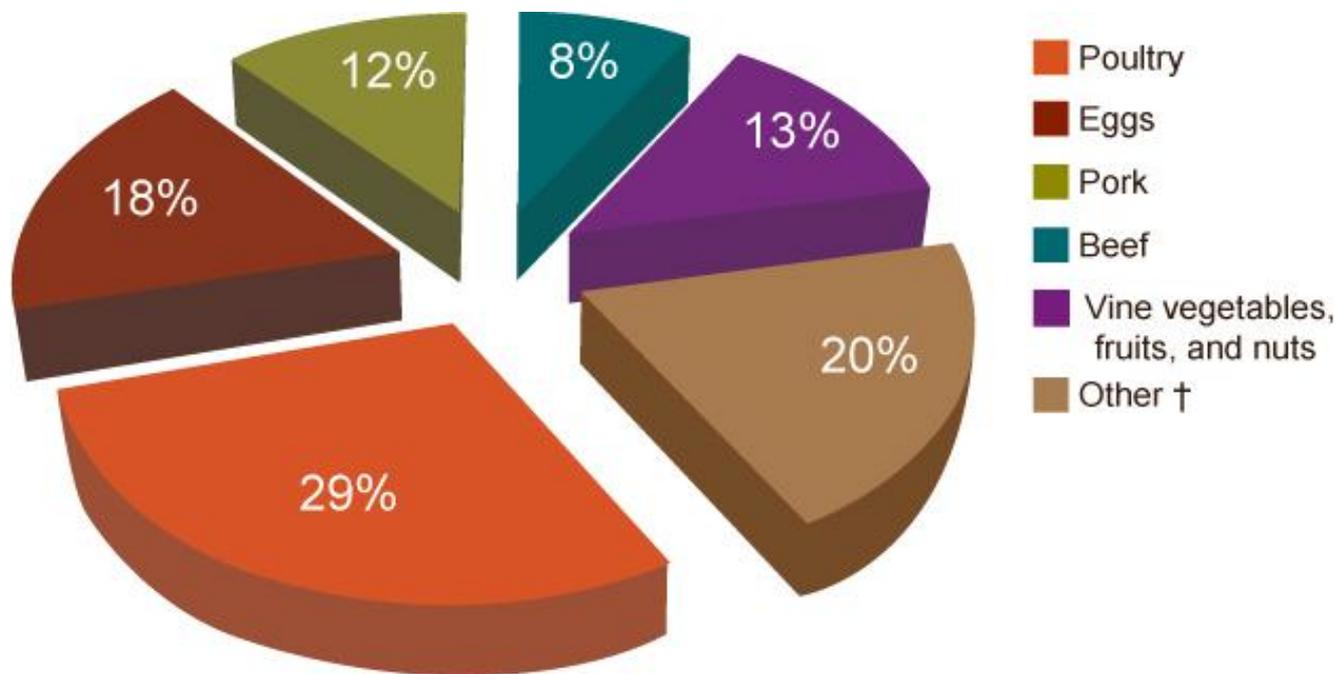
Recent National Outbreaks





Google Image Results: Hedgehog

Foods associated with *Salmonella* outbreaks*



*These contaminated ingredients or single foods (belonging to one food category) were associated with 1/3 of the *Salmonella* outbreaks.

†Other includes: Sprouts, leafy greens, roots, fish, grains-beans, shellfish, oil-sugar, and dairy.

Source: CDC National Outbreak Reporting System, 2004–2008.

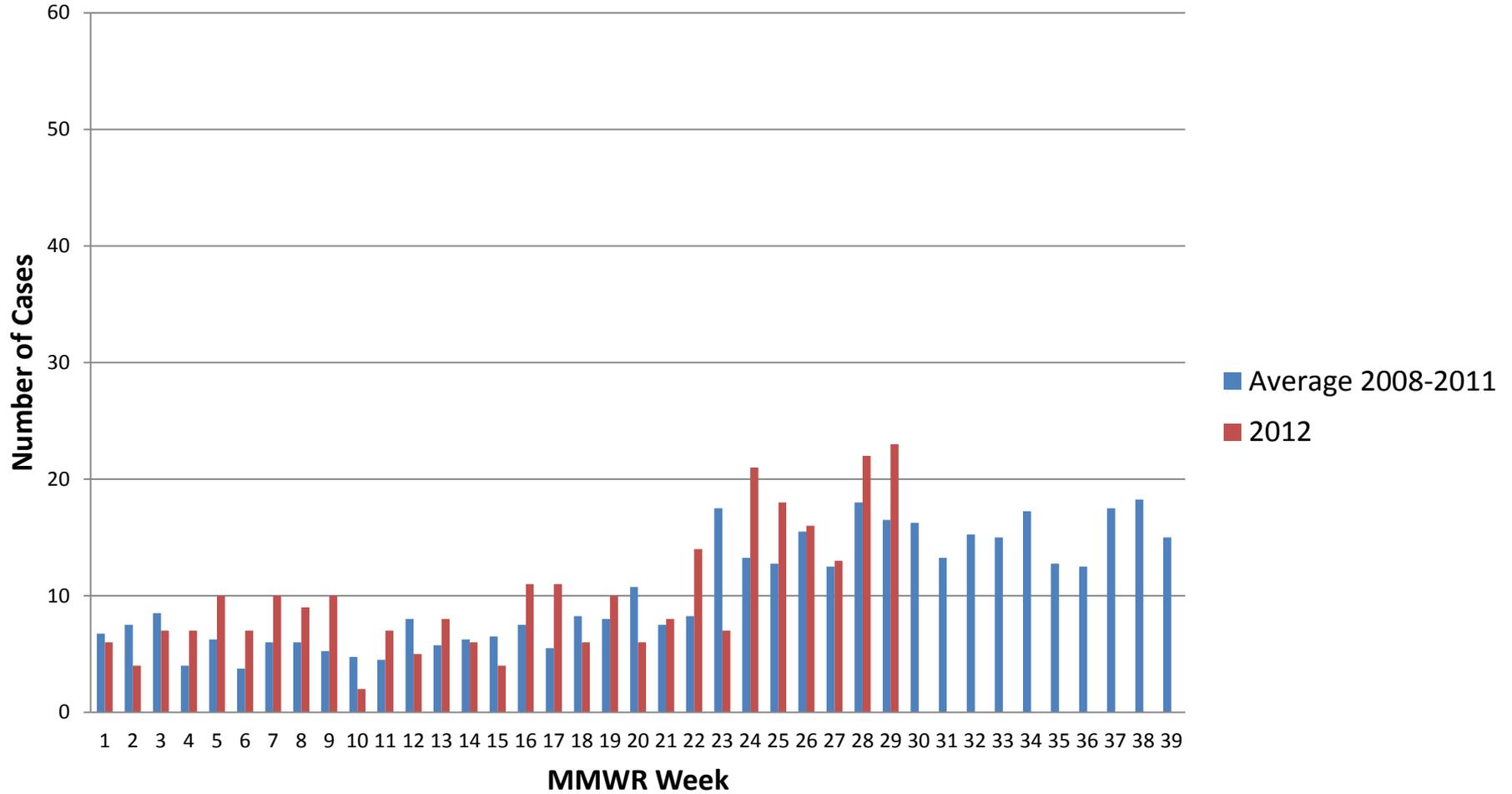
Foodborne Reportable Disease Investigation

- Enteric disease questionnaires
 - Food history 72 hours prior to illness onset
 - Environmental exposures
 - Attempted for every reported case
- Entered into NEDSS locally- accessed at KDPH electronically
 - NEDSS does not have all questionnaire data

Definition of Outbreak

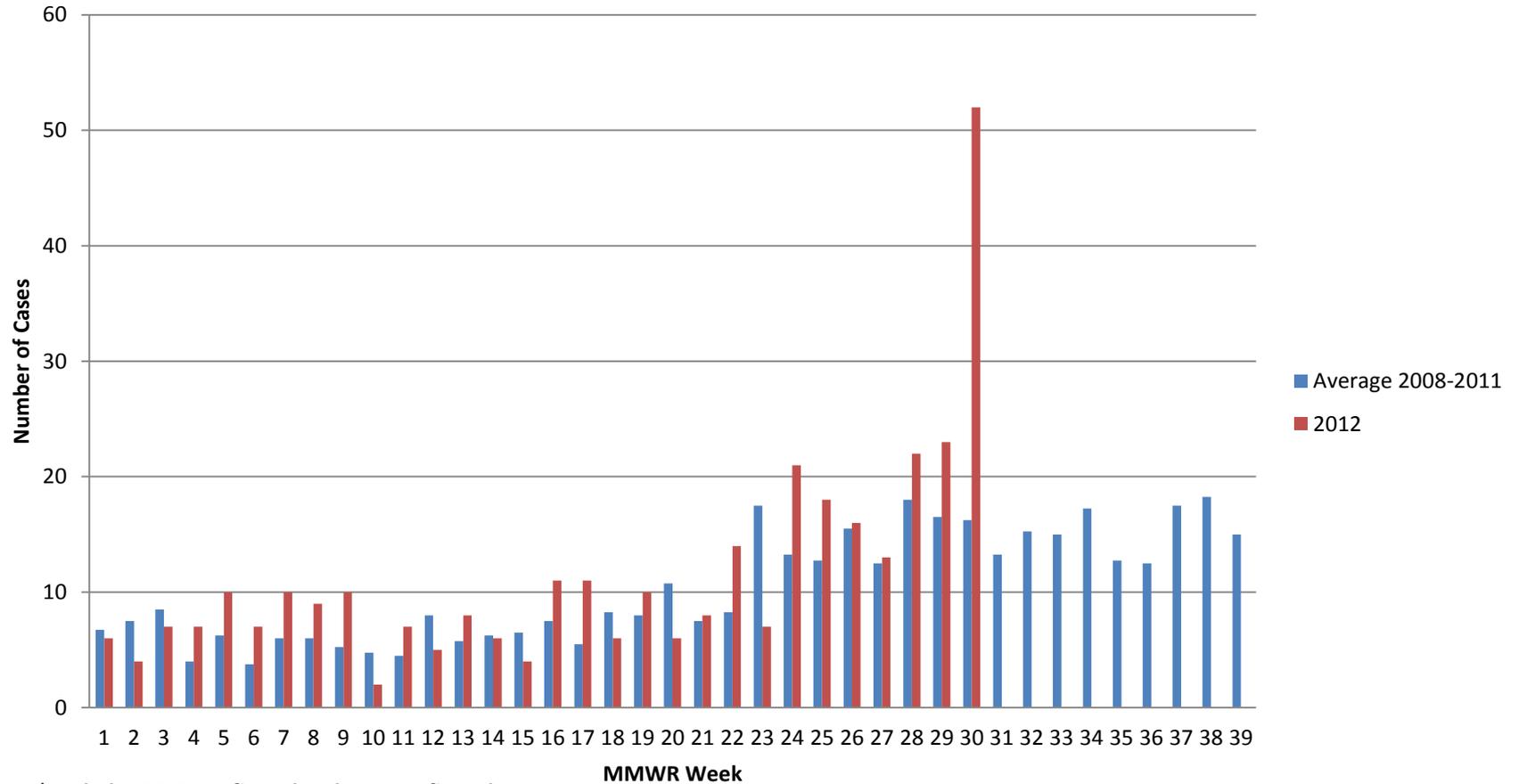
- More than 2 linked cases
 - Known to be related- family, school, etc.
 - Similar risk factor
- CIFOR Guidelines
 - Council to Improve Foodborne Outbreak Response
 - Triggers for outbreak investigation
 - <http://www.cste.org/dnn/ProgramsandActivities/InfectiousDiseases/CIFORGuidelines/tabid/207/Default.aspx>

