# Multistate outbreak of *Listeria* infections linked to cantaloupe, United States, 2011
# The deadliest foodborne outbreak in 80 years

Robert Tauxe, MD, MPH
Deputy Director
Division of Foodborne, Waterborne, and Environmental Diseases
National Center for Emerging and Zoonotic Infectious Diseases
Centers for Disease Control and Prevention

November 10, 2011

# *Listeria monocytogenes*

- A invasive bacterial pathogen
- Found in soil and water
- Causes meningitis and abortion in animals
- Rare but serious infections in people at high risk
  - Elderly
  - Pregnant women
  - Immunocompromised
- Grows at low temperatures
- Transmitted to people by food
  - Processed meats
  - Soft cheeses made with raw milk
  - Produce
- **Incubation period 1-6 weeks**

# Surveillance for listeriosis in the United States

- 1982: listeriosis made a notifiable infection

- Active surveillance
  - 1980's: 8/million per year
  - Now: 2.7/million per year*
  - Because of improvements in meat safety

- 800 cases diagnosed each year
- Mortality 15%: ~ 120 deaths per year

- 1996: PulseNet started

- 2 outbreaks/ decade → 2-3 outbreaks/year

*CDC (2011) MMWR 60: 749-755

National Molecular Subtyping Network for Foodborne Disease Surveillance

# PulseNet

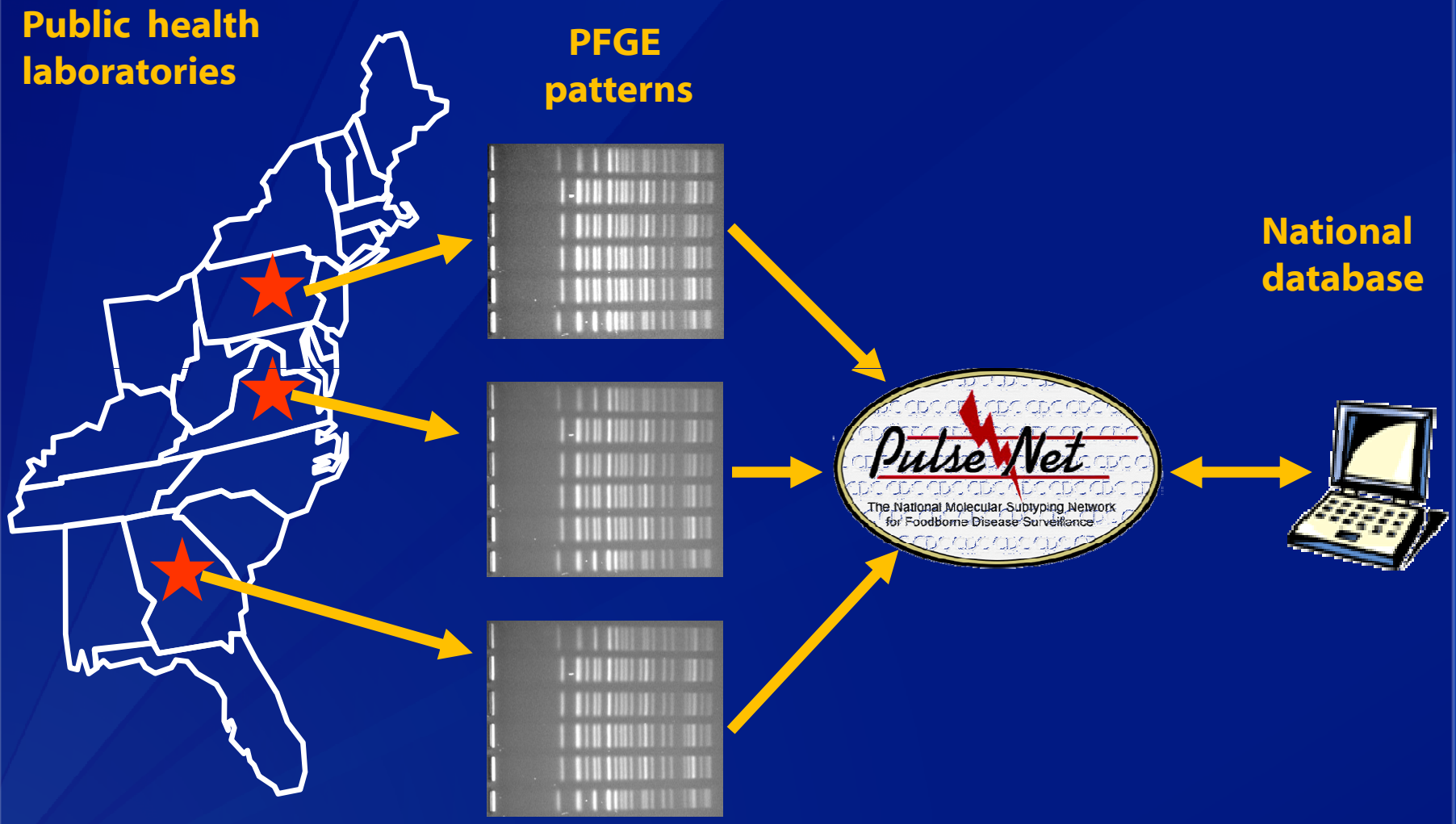

**Connects cases of illness nationwide to identify outbreaks that would otherwise go undetected**

**Developed:** 1996

**Because:** 1993 *E. coli* O157 outbreak (726 cases , 4 deaths) . Many clinical labs began testing for *E. coli* O157. New resources for food safety: began molecular surveillance to detect outbreaks better.

**Now:** National network of public health and food regulatory agency laboratories that perform standardized molecular subtyping ("fingerprinting") of *E. coli* O157, *Salmonella* and *Listeria*

# State public health laboratories contribute to PulseNet



# CDC started *Listeria* Initiative in 2004

- CDC requests that states interview all cases with a standard form that asks about foods
- CDC requests that all *Listeria* isolates are rapidly fingerprinted in PulseNet to monitor for clusters
- When cluster detected, CDC compares food exposures of
  - cases in the cluster with
  - *Listeria* patients with non-matching isolates
