

Salmonella and Tomatoes



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1996-2005 Produce Outbreaks by Commodity

Tomatoes	10	Green onions	3
Lettuce	10	Mango	2
Romaine lettuce	4	Almonds	2
Mixed lettuce	2	Parsley	2
Cabbage	1	Basil	4
Spinach	1	Green grapes	1
Cantaloupe	7	Snow Peas	1
Melons	1	Basil or Mesclun	2
Honeydew melon	2	Squash	1
Raspberries	5	Unknown	2

1998-2005 Fresh Cut Produce Outbreaks

■ Romaine lettuce	2
■ Lettuce	4
■ Mixed lettuce	1
■ Spinach	1
■ Roma Tomatoes	2
■ Tomatoes	1
■ Mixed melons	1

Outbreak Reservoirs

Zoonotic

- 7 *E. coli* O157:H7
- 17 *Salmonella* sp.

Human

- 12 *Cyclospora*
- 3 Hepatitis A
- 2 *Shigella*

Source

- 17 Domestic
- 4 Foreign
- 6 Unknown
- 24 Total

- 1 Domestic
- 10 Foreign
- 6 Unknown
- 17 Total



History of Tomato Outbreaks

- 1998 *S. Baildon* 86 cases
- 2000 *S. Thompson* 29 cases
- 2002 *S. Newport* 512 cases
- S. Newport* 12 cases
- S. Javiana* 90 cases
- 2004 *S. Javiana* 471 cases
- S. Braenderup* 123 cases
- 2005 *S. Newport* 71 cases
- S. Braenderup* 73 cases