Reported Salmonellosis Cases* in Kentucky 2008-2012



* Includes 2012 confirmed and non-confirmed cases

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Outbreak Recognized

- Outbreak recognized through epidemiologic evidence by Local Health Departments
 - Western KY
 - Late July
- Salmonella samples were prioritized by the Division of Laboratory Services (DLS)



Specimen
Collected

Private
Laboratory
Testing

**Local Health
Department**

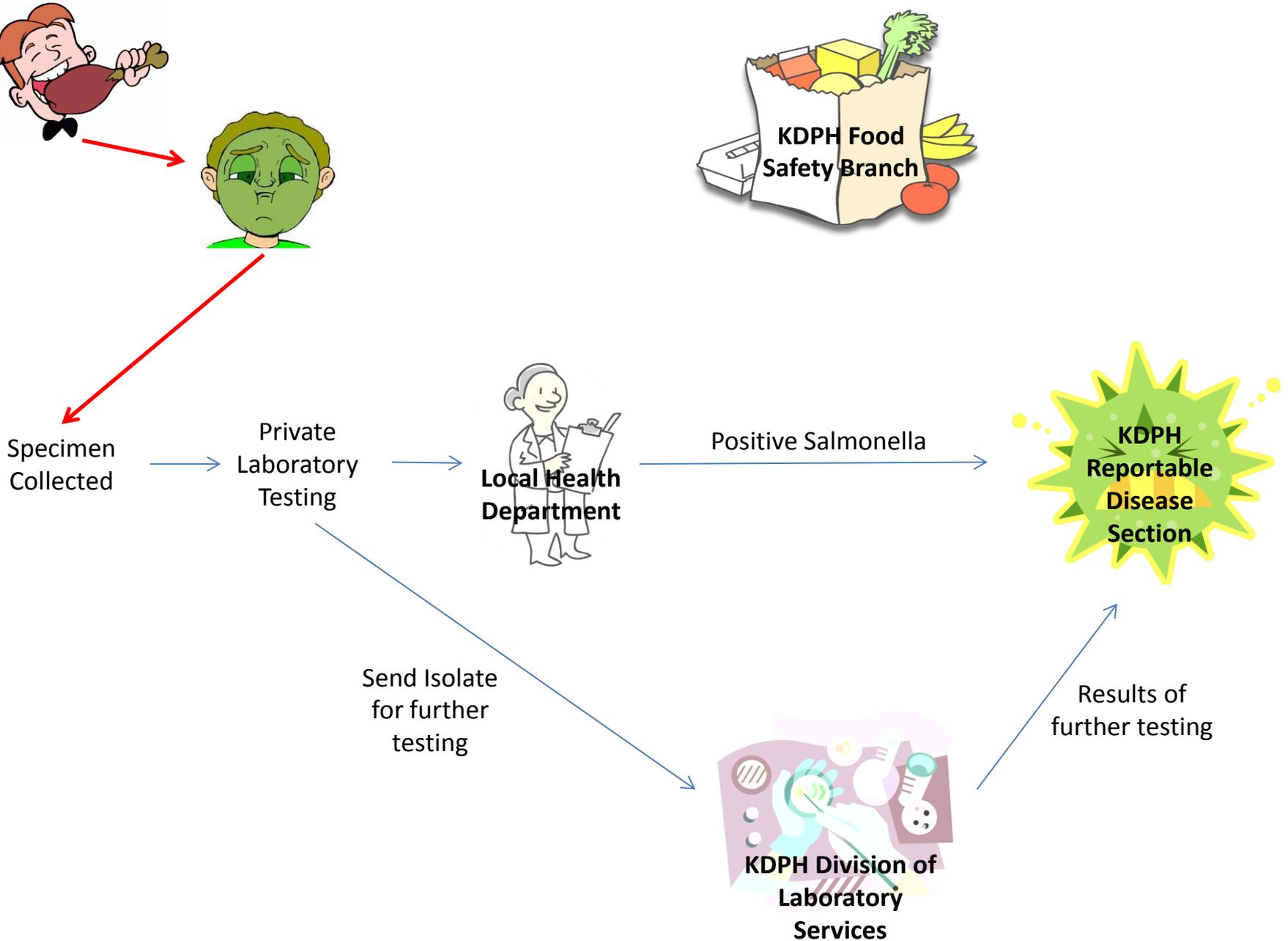
Positive Salmonella

**KDPH
Reportable
Disease
Section**

Send Isolate
for further
testing

**KDPH Division of
Laboratory
Services**

Results of
further testing



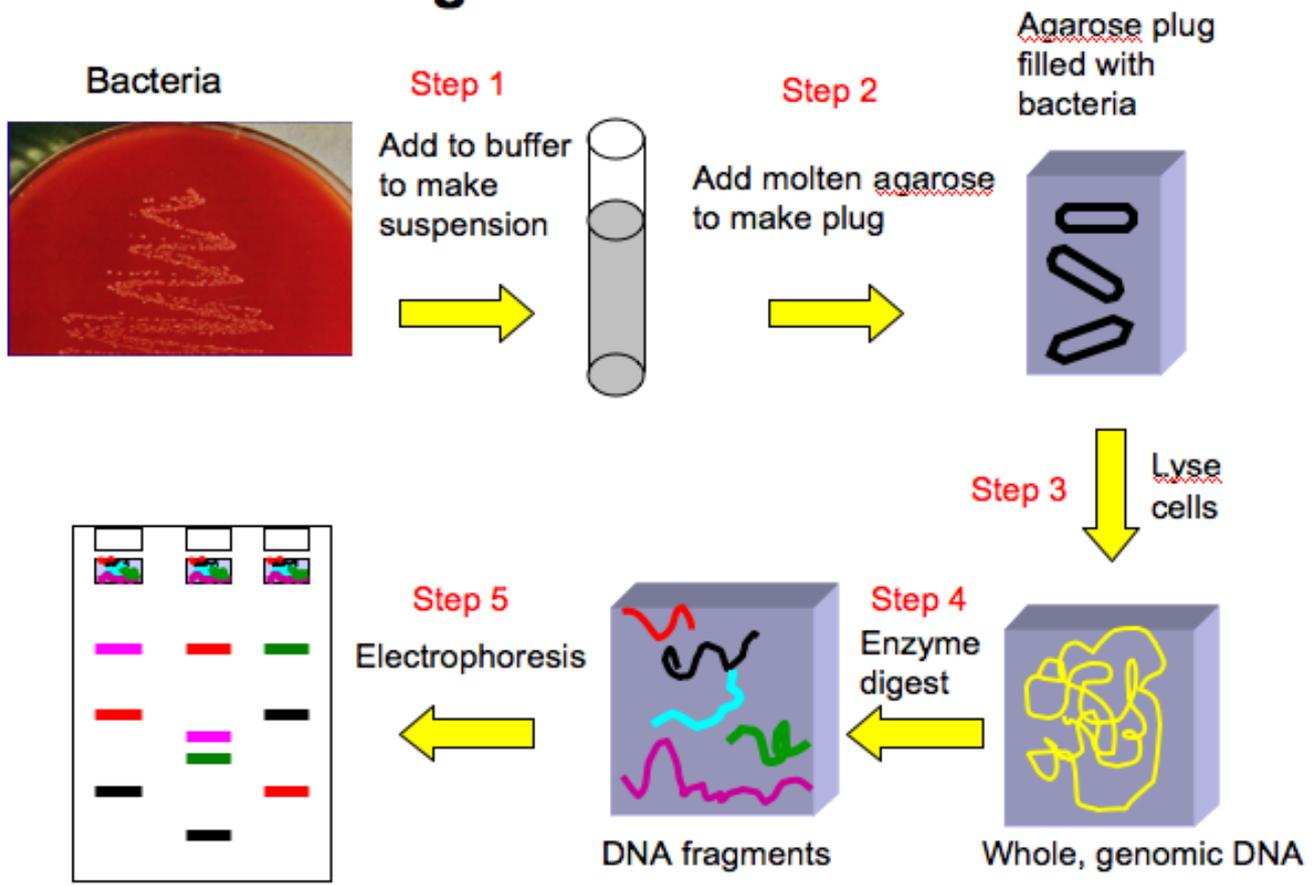
Bacterial Testing



Species	Hospital/ Contract Lab	Salmonella enterica
Group	Hospital/ Contract Lab OR State Lab	Group B
Serotype	State Lab	Typhimurium
PFGE Pattern	State Lab	JPXX01.0324