  - to generate hypotheses about food source

# *Listeria* infections from cantaloupe, United States, 2011

Information as of November 1, 2011

- **Se**ptember 2: Increase in Listeria infections reported to Colorado State Health department (7 in preceding week, vs 10 per year expected)
- September 6: PulseNet finds most had same PFGE pattern.
- September 9: Standard interviews finds cantaloupes eaten by all cases, Colorado warns their high risk inhabitants to avoid cantaloupe
- September 9: PulseNet finds 3 in neighboring states
- September 10, Inspection of Colorado farm identified by preliminary traceback of "Rocky Ford" cantaloupes. Product sampled, learned cantaloupes went to ≥17 states

# *Listeria* infections from cantaloupe, United States, 2011 (continued)

Information as of November 1, 2011

- **Se**ptember 12: 13 of 13 cases compared with 64% of controls in Listeria Initiative database (with listeria, age > 60, month of August), including 2 cases outside of Colorado. ($p < 0.01$)
- September 12: CDC warns all high risk persons in US not to eat cantaloupe sold as "Rocky Ford" type
- September 14: Full traceback completed. Positive cultures from cantaloupe in stores and on farm. Company recalled all cantaloupes at request of FDA.
- October 19: FDA reports investigation of farm showed
  - Poor sanitation in packing shed
  - Listeria in shed, not in field
  - Uncleanable equipment, designed for potatoes, not cantaloupe

# Cantaloupe association quickly found using data from the *Listeria* Initiative questionnaires

| Date when data on cases available | Ate Cantaloupe | Ate Ham |
|---|---|---|
| | 54 (64%) of 85 controls | 360 (47%) of 774 controls |
| Sept 9 | **All 11 cases**<br>**Odds ratio 8.5**<br>P=0.02 | **7 (64%) of 11 cases**<br>**Odds ratio 2.0**<br>P=0.41 |
| Sept 12 | **All 13 cases**<br>**Odds Ratio 10.1**<br>P=0.01 | **9 (69%) of 13 cases**<br>**Odds ratio 2.6**<br>P=0.18 |
| Sept 14 | **All 19 cases**<br>**Odds ratio 14.9**<br>P=0.001 | **10 (56%) of 18 cases**<br>**Odds ratio 1.4**<br>P=0.60 |

In controls, cantaloupe exposures limited to those with isolation dates in August. Controls are non-pregnancy associated sporadic cases among persons 60 years or greater.

