

# **Produce Related Foodborne Infections: Review of the Centers for Disease Control Foodborne Outbreak Surveillance**

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# Public health burden of foodborne disease

- Each year an estimated 76 million cases (1999 estimate)
  - 1 in four Americans gets a foodborne illness each year
  - 1 in 1000 Americans is hospitalized each year
  - \$6.5 billion in medical and other costs
  
- Prevention depends on efforts from farm to table to reduce contamination of food
  
- Increasingly recognize a problem in fresh produce

## Recent outbreaks associated with produce

- September, 2006 *E. coli* O157:H7 infections in multiple states due to fresh bagged spinach
- November, 2006 *Salmonella* Typhimurium infections associated with tomatoes served in restaurants
- December, 2006 *E. coli* O157:H7 infections due to shredded iceberg lettuce served at fast food restaurants

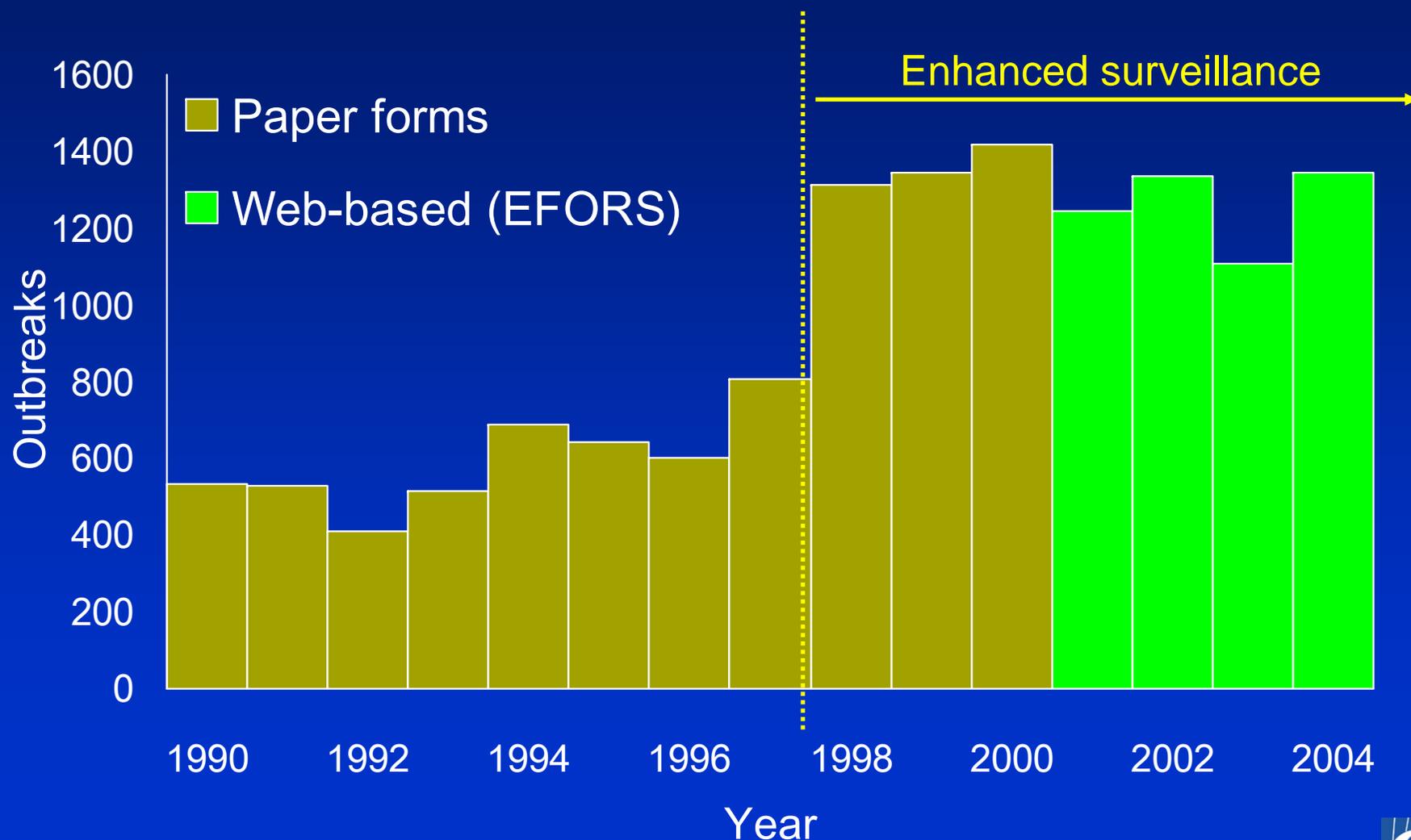
# Foodborne pathogens and their reservoirs

- Infection with a variety of different pathogens
- Each pathogen has a characteristic reservoir
  - Some have a human reservoir: *Shigella*, hepatitis A, Norwalk virus
  - Some have an animal reservoir: *Salmonella*, *Campylobacter*, *E. coli* O157:H7, *Listeria*, *Vibrio*, *Yersinia*, *Toxoplasma*
- Transmitted by several different pathways
  - Foods, water, contact with animals, contact with humans

# Foodborne outbreak surveillance

- Most outbreaks detected, investigated and controlled by local and state health departments
- CDC collects reports of outbreaks investigated
  - Reporting is voluntary and incomplete
  - Definition of an outbreak:
    - 2 or more cases of a similar illness resulting from the ingestion of a common food
  - Data collected: No of cases, implicated food, etiology
  - Received reports of 400-600/year before 1998

# Foodborne-disease outbreaks reported to CDC, 1990 - 2004<sup>1</sup>



<sup>1</sup> By states to the Foodborne Disease Outbreak Surveillance System

# Foodborne outbreaks related to fresh produce, 1973-1997\*

- Fresh produce defined as: uncooked produce items, or “salad” without eggs, cheeses, seafood or meat
- 1973-1997
  - 190 foodborne outbreak linked to fresh produce
  - 16,058 illnesses
  - 598 hospitalizations
  - 8 deaths
- 3.2 % of all outbreaks of determined source
- 6.2 % of those outbreak-associated cases



# Foodborne outbreaks related to fresh produce, 1973-1997: Trends in burden

	1970's	1990's
Number of outbreaks/yr	2	16
Median cases/outbreak	21	43
% of OB of known vehicle	0.7%	6%
% of outbreak associated cases	0.6%	12%

# Foodborne outbreaks related to fresh produce, 1973-1997: Food vehicles implicated in 190 outbreaks

➤ **Generic or multiple:** 105 outbreaks

➤ **One specific vehicle:** 85 outbreaks

➤ <b>Lettuce</b>	<b>25</b>
➤ <b>Melon</b>	<b>13</b>
➤ <b>Seed sprouts</b>	<b>11</b>
➤ <b>Apple or orange juice</b>	<b>11</b>
➤ <b>Berry</b>	<b>9</b>
➤ <b>Tomato</b>	<b>3</b>
➤ <b>Green onion</b>	<b>3</b>
➤ <b>Carrot</b>	<b>2</b>
➤ <b>Other</b>	<b>8</b>

**88% of outbreaks  
with one specific  
vehicle**

# Foodborne outbreaks related to fresh produce, 1973-1997: Etiologies identified in 103 (54%) of 190 outbreaks

## ➤ Bacterial 62:

- *Salmonella* 30
- *E. coli* O157 13
- *Shigella* 10
- *Campylobacter* 4
- Other 5

Pathogens with animal reservoir  
= 48 outbreaks

Pathogens with human reservoir  
= 34 outbreaks

## ➤ Viral 21

- Hepatitis A 12
- Norovirus 9

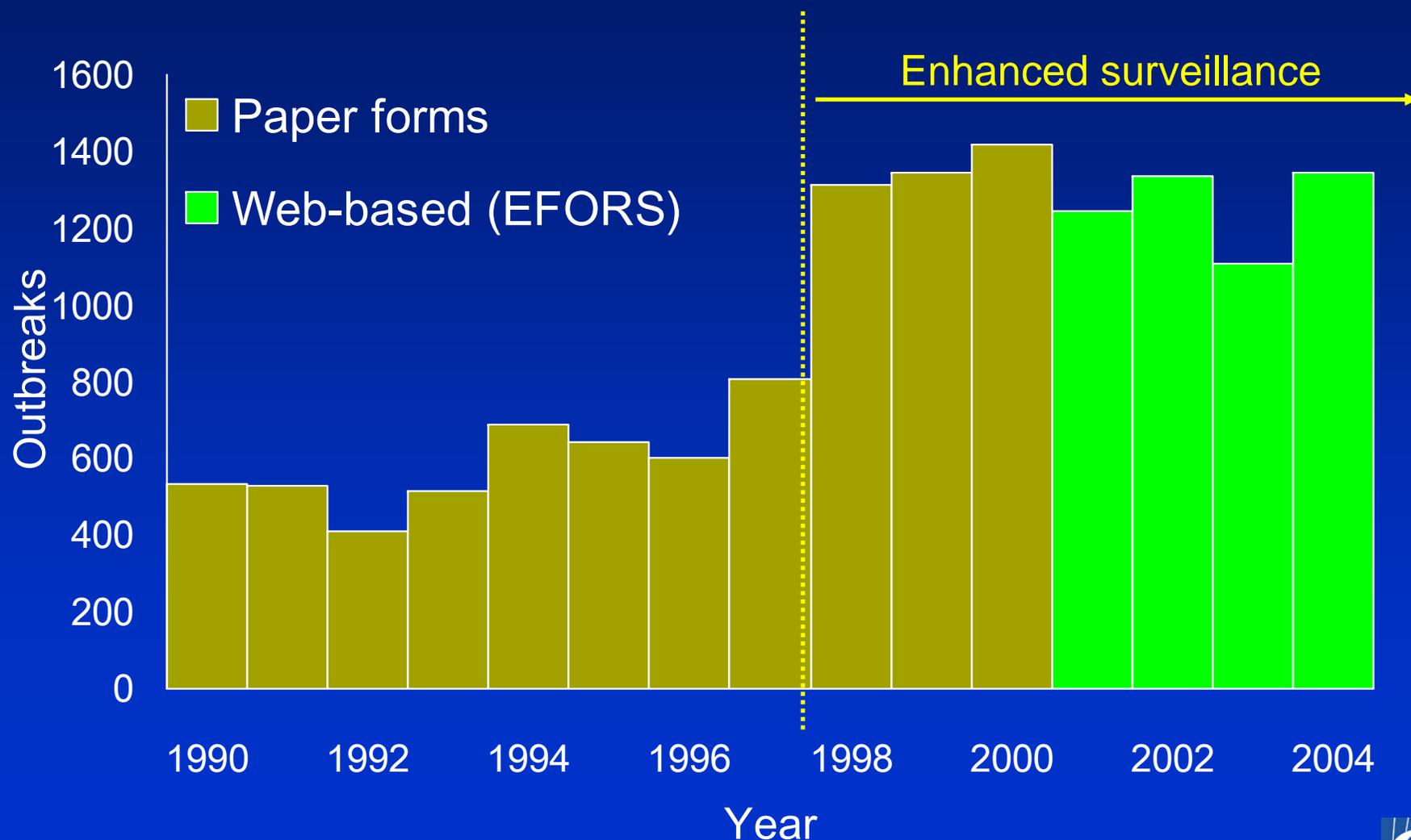
Pathogens or agents with  
uncertain reservoir  
= 21 outbreaks

## ➤ Parasite 16

- *Cyclospora* 8
- Other 8

## ➤ Chemicals 4

# Foodborne-disease outbreaks reported to CDC, 1990 - 2004<sup>1</sup>

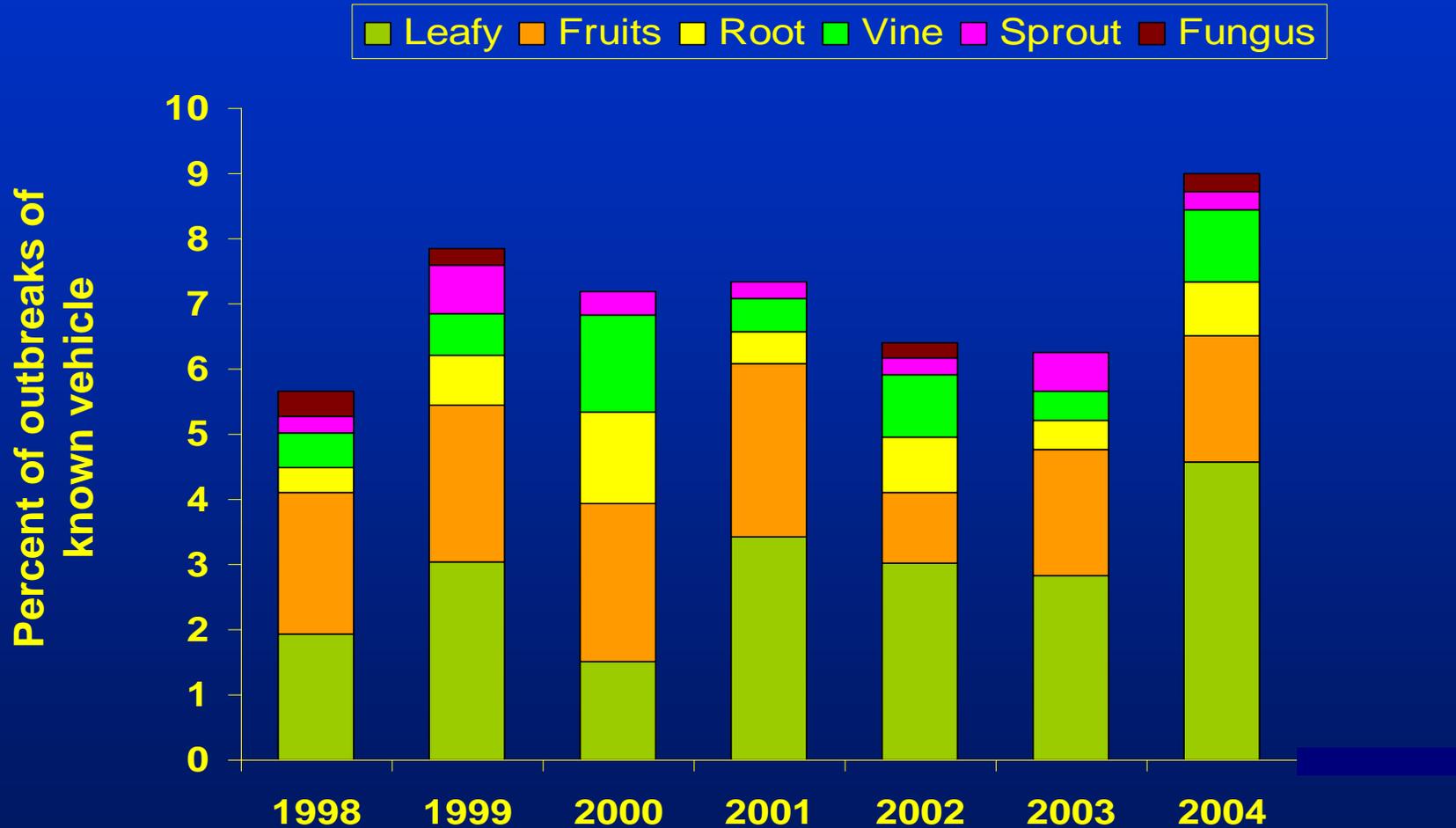


<sup>1</sup> By states to the Foodborne Disease Outbreak Surveillance System

# Foodborne outbreaks related to produce, reported to CDC, 1998-2004\*

- **Produce defined as food items that are classified as either fruit or vegetables**
- **1998-2004**
  - 384 outbreaks linked to produce items (28 multistate outbreaks)
  - 15,856 Illnesses
  - 716 Hospitalizations
  - 15 Deaths
- **7% of all outbreaks of determined source**
- **14% of those outbreak-associated cases**

# Proportion of Foodborne Outbreaks Related to Produce, by Major Produce Category, 1998-2004\*



\*eFORS, preliminary analysis and subject to change

# Foodborne outbreaks related to produce, 1998-2004\*: Food vehicles implicated in 384 outbreaks

- **Generic or mixed:** 216 outbreaks
  
- **One specific food:** 168 outbreaks
  - **Lettuce:** 29
  - **Sprouts:** 20
  - **Tomatoes :** 11
  - **Melons:** 11
  - **Juice:** 8
  - **Berries:** 7
  - **Green onions:** 4
  - **Other produce items:** 78

# Foodborne outbreaks related to produce 1998-2004\*: Reported etiologies in 190 (49%) of 384 outbreaks

## ➤ Bacterial: 97

- *Salmonella* 53
- *E. coli* O157 19
- *Shigella* 6
- *Campylobacter* 6
- Other 13

➔ Pathogens with animal and human reservoirs

## ➤ Viral: 81

- Calicivirus/Norovirus 73
- Hepatitis A 8

➔ Increased availability of Norovirus diagnostic testing

## ➤ Parasitic: 6

- Cyclospora 5
- Other 1

## ➤ Chemical: 6

# Conclusions

- A greater proportion of the burden than in the past
- 14% of outbreak- associated cases
- Both larger outbreaks, and a larger number of outbreaks
- Variety of fruits and vegetables (lettuce, melons, tomatoes, sprouts)
- Spectrum of pathogens reflects contamination with human and with animal feces
- Contamination and amplification can occur from farm to table

# Thank-You

*"THE FINDINGS AND CONCLUSIONS IN THIS PRESENTATION HAVE NOT BEEN FORMALLY DISSEMINATED BY CDC AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY."*



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# Foodborne outbreaks reported to CDC, 1998-2004\*: Spectrum of produce categories implicated in 384 outbreaks

➤ Leafy greens—e.g. <i>lettuce</i> :	155 (40%)
➤ Fruits-Nuts-- <i>melons</i> :	115 (30%)
➤ Vine-- <i>tomatoes</i> :	43 (11%)
➤ Sprouts-- <i>alfalfa</i> :	21 ( 5%)
➤ Root-- <i>onions</i> :	41 (11%)
➤ Fungus-- <i>mushrooms</i> :	9 ( 2%)

\*eFORS, preliminary analysis and subject to change