Pulsed-Field Gel Electrophoresis

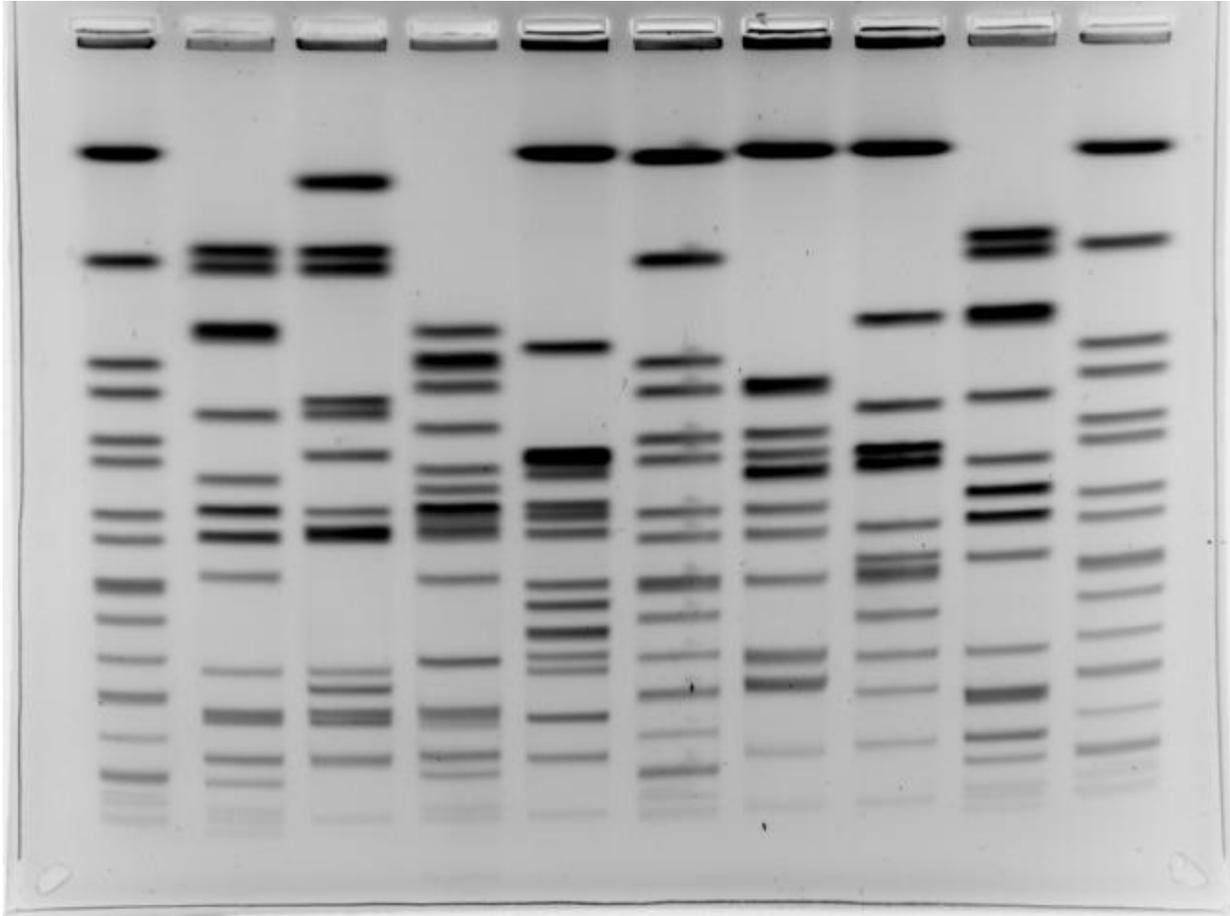
Figure 1 - PFGE



PFGE Steps Continued



Image 📎 for Analysis



PulseNet

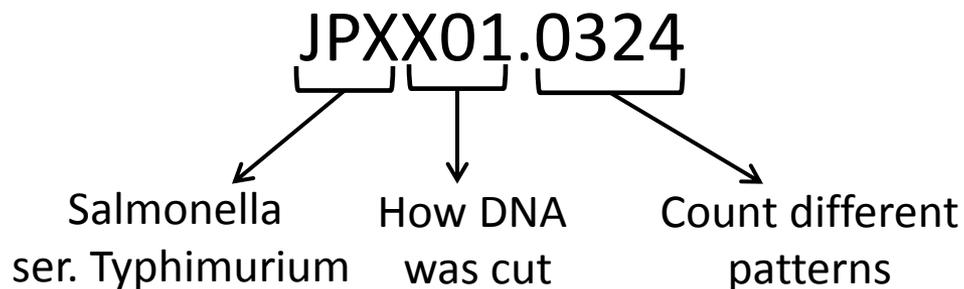
- CDC program used by state public health labs to detect foodborne disease clusters and outbreaks
 - www.cdc.gov/pulsenet
- Started after 1993 E. Coli outbreak associated with Jack In The Box

PulseNet

- Outbreak of Salmonella: 3 or more isolates with matching PFGE patterns or 2x baseline for common PFGE patterns
- Images sent to CDC electronically
- CDC assigns ID to isolate pattern (can take several days)

Case Definition

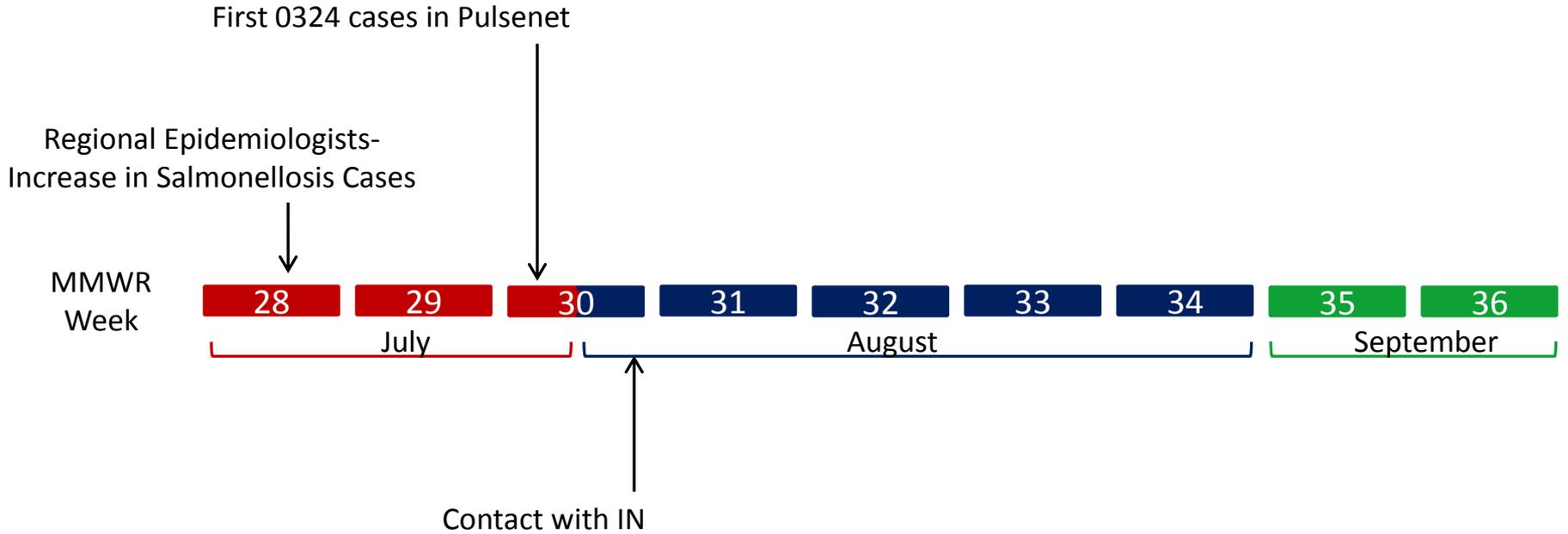
- A case (person, place, time):
 - A person infected with Salmonella Typhimurium PFGE Pattern JPXX01.0324
 - In the United States
 - Illness onset July 6th through October 1st

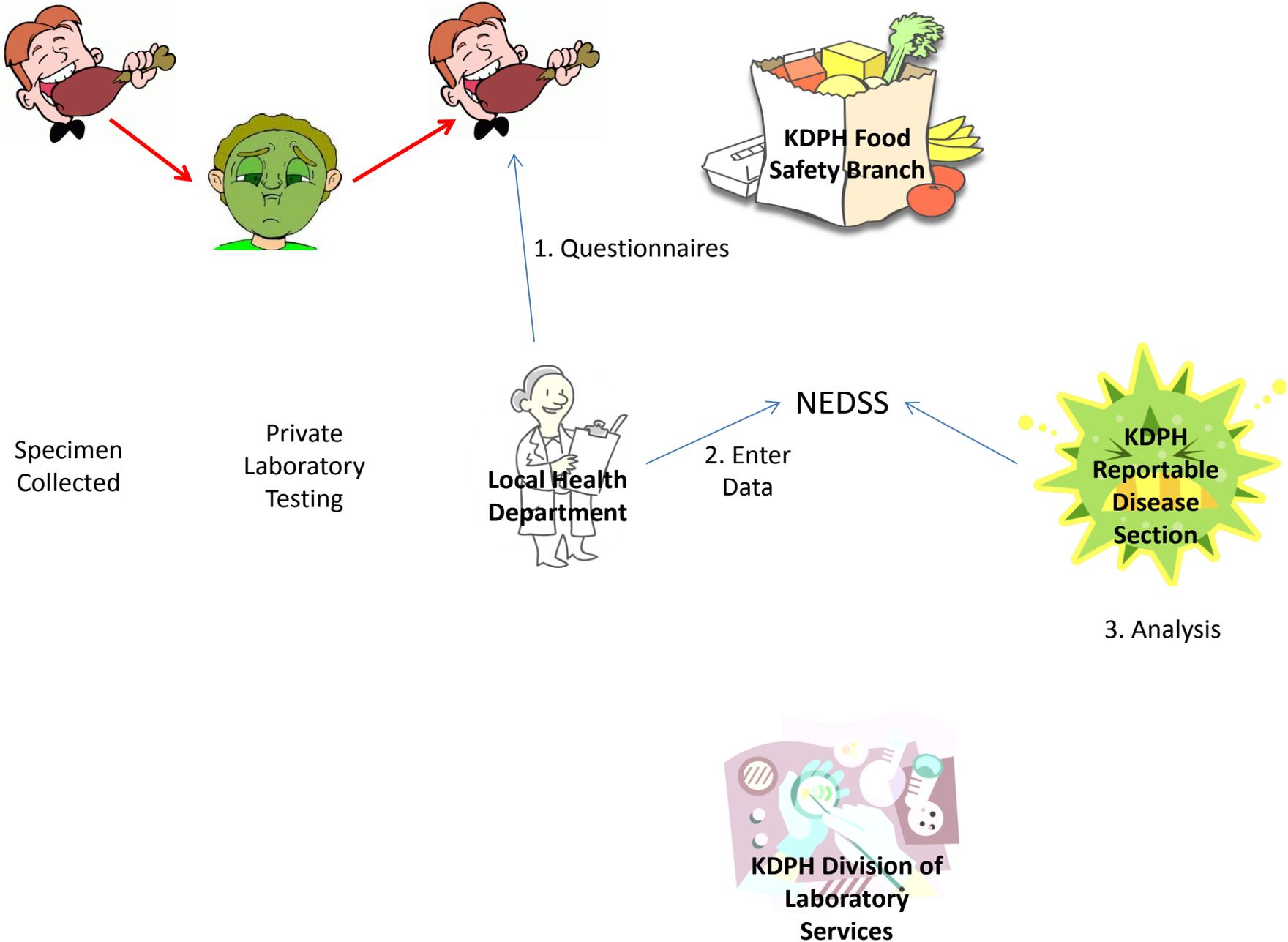


Initial Laboratory Investigation

- PFGE Results
 - many of the isolates from Western Kentucky were genetically related
- Connected to IN cases through PulseNet