# *Listeria* infections from cantaloupe, United States, 2011 (continued)

Information as of November 1, 2011

- Within 1 week of detection: Product implicated, local high risk population warned
- Within 10 days of detection: National risk identified, national warning issued
- Within 12 days of detection: Specific product recalled

- That was just the beginning (long incubation period):
- Ongoing surveillance: 4 different PFGE patterns both in patients and in cantaloupes

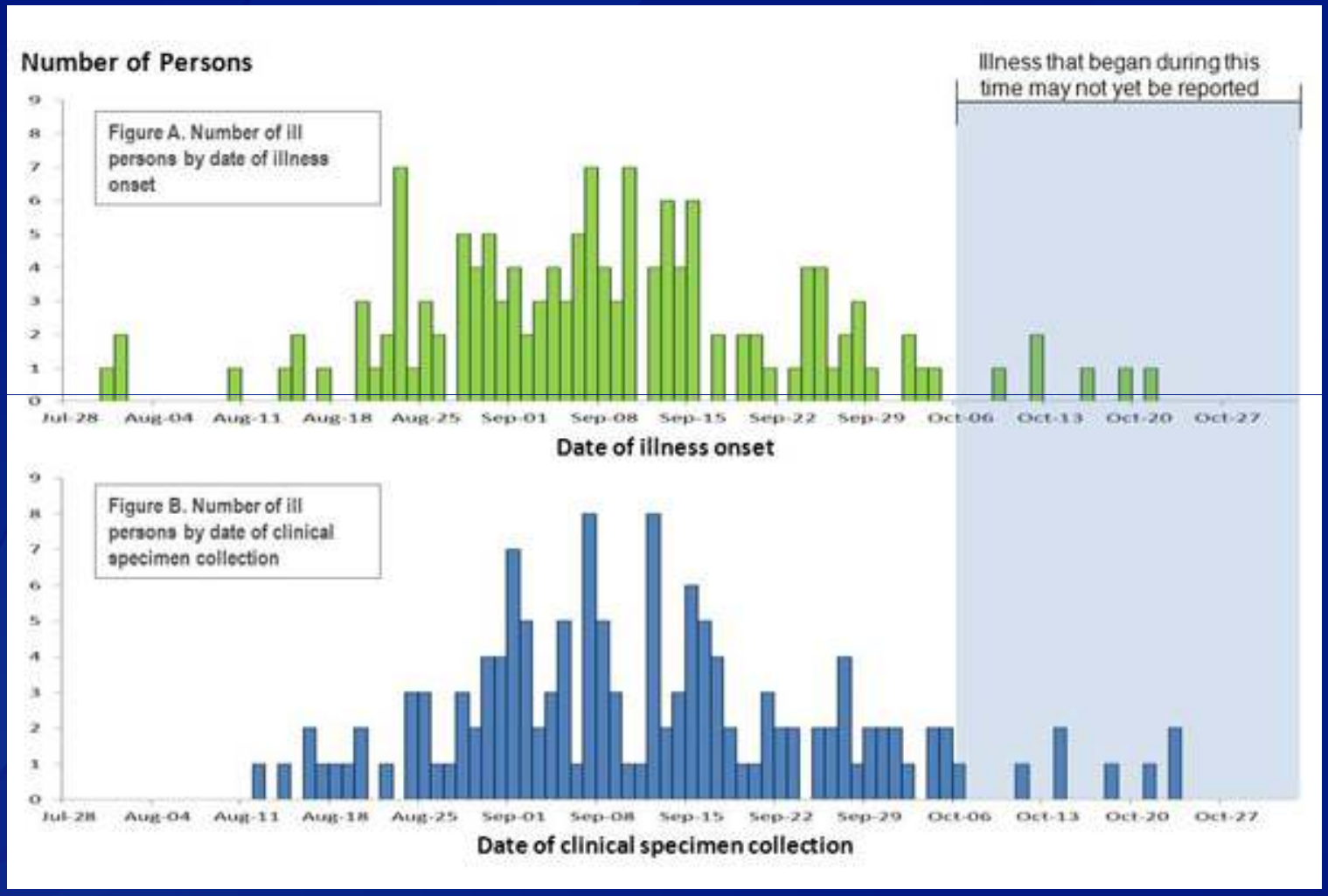
- Still getting reports of cases

