



Source Investigations

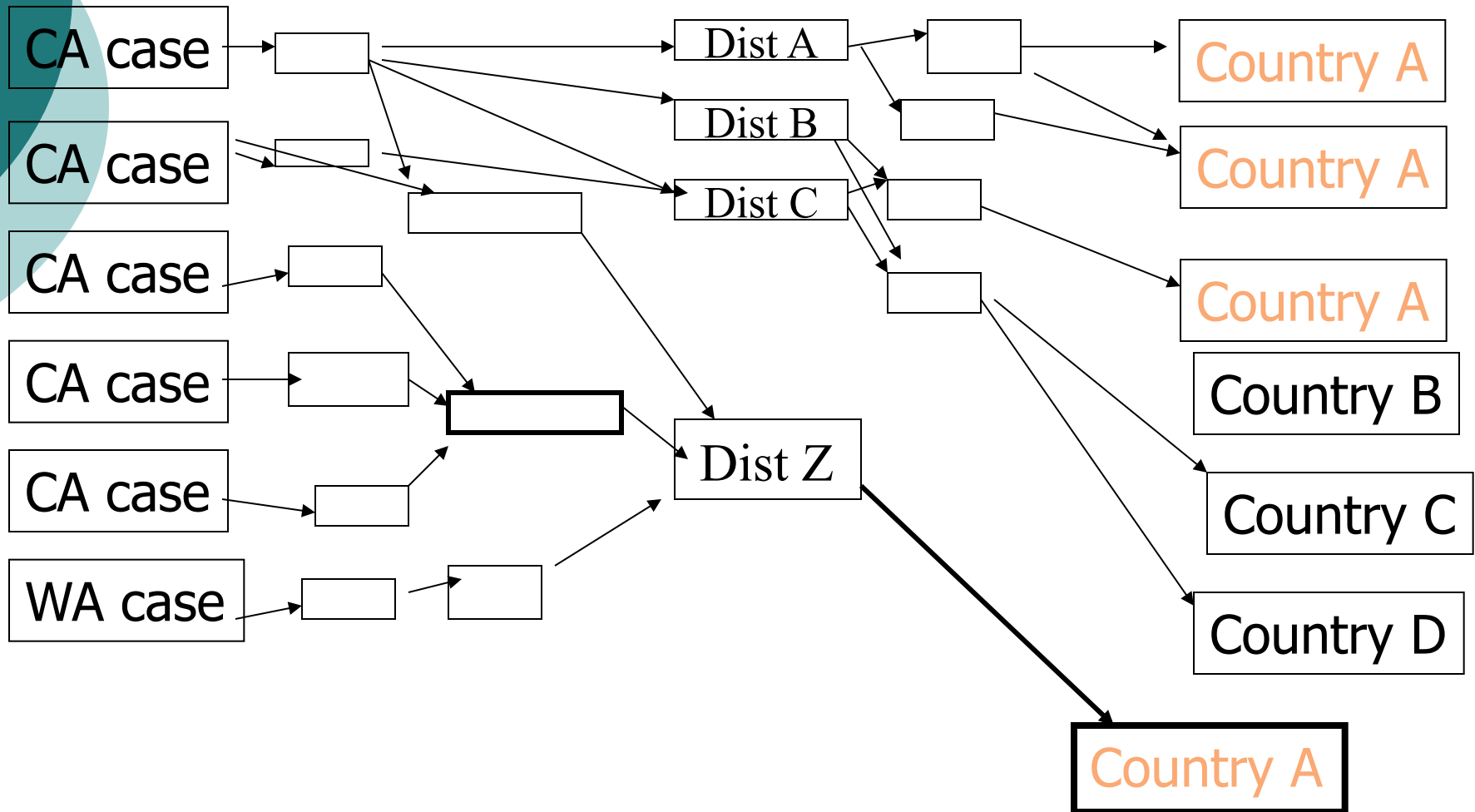
The Follow-Up to Tracebacks
from Foodborne Outbreaks



Anatomy of an Outbreak Investigation

- Surveillance
- Epidemiological investigation
- Laboratory analysis
- Environmental investigation
- Response/recall
- Traceback/traceforward
- **Source investigations**

Traceback Diagram





Lessons Learned From Past Investigations

- Challenges associated with tracebacks:
 - Poor and incomplete record keeping
 - Slow response in providing records
 - Multiple sources of the same product at the same time at various steps in the system
 - Records from one point in the supply chain do not always agree with records from adjacent points
 - Processors cannot match finished product with incoming raw ingredients
 - Tracebacks often require huge amounts of resources



From Traceback Investigation to Source Investigation

- Ideally...
 - traceback data analysis will converge to a common supplier, source, farm, etc. where the initial contamination may have occurred



Source Investigations

- Purpose of Source Investigation:
 - *Note:* Not your typical inspection
 - Sources of Microbial Contamination
- Lessons Learned:
 - Team approach is critical
 - Multi-disciplinary
 - Multi-organizational
 - Planning and Coordination is key



Source Investigations Highlights

- Produce farm layout
- Water sources
- Animal management
 - Manure use and management
- Harvest tools and equipment
 - Pesticide application equipment



Source Investigations Highlights

- Processing & packing facilities
 - Transportation of product
- Worker health and hygiene
 - Sewage management
- Environmental and product sampling



Source Investigation: Farm Layout

- Possible sources of contamination
- Geography (eg. land gradient), wind blown sources
- Weather, flooding, drought

Examples of Farm Layout





Source Investigation: Water Source, Distribution & Storage

- Water sources
 - Wells protected from contamination, tested
 - Surface sources protected from contamination
 - Irrigation water sources
- Water distribution and storage
 - Holding ponds
 - Storage tanks

Examples of Water Source and Distribution





Source Investigation : Animal and Manure Management

- Evidence of animal activity near or around fields
 - Domestic or wild animals in fields
 - Grazing in harvested fields
- Fences or barriers
- Manure use and management
 - Run-off from manure storage and treatment areas
 - Manure source, treatment, storage on-site, and timing of applications

Animal Management





Source Investigations : Field Sanitation

- Harvest tools and equipment
- Field Equipment, Sanitation,
and Transportation
- Processing, packing equipment
 - construction, cleaning, sanitizing

Field Sanitation





Source Investigation: Worker Health & Hygiene and Sewage Management

- Community disease surveillance
- Worker health and hygienic practices
- Firm's training program for worker health and hygiene
- Waste/sewage disposal for both the field and packing facility



Source Investigation: Product and Environment Testing

- Environmental sampling
 - Water sources, soil, drainage ditches
 - Animal feces or swab of animal
- Product sampling
 - Same or similar products



Lessons Learned From Past Investigations

- Environmental vs. Regulatory Investigation
 - Standardized protocols and forms
 - Investigation VS Inspection
 - Multi-disciplinary, coordination among multiple organizations
 - Rapid Response Teams



How are Source Investigation Findings Utilized?

- Regulatory actions
 - Import alerts
- Stimulating action by stakeholders
- Stimulate Research
 - Prevention approaches by FDA, academia, and others
- Outreach – states, consumers, and industry

Source Investigation findings lead to changing practices to minimize potential for contamination!



What FDA Recognizes

- Respect for cultural differences
- Gathering and analyzing scientific data is an ongoing process
- Different regulations
- Continuous dialogue is critical



Conclusions

- Source Investigations used to determine how the pathogen may have contaminated the crop and/or how the contamination may have been spread
- Frequently find multiple means by which contamination may have occurred
 - Seldom find “smoking pig or pepper”
- Coordination and Team Approach is essential



Questions?