Timeline



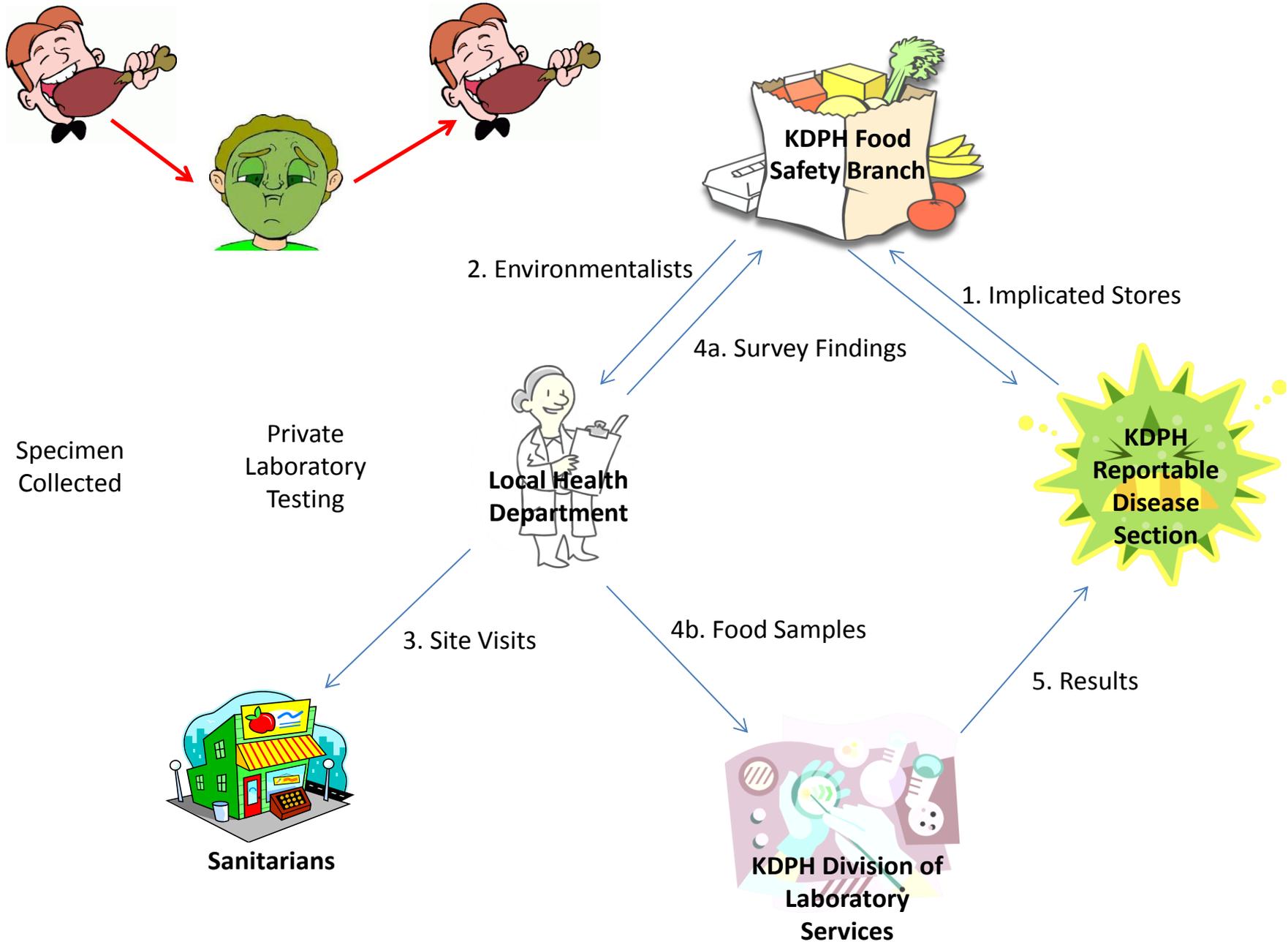


Epidemiologic Investigation

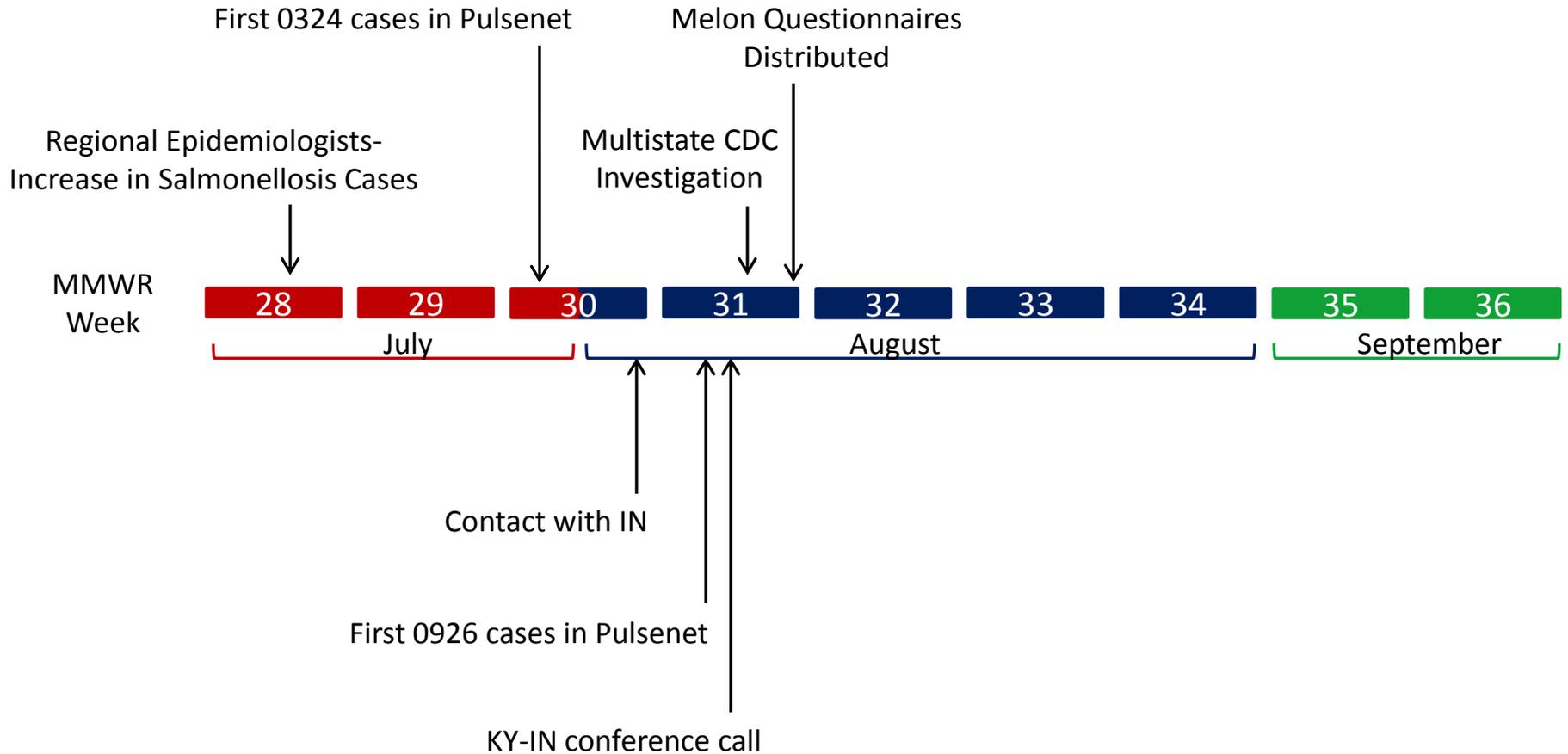
- All regional epidemiologists and local health departments statewide warned of increase in Salmonellosis cases
- Association suspected between illness and melon consumption based on questionnaires
 - Enteric Disease Questionnaire data from cases to date downloaded from NEDSS
- Melon traceback investigation initiated

Traceback Investigation

- Patient questionnaires:
 - Enteric- where they generally shopped for food
 - Melon- when/where melons purchased, consumption
- Food Safety Branch analyzed aggregated purchasing data and arranged site visits
 - Melon Supplier Questionnaire
 - Collected information on all sources of melon
 - Where applicable:
 - Collect melons for testing
 - Swab facility for contamination