# *Listeria* infections from cantaloupe, United States, 2011 (continued)

Information as of November 1, 2011

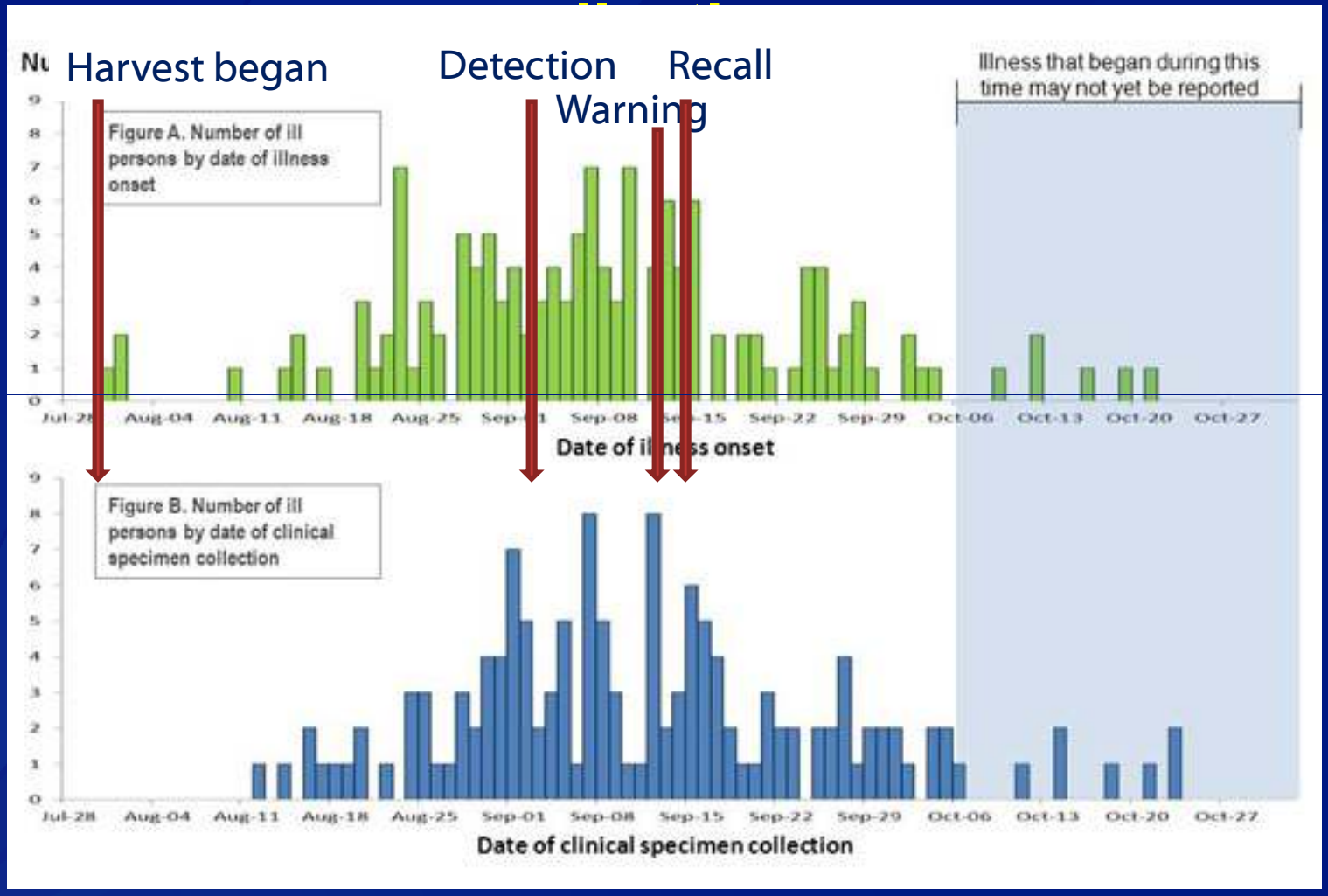
- 139 cases reported from 28 states
- 29 deaths and 1 miscarriage (CFR = 21%)
- 56% female
- Mean age 77 years (range <1 – 96)
- 99% hospitalized
- 5 pregnancy-related, 1 miscarriage
- Largest Listeria outbreak 1985, California, queso fresco with 142 cases, 28 deaths and 20 miscarriages
- More deaths than any foodborne outbreak since 1924: Typhoid fever, raw oysters, ~1500 cases and ~150 deaths