Case Study

Salmonella Newport in Tomatoes

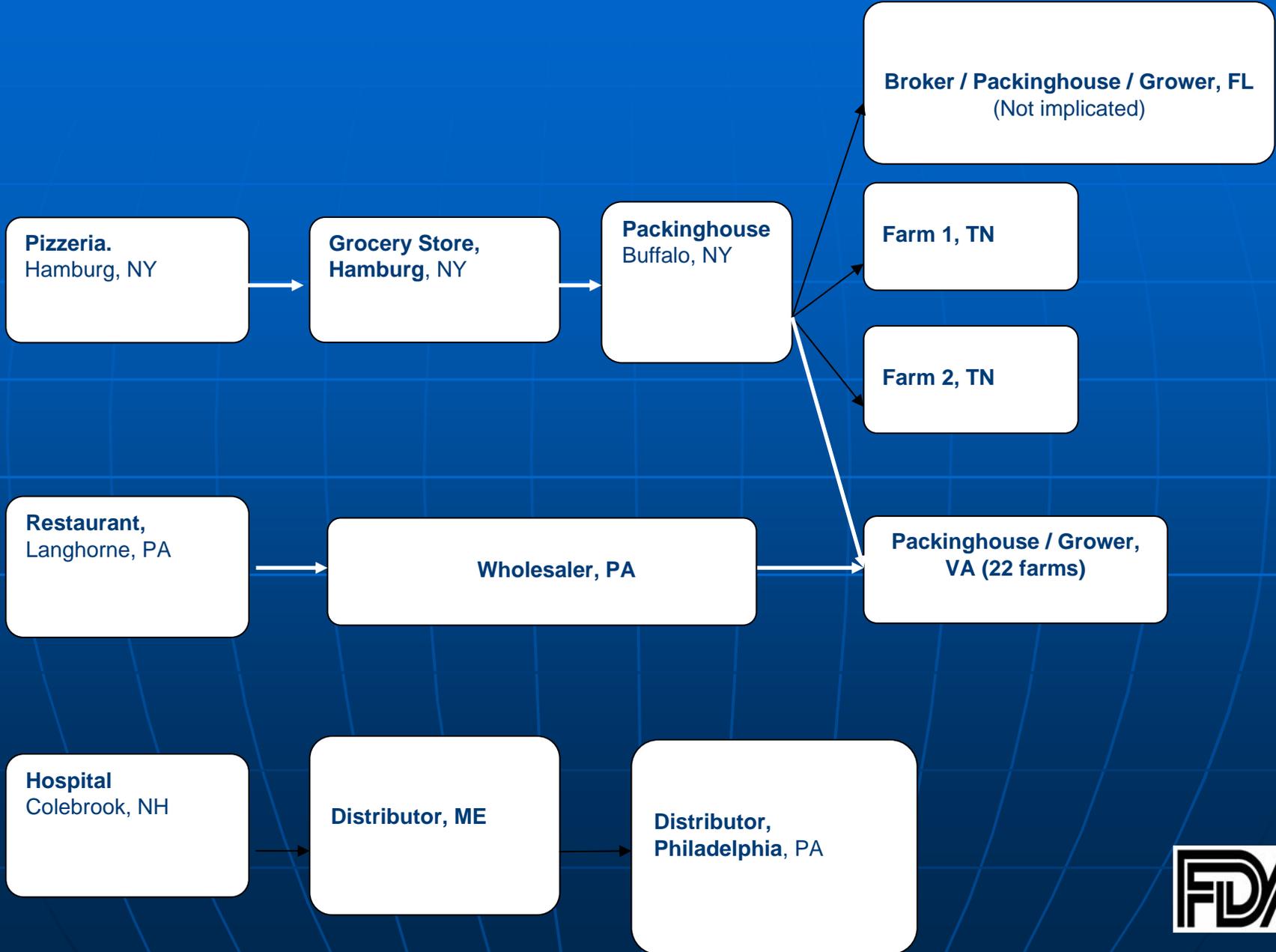


Descriptive Epidemiology

- *Salmonella* Newport
- Recovered 7/2/02 – 10/30/02
- 512 cases reported
- 285 culture confirmed cases; matching PFGE
- 22 states
- Tomatoes implicated in multiple case-control studies



Salmonella Newport – Traceback Investigation Flow Diagram – Tomatoes (Aug-Oct 2002)



Sources of Contamination

■ Field Environment

- Irrigation water
- Water applied to foliage
- Animal and bird habitat / reservoirs / interaction

■ Packinghouse

- Dump tank

■ Fresh-Cut Processor

- Ripening rooms
- Ice baths



Field Environment



Where does water contact the fruit? What is the quality of the water?



Typical Ag Well Set-up



Filters (to prevent clogging of the drip tape)