Timeline



Bacterial Testing

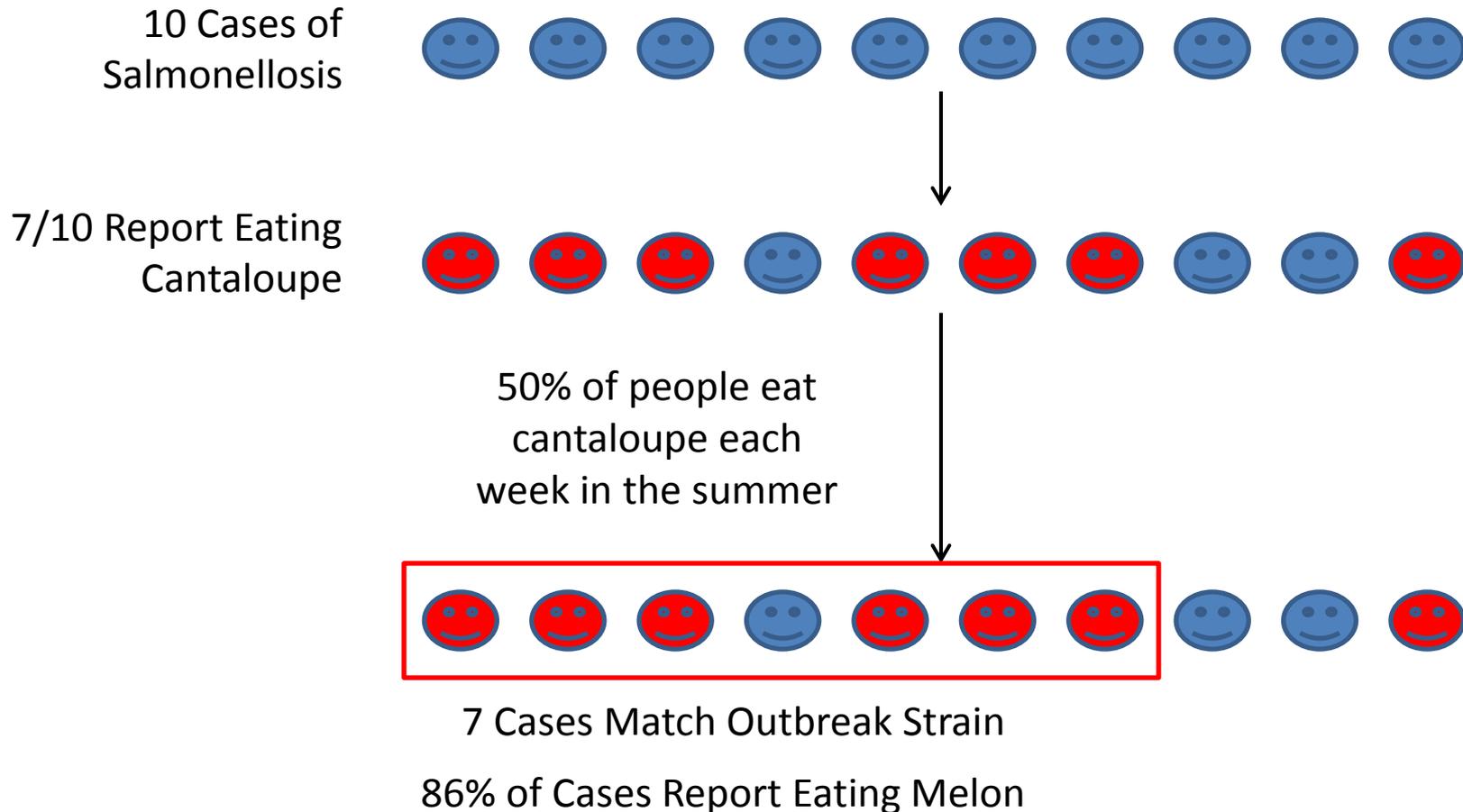


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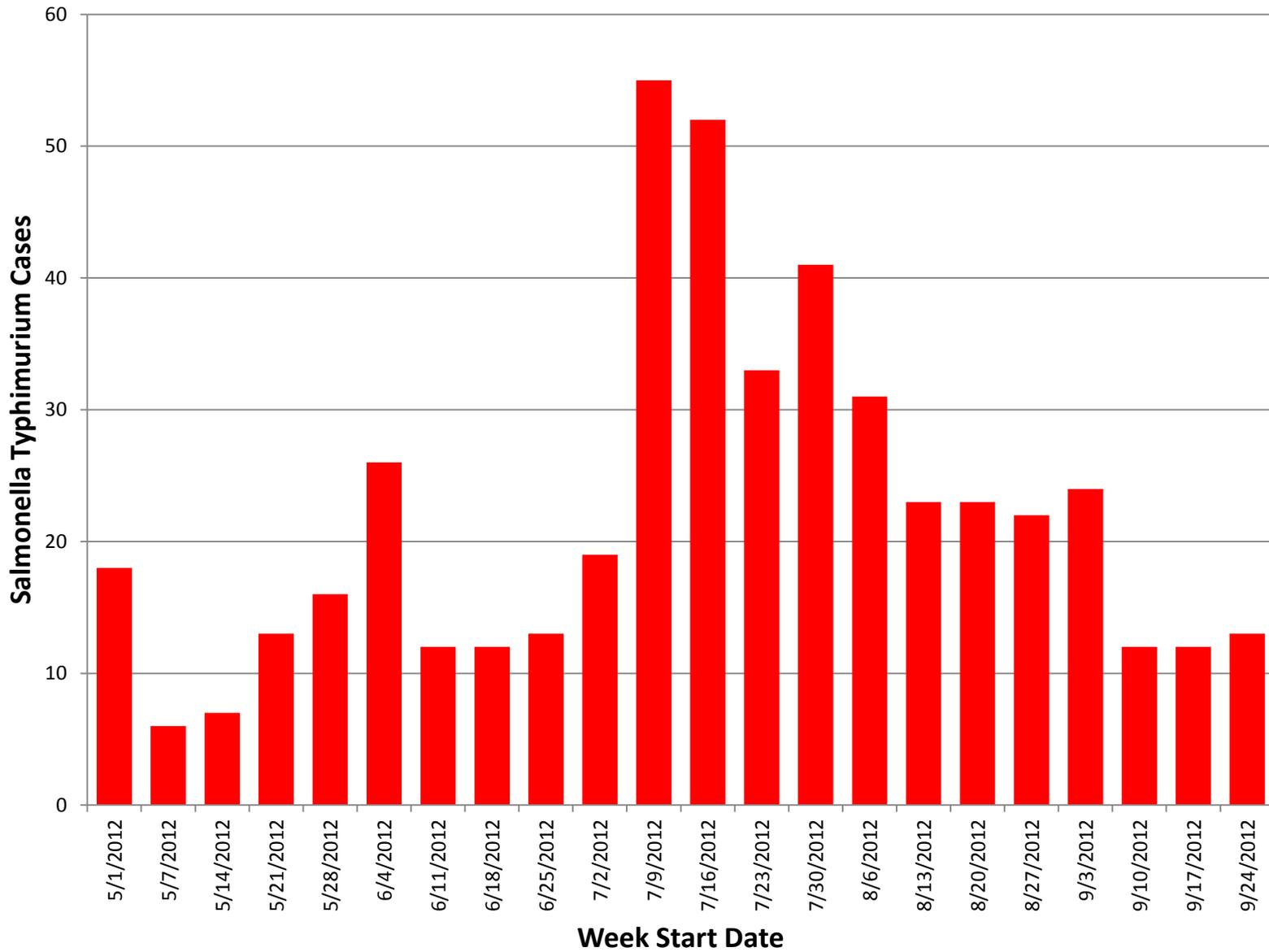
Laboratory Investigation

- Foodborne illness survey data includes non-outbreak cluster cases
 - Each pattern may have different source of outbreak
 - Background cases dilute the signal
- Laboratory results can narrow to only outbreak patient data

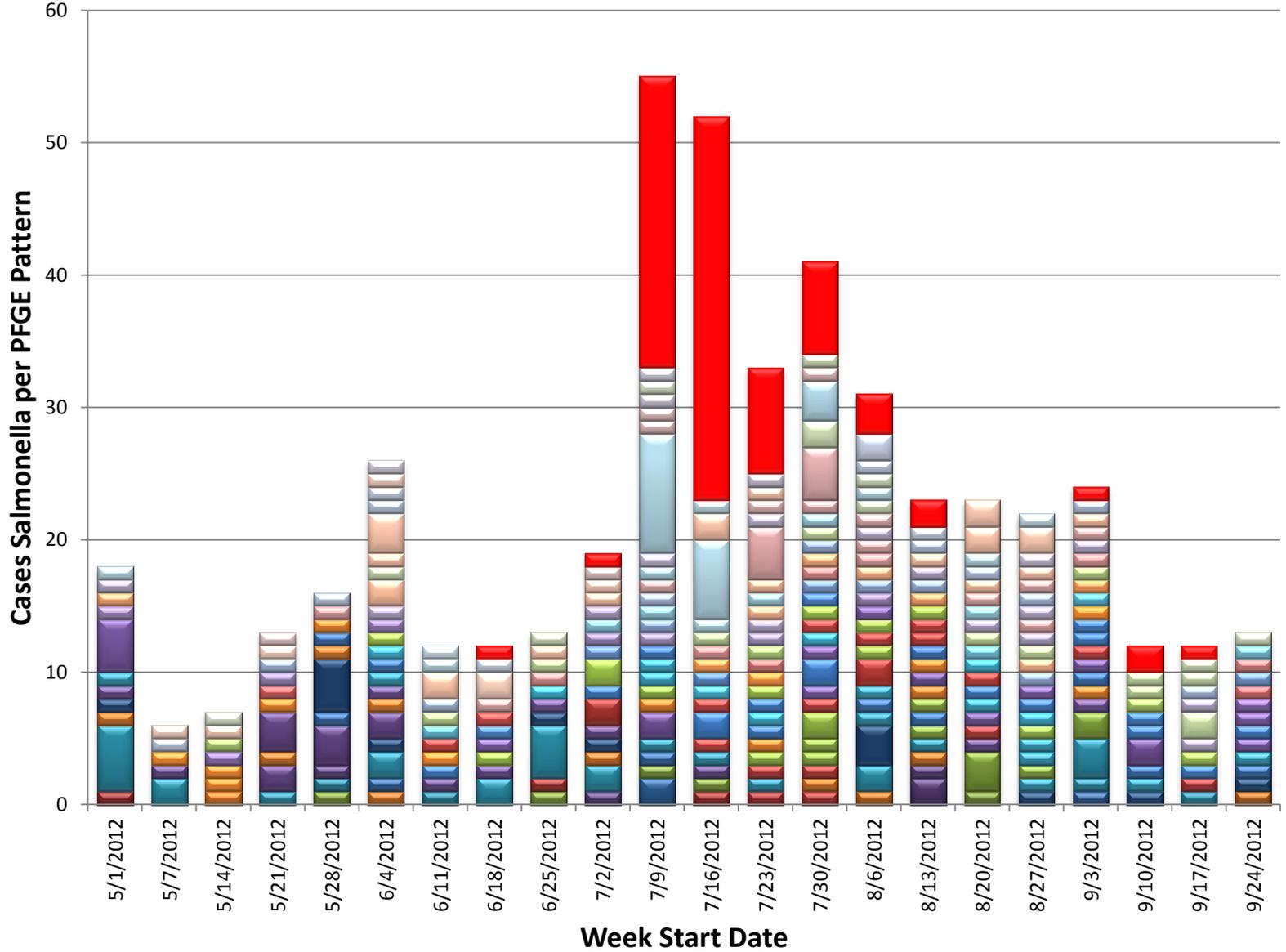
Laboratory Testing in Public Health



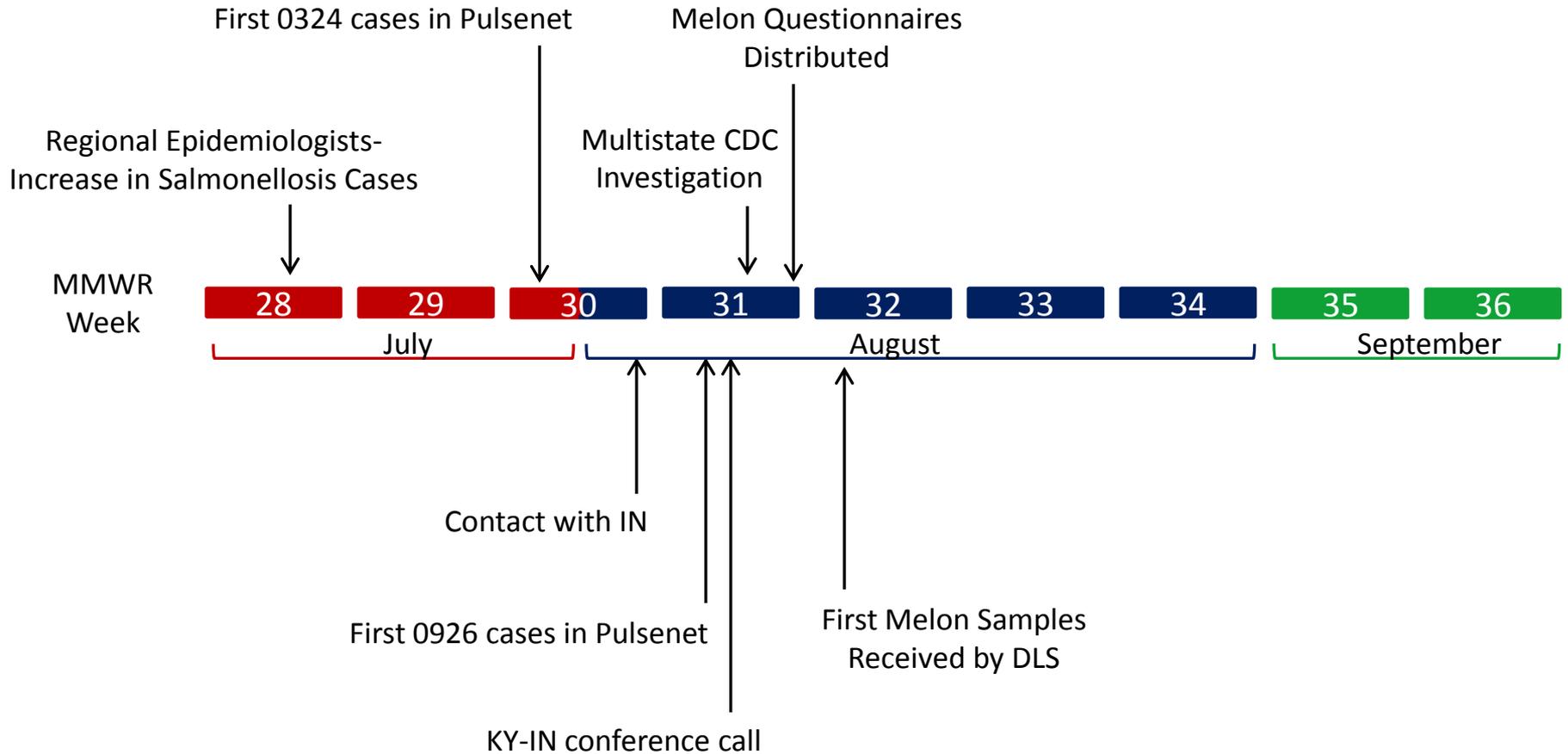
Salmonella Isolates Tested with PFGE



Salmonella Isolates Tested with PFGE by Pattern



Timeline



Melon Traceback

- Focused traceback investigation on stores where outbreak cases purchased melons
 - Western Kentucky
 - Additional Regions

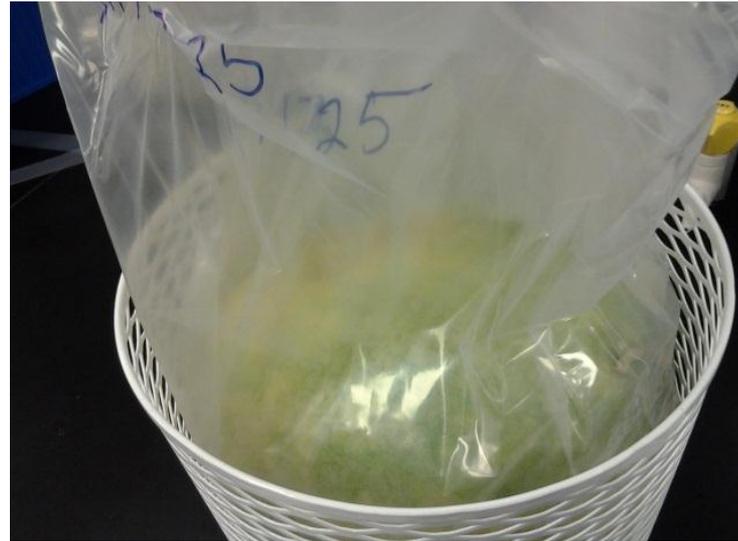
Food Testing Process at DLS

- LHD and Reportable Disease Section communicate with DLS Food Lab to choose appropriate food sample for testing
- Forms
 - Source
 - Date Collected
- Packing Instructions



Food Testing at DLS

- Each pathogen has own test protocol
- Melon testing
 - Whole melon
 - Cut up melon



Food Testing at DLS

- Determine if a bacterial pathogen is detected
 - ~4 days
- Sent to the Bacteriology lab for identification
 - ~2-3 days
- PFGE lab for genetic analysis
 - ~4 days

Traceback Investigation

- As testing was in process, additional melon supplier surveys conducted
- Two chains were implicated more often than others
 - Regional?
 - Common distributor of contaminated produce?