# Persons infected with an outbreak strain of *Listeria*, by date of onset, and date of specimen collection



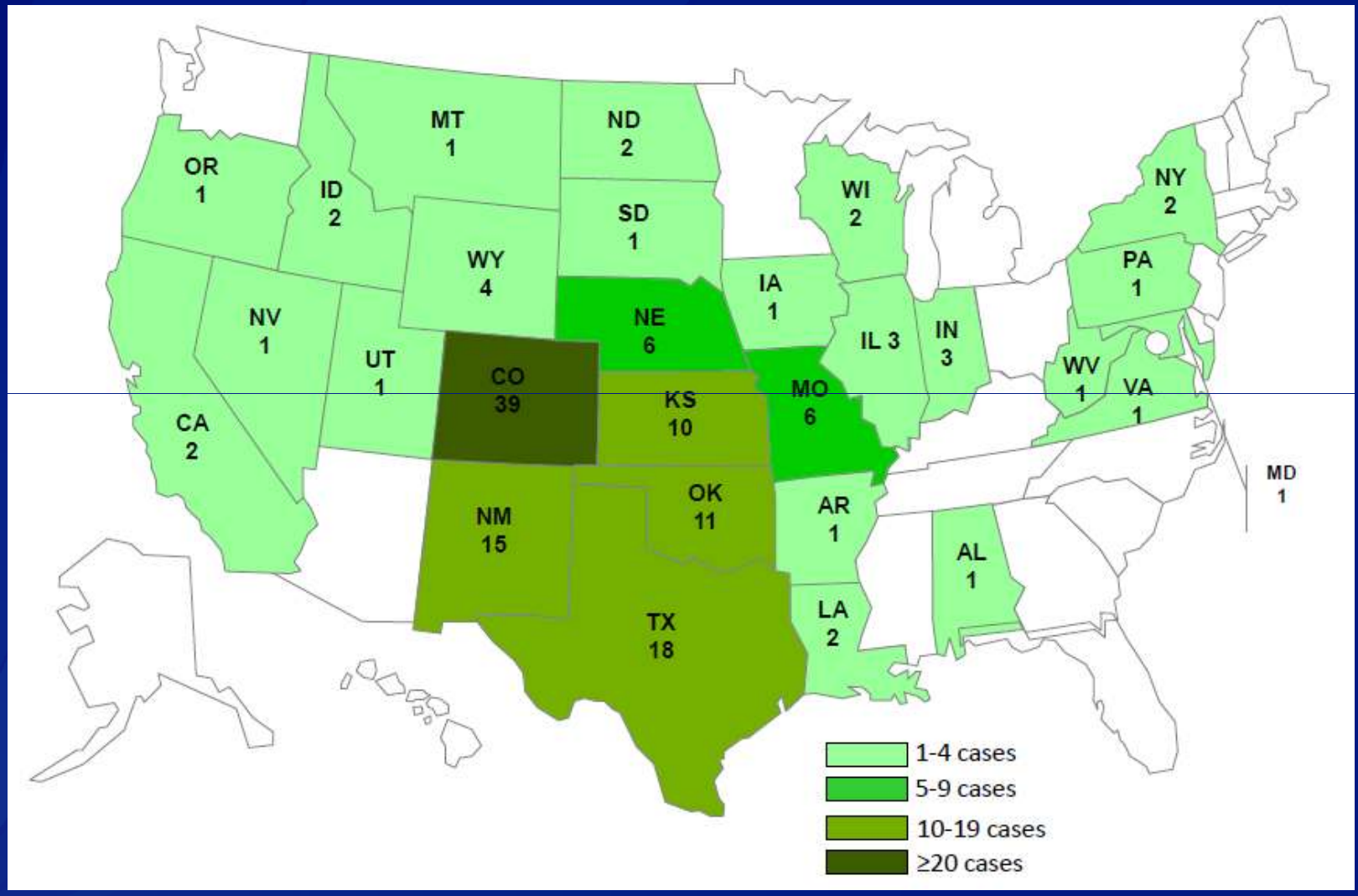

* n= 139 for whom information was reported to CDC by 11am EDT on November 2, 2011