Turbine pump

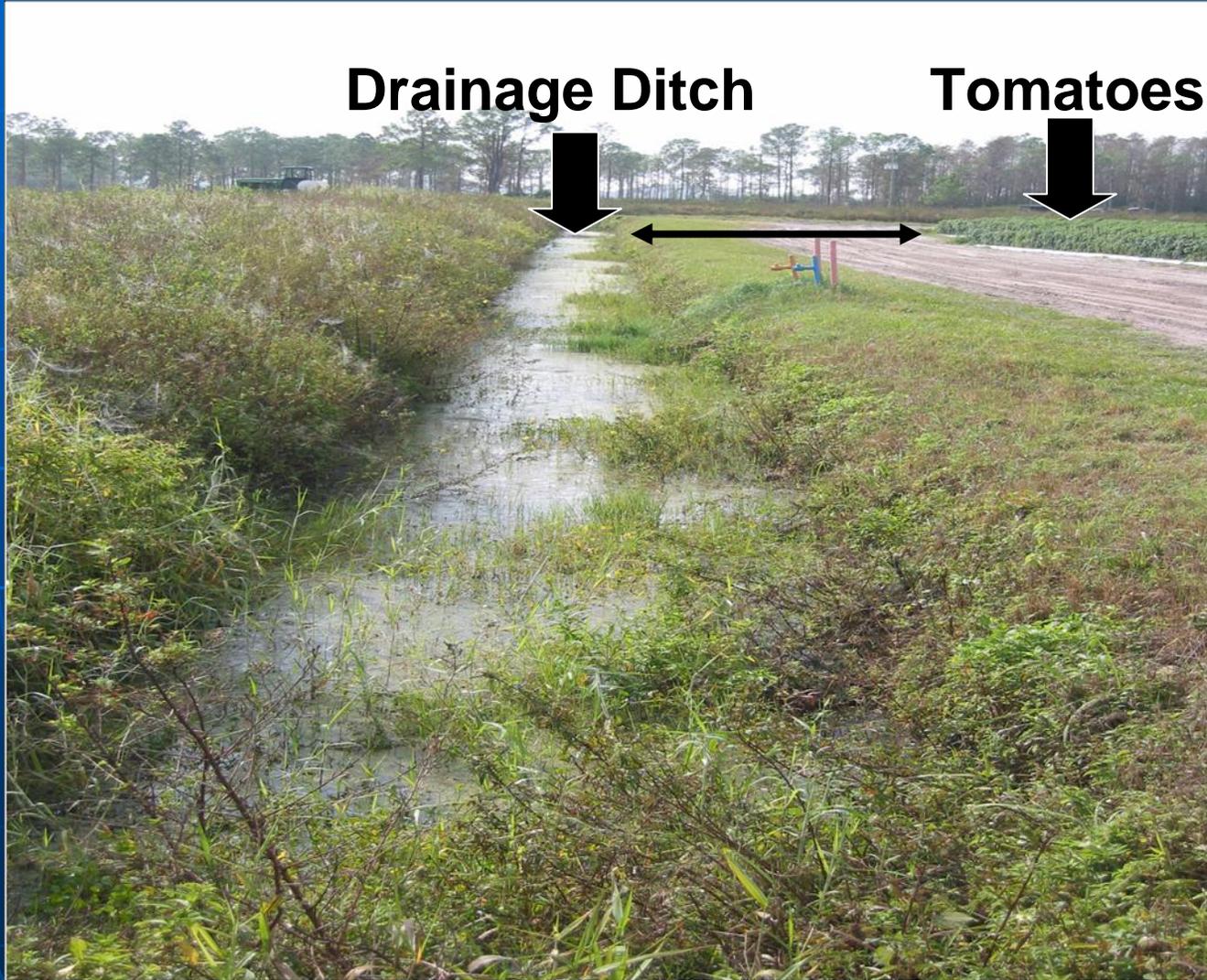


Liquid fertilizer

Potential Sources of Contamination



Proximity to the Environment



Which one do you think was positive for *Salmonella*?



Sprayer Filling Stations



Attractants During Drought



Historical Use Of the Land



The Human Factor







Environmental Sampling













Environmental sample	Salmonella serotype isolated
Anuran	S. Mississippi
Anuran	S. Aqua
Anuran	S. Saintpaul
Anuran	S. Gaminara
Lizard	S. Newport
Feces	S. Gaminara
Feces	S. Manhattan
Ditch water	S. Manhattan
Ditch water	S. Newport
Ditch water	S. Hartford
Ditch water	S. Braenderup (Different PFGE)
Ditch water	S. Java
Ditch water	S. Florida
Ditch water	S. Miami
Ditch water	S. Anatum (Different PFGE)
Ditch water	S. Tallahassee
Ditch water	S. Group D untyped (Different PFGE)
Sand filter media	S. Iverness



Packinghouse



Packinghouse



Unloading at the Packinghouse

Hot (100°F) Flume Water



Tomatoes exit here



Fluming into the Dump Tank



Re-Washing After 2-3 Days of Ripening in the Gas Room



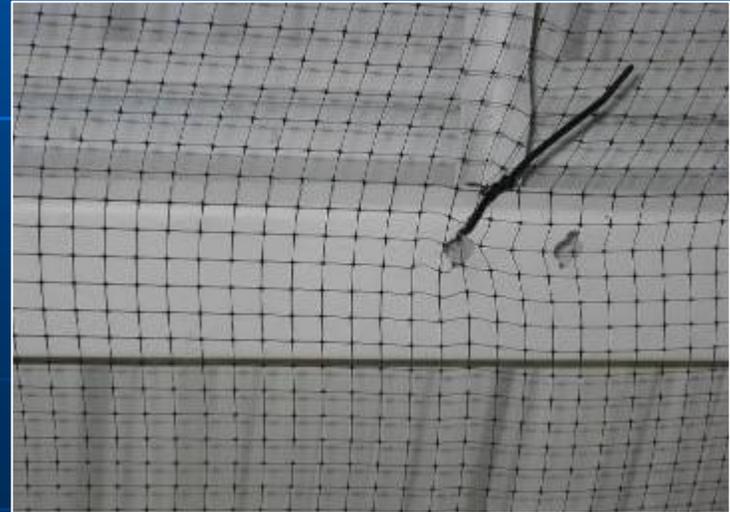
Heavy Organic Load in the Dump Tank



Drained Dump Tank



Birds



Fresh-Cut Processor



Ripening Room (50-60°F)



Chill to Improve Slicing (33-35°F)



Our Business Objective.....

2004 FDA Produce Safety Action Plan

Minimize the incidence of foodborne illness associated with consumption of fresh produce

- **Prevent contamination**
- **Minimize public health impact when contamination occurs**
- **Improve communication with industry and consumers**
- **Research**



Recent FDA Activities...

- Letter to the Tomato and Lettuce Industry – Feb 2004
- Produce Safety Action Plan – Oct 2004
- Produce Sampling Assignments – 2005-06
- Draft Guide to Minimize Microbial Food Safety Hazards of Fresh-cut Fruits and Vegetables - Mar 2006 (complements the FDA's Current Good Manufacturing Practice regulations)
- Commodity Specific Guidance by Industry – (The melon guide and the lettuce guide are completed and the tomato guide is in draft)
- Educational Outreach - Partnership for Food Safety - 2005
- FDA Farm Investigation Course – June 2006