Traceback Investigation

Results of Melon Survey

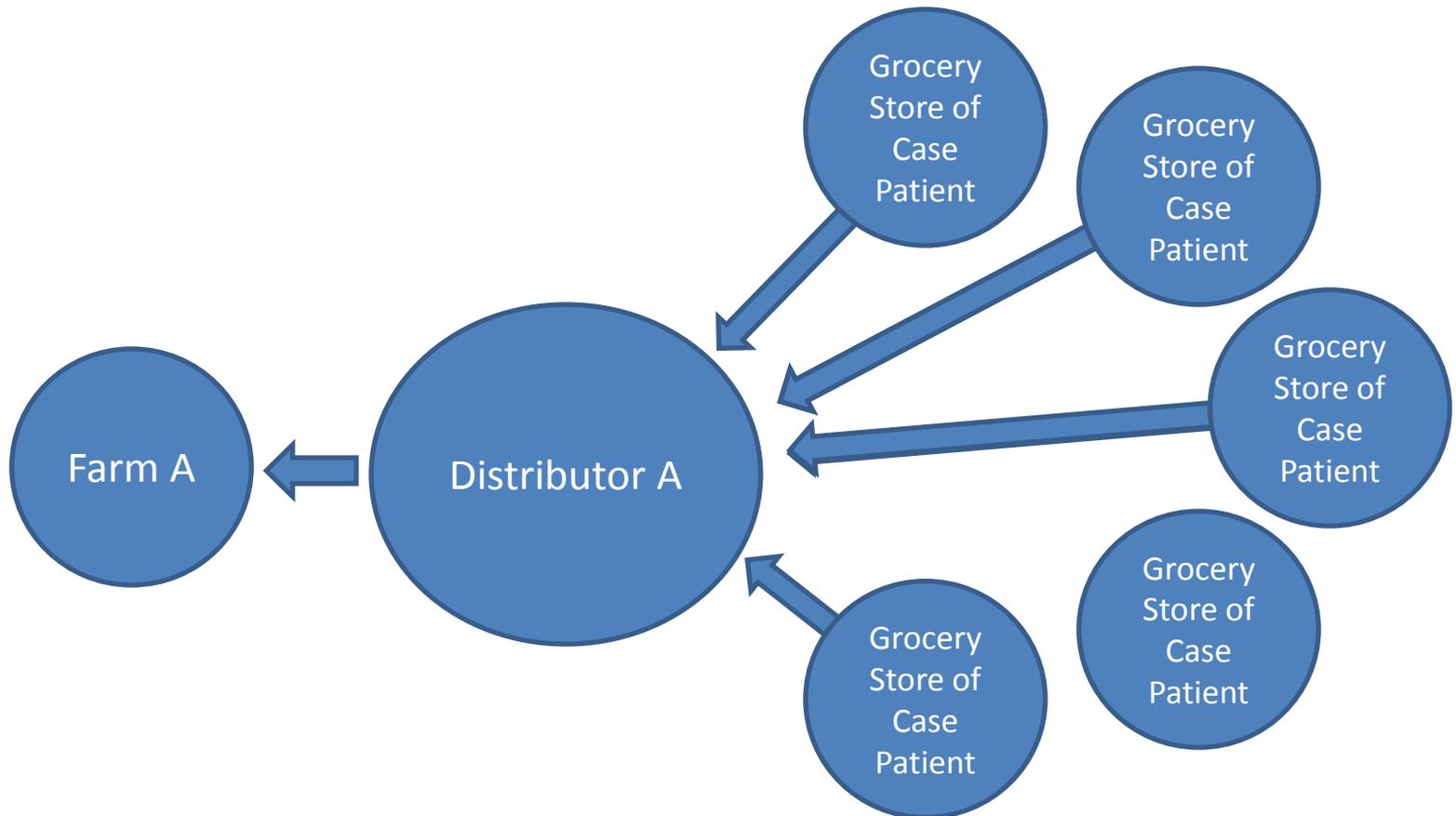
Store	Pattern		
	Back-ground	0324	0926
Grocery Store 1	5	5	2
Grocery Store 2	6	4	0
Other	19	1	2
Total	30	10	4

Grocery Stores 1 & 2

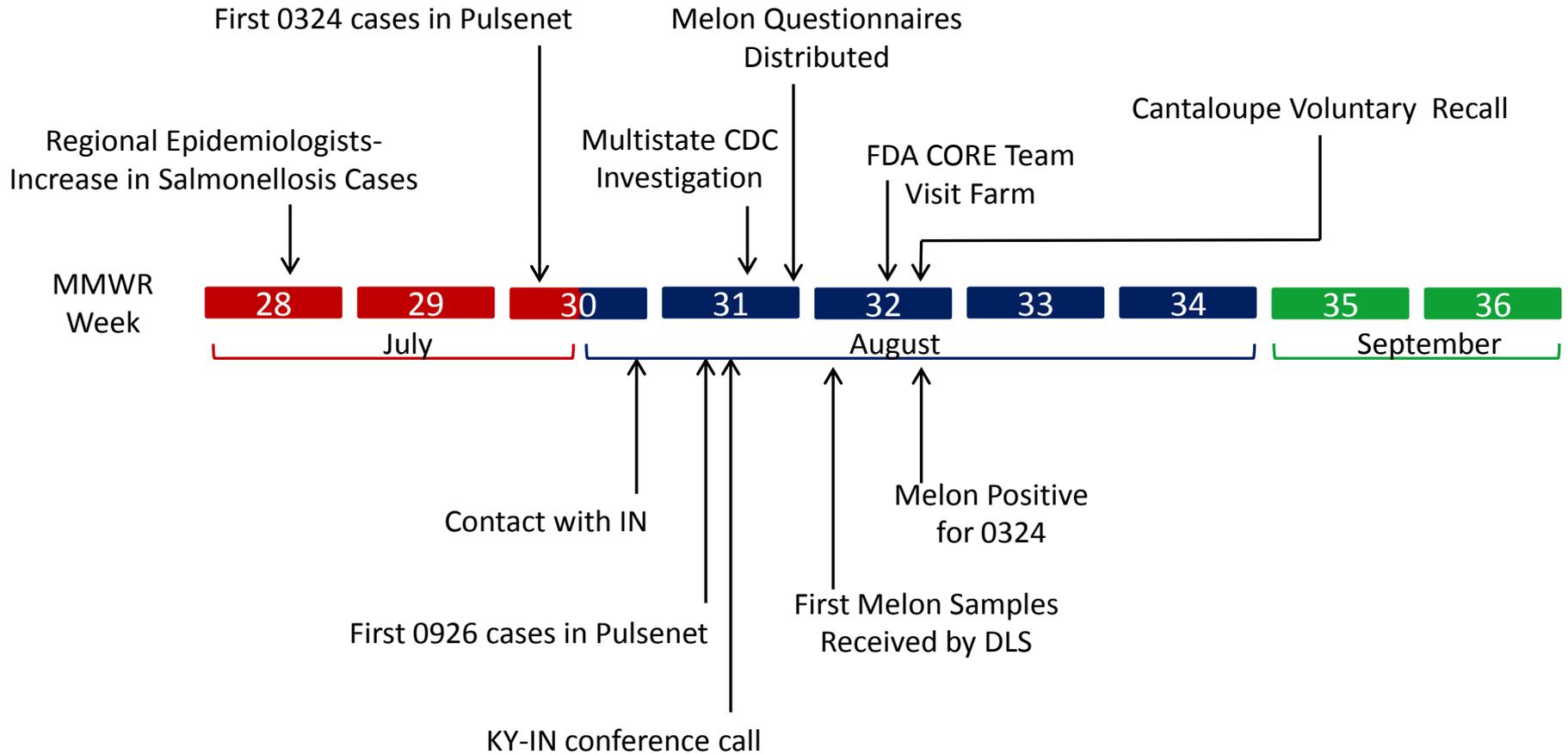
- Reported by 9 of 10 patients with the outbreak pattern
 - 90%
- Reported by 11 of 30 patients with background patterns
 - 37%

Melon Traceback

- Identified single supplier for stores- Farm A



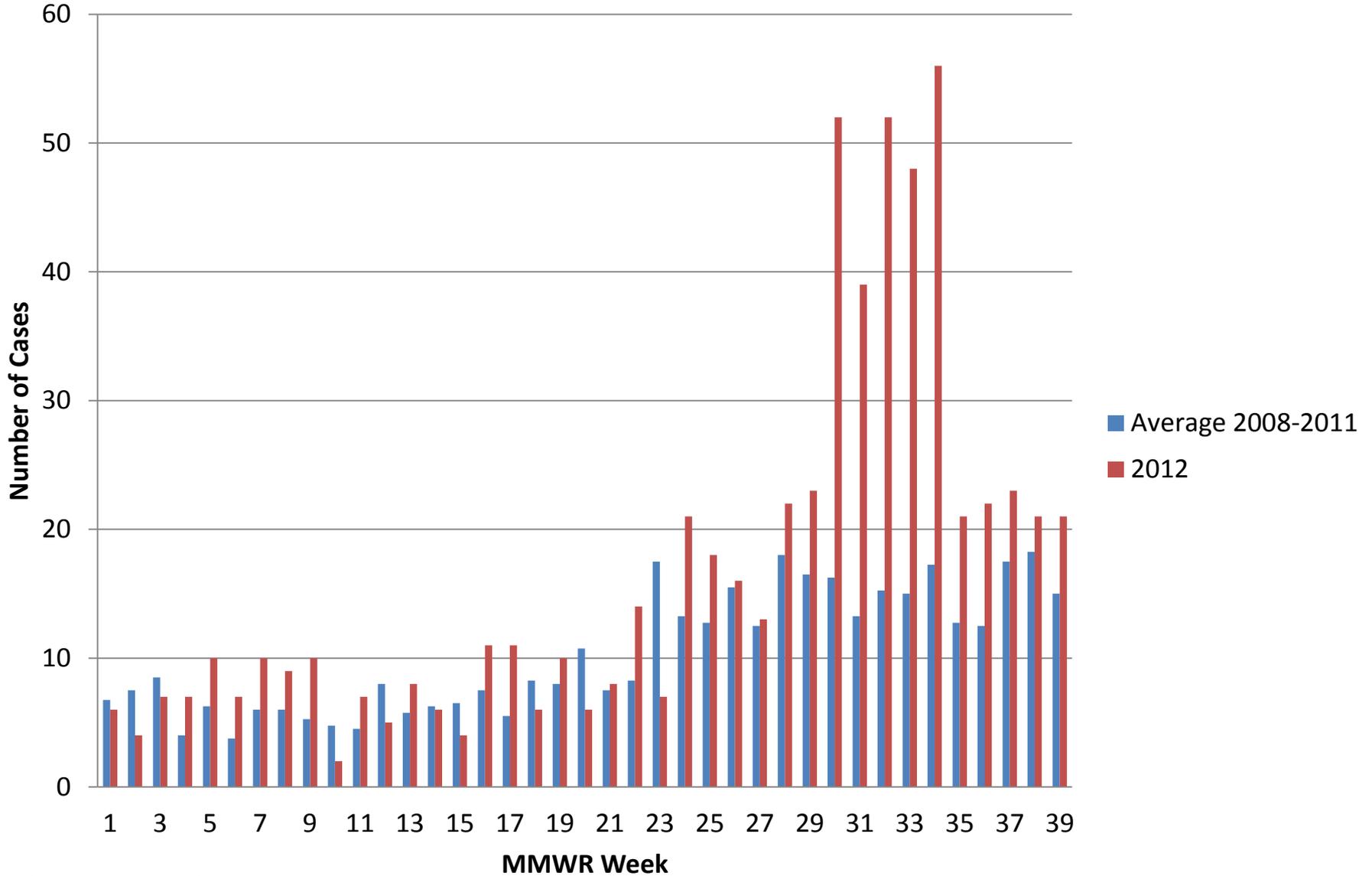
Timeline



Melon Traceback

- Food and Drug Administration visited Farm A to conduct investigation of practices and collect samples
- Salmonella matching the outbreak strain was isolated from a field on the farm

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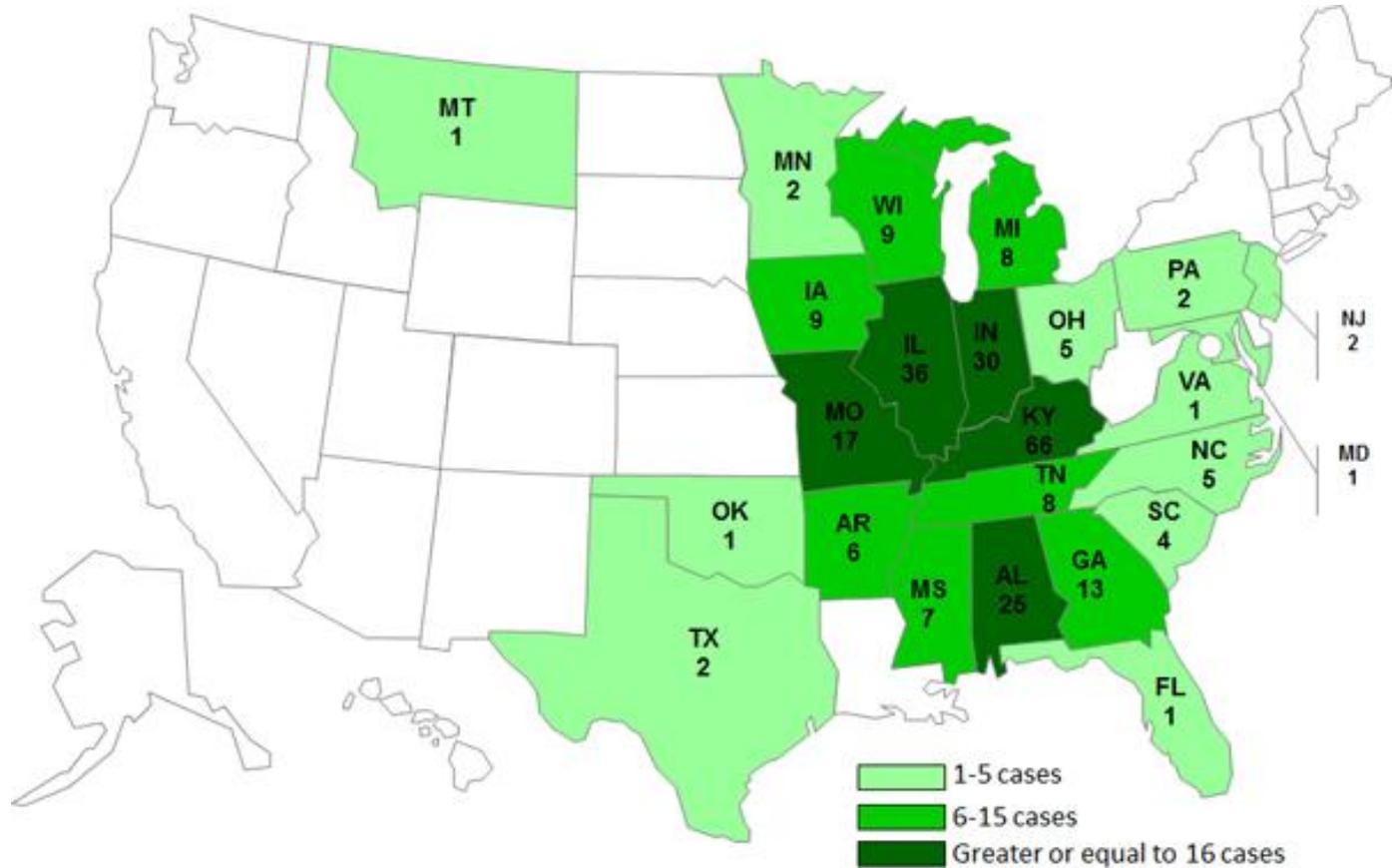
* Includes 2012 confirmed and non-confirmed

Courtesy of TJ Sugg

Summary of Outbreak

- 70 Cases of Salmonellosis Matching the Outbreak Strain
 - Average Age: 48 years
 - 73% Female
 - 75% Hospitalized
- Outbreak Strain Isolated:
 - Store
 - Farm

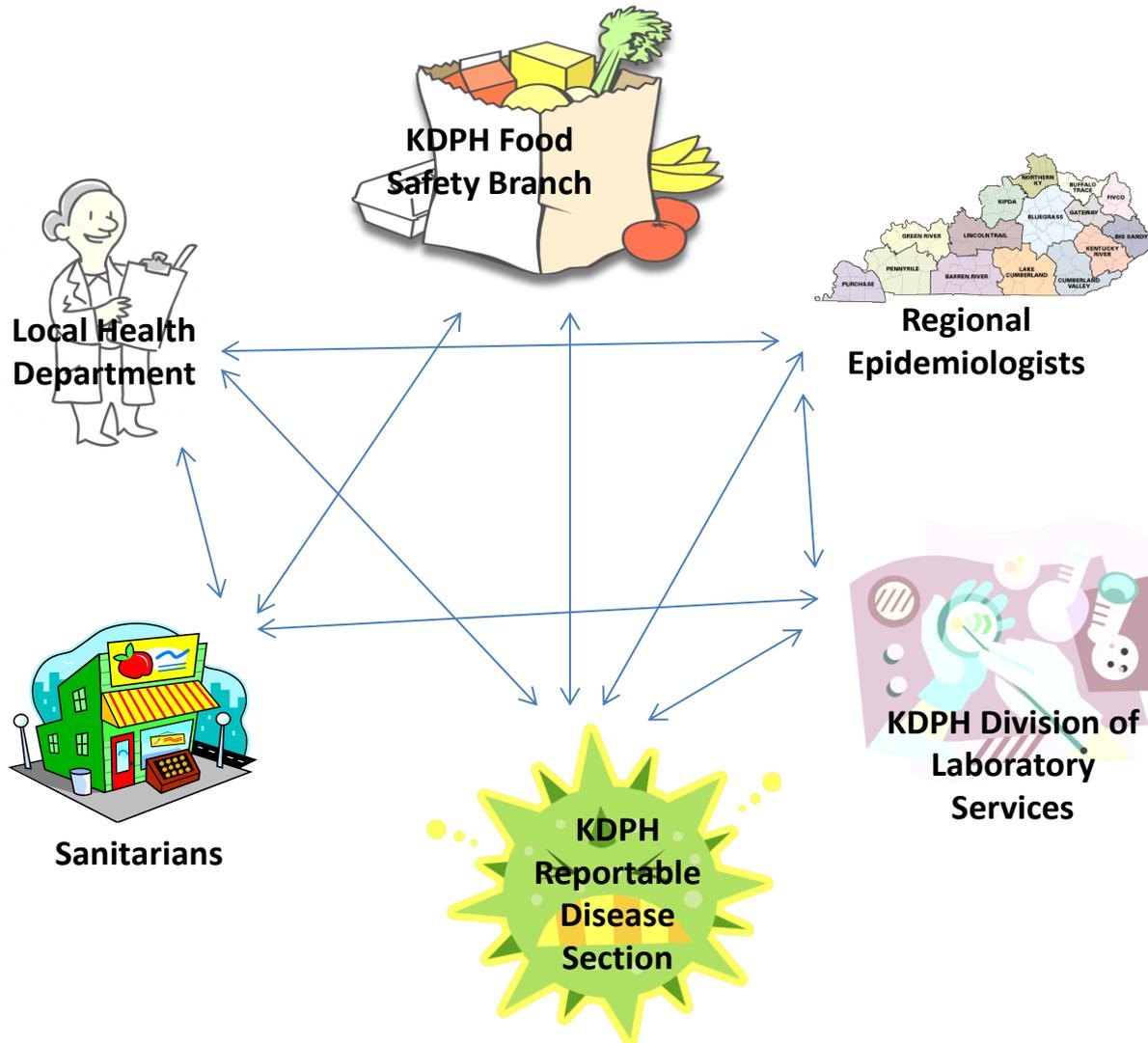
National Case Count



Successes

- Communication and Coordination
 - local, state, and federal partners
 - LHD – RDS – DLS – all informed at every step
- Data collection and documentation by local health departments
 - Invoices critical for traceback

Collaborative Effort



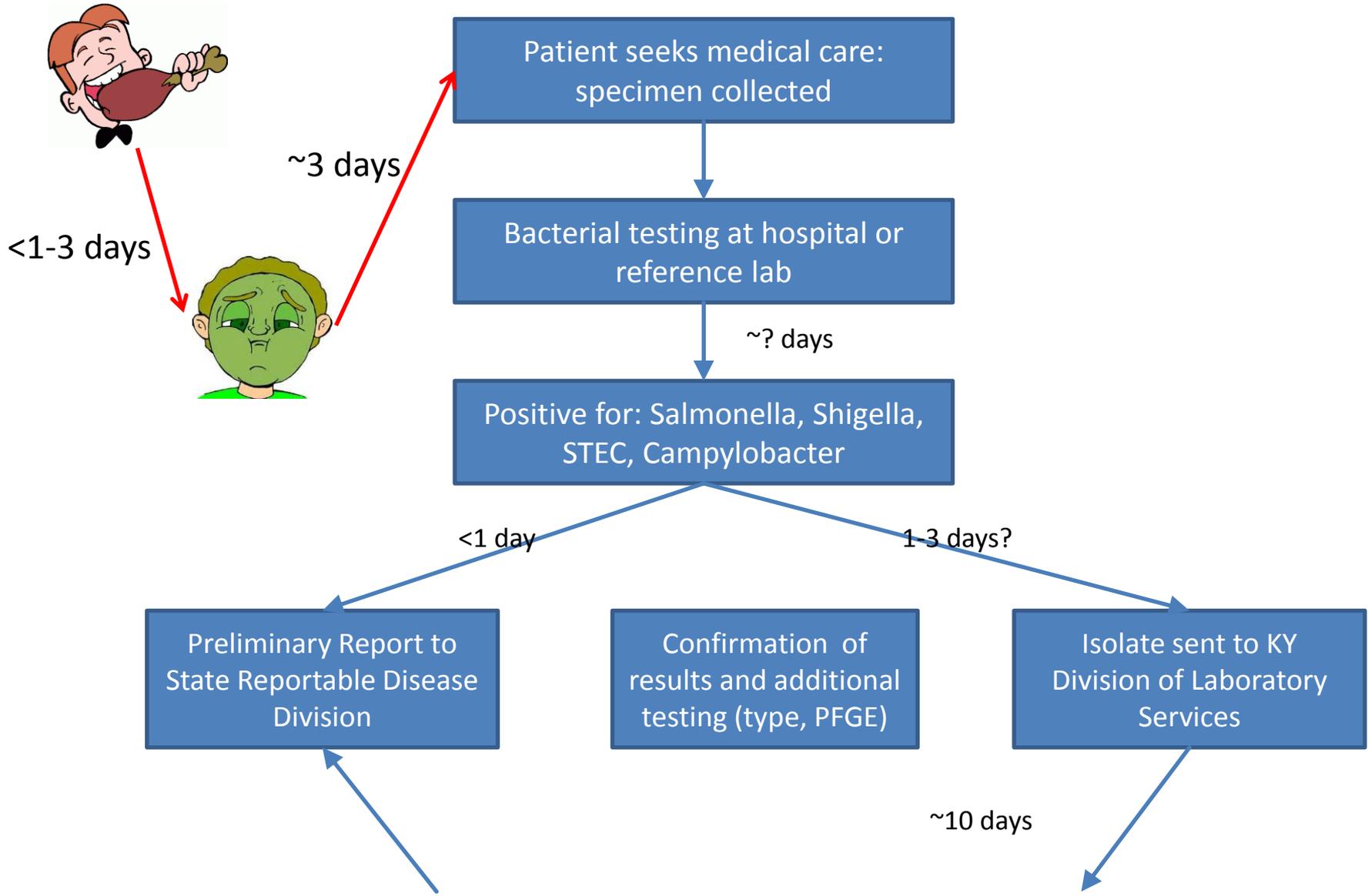
Challenges

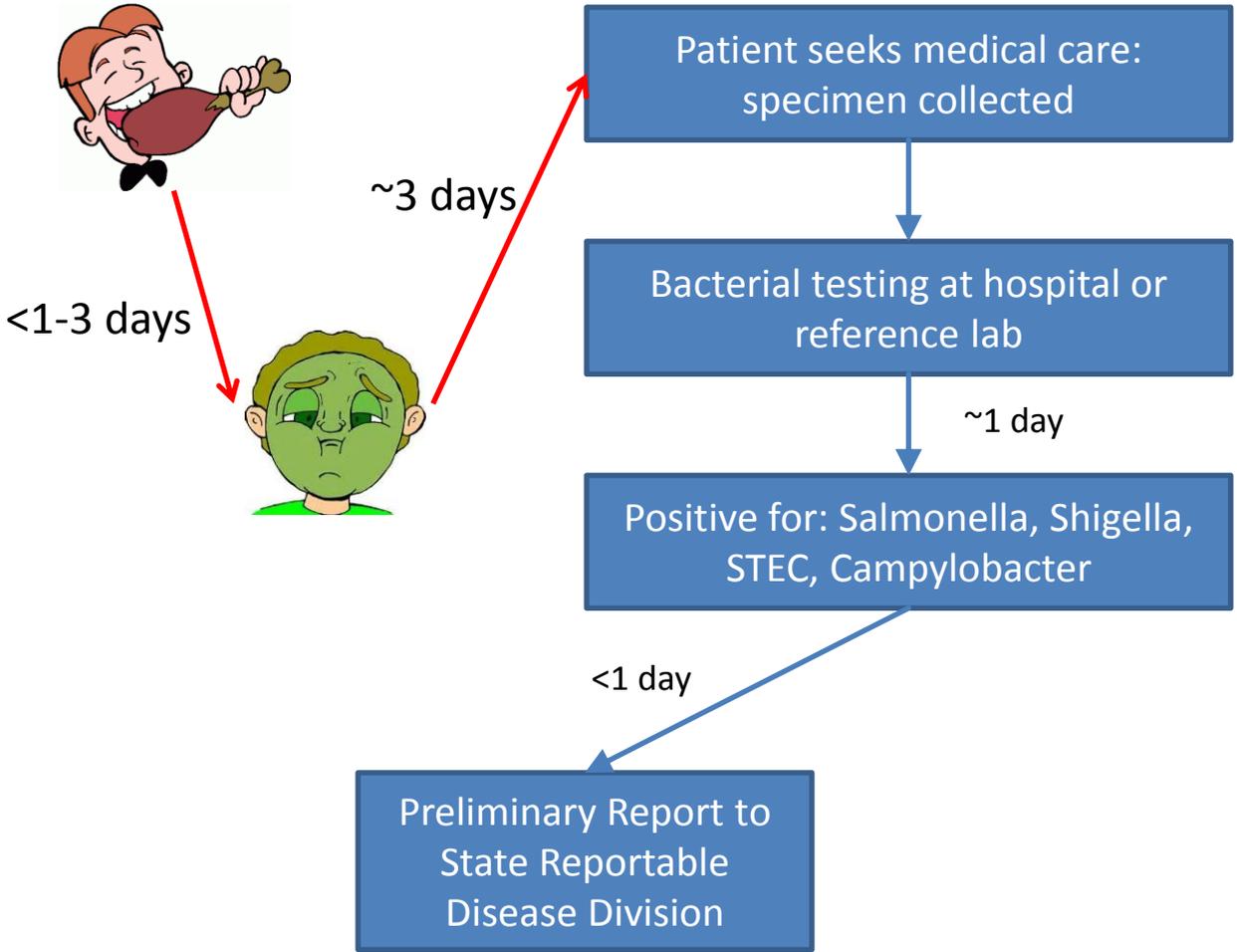
- Data
 - NEDSS does not have all Enteric Disease Questionnaire variable fields
- Cannot speed up laboratory processes
- Information sharing with federal partners
- Incredible complexity of the food supply
 - Even for single product!

Acknowledgements

- Local Health Departments
 - Nurses
 - Sanitarians
 - Epidemiologists
- Kentucky Department for Public Health
 - Reportable Disease Section
 - Division of Laboratory Services
 - Food Safety Branch
 - Preparedness
 - Division of Epidemiology and Health Planning
- Indiana State Department for Health
- Centers for Disease Control and Prevention
- Food and Drug Administration
 - CORE Team

THANK YOU!
QUESTIONS?





Bacterial Suspension



Mix with Agarose

Plug Mold



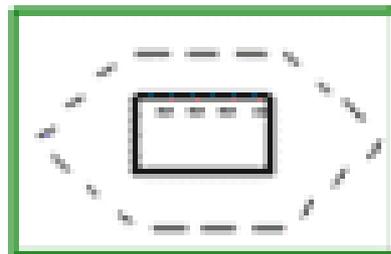
Chemical Lysis and Washing



DNA in Plugs



Restriction Enzyme



Electrophoresis (PFGE)



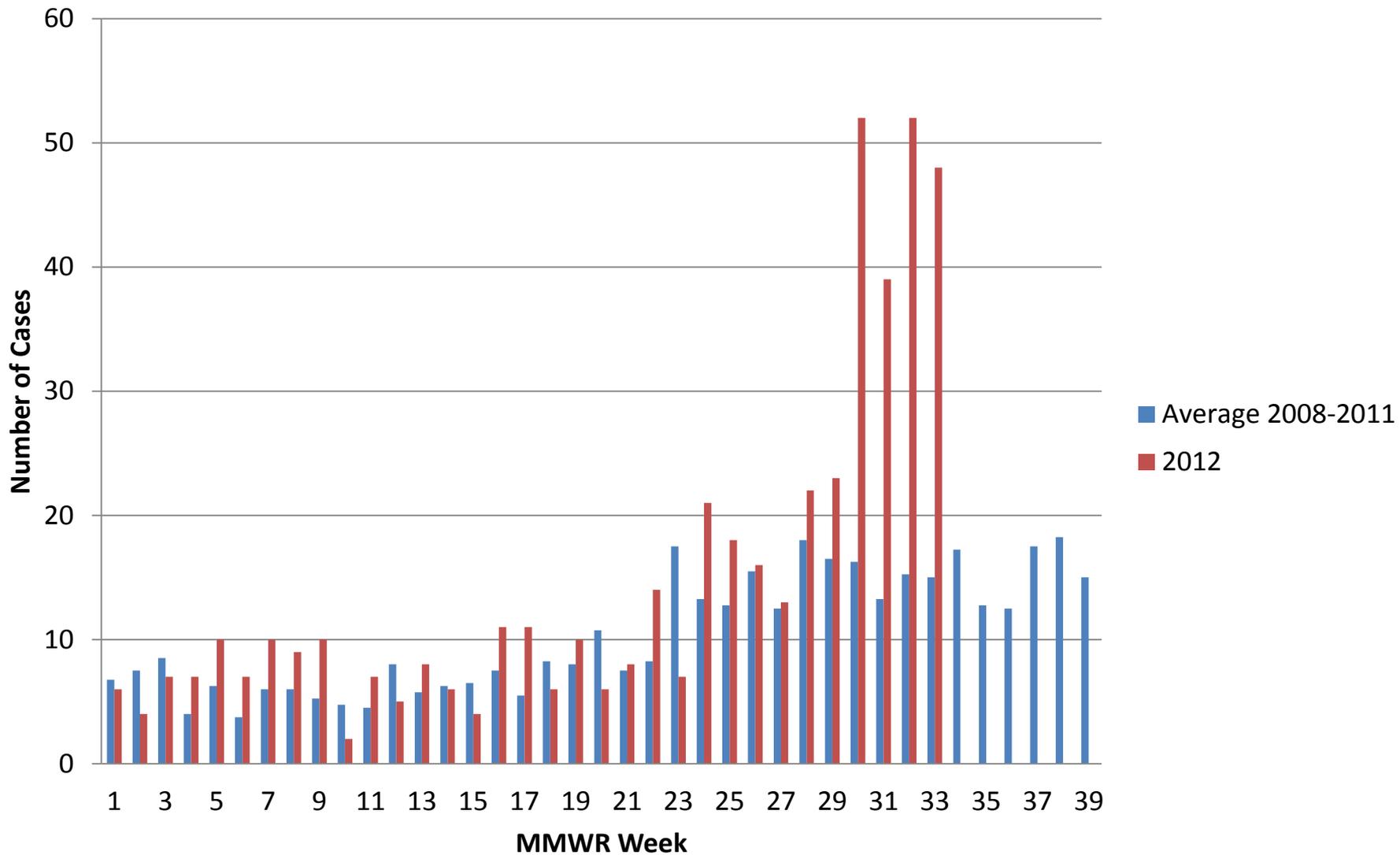
Documentation (capture gel image)



Data Analysis

<http://www.cdc.gov>

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