# Persons infected with an outbreak strain of *Listeria*, by date of onset, and date of specimen collection




* n= 139 for whom information was reported to CDC by 11am EDT on November 2, 2011

# Locations of *Listeria* cases related to cantaloupe from Jensen Farms




* n= 139 for whom information was reported to CDC by 11am EDT on November 2, 2011

# *Listeria monocytogenes* infections and cantaloupes Prevention lessons learned

- One processing facility contaminated a fresh produce item that was nationally distributed
- First time a whole produce item implicated as source of listeriosis in the US.
- Rapid action stopped the outbreak and saved lives
  - Harvest and distribution halted early
  - Prevented 50-100 cases and 10-20 deaths
- Irregular processing equipment not in common use for cantaloupes
- Third party auditor failed to identify the problem
- Produce industry largely unregulated in the US

# *Listeria monocytogenes* infections and cantaloupes Process lessons learned

- A highly dispersed outbreak
  - Cases outside of Colorado only found because of PulseNet

- Investigation fast and successful because
  - Standardized rapid interviews (onset to interview: mean 5 days)
  - Rapid PFGE determination of Listeria (onset to posting : mean 10 days)
  - Case–case comparison worked ("cantaloupe" on questionnaire)
  - Rapid presumptive traceback was part of investigation

- Challenges and unanswered questions
  - No focal clusters
  - "Long-tailed" outbreak – infection with long incubation period
  - Worried well: many exposed
  - Why so few pregnancy-associated cases?
  - How did *Listeria* get inside the cantaloupes?

# *Listeria monocytogenes* infections and cantaloupes
# Questions for other countries

- Does your clinical system diagnose listeriosis from blood or CSF culture?
- Is listeriosis a notifiable infection?
- How big is the problem of listeria associated miscarriage, still births?
  (If pregnant women drink raw milk, or eat soft raw milk cheese, you have it)
- Will your current surveillance detect a dispersed outbreak like this one?
- Would the case-case methodology work for you?

# Foodborne outbreak investigations

- Can prevent illness and save lives
- Are critical to improving long term prevention
- Depend on systematic approaches, as well as creativity, and innovation
- Can lead to surprising answers
- Are a team sport, requiring many groups to work together
- Are excellent preparation for unexpected epidemic management

Centers for Disease Control and Prevention

MMWR

Morbidity and Mortality Weekly Report

Early Release / Vol. 60

September 30, 2011

# Multistate Outbreak of Listeriosis Associated with Jensen Farms Cantaloupe — United States, August–September 2011

Listeriosis is caused by *Listeria monocytogenes*, a gr
acillus common in the environment and acquired
rimarily through consumption of contaminated foo
auses a spectrum of illness, ranging from febrile gas
o invasive disease, including sepsis and meningoe
nvasive listeriosis occurs predominantly in older
ersons with impaired immune systems. Listeriosis
omen is typically a mild "flu-like" illness, but c

CDC Home

Centers for Disease Control and Prevention

CDC 24/7: Saving Lives. Protecting People. Saving Money through Prevention.

A-Z Index A B C D E F G H I J K L M N O P Q R S T U V W X Y Z #

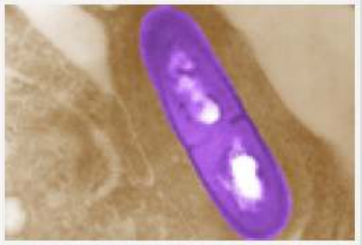
## Listeriosis (*Listeria* infection)

Listeriosis, a serious infection usually caused by eating food contaminated with the bacterium *Listeria monocytogenes*, is an important public health problem in the United States. The disease primarily affects older adults, pregnant women, newborns, and adults with weakened immune systems. However, rarely, persons without these risk factors can also be affected. The risk may be reduced by recommendations for safe food preparation, consumption, and storage.


### Multistate Outbreak of Listeriosis, September 2011

The Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) are investigating a multistate outbreak of listeriosis in coordination with state and local health departments, including the Colorado Department of Public Health and Environment. The outbreak started in the late summer; Collaborative investigations by local, state, and federal public health and regulatory agencies indicate the source of the outbreak is whole cantaloupe grown at Jensen Farms' production fields in Granada, Colorado...

Latest update »



*Listeria monocytogenes*

www.cdc.gov/listeria

# Thank you

*The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention*