

# Enteric Zoonoses at the National Level



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

National Center for Emerging and Zoonotic Infectious Diseases

Division of Vector-Borne Diseases



# Animals are important to many of us!



# We are not a population of people living in isolation...



**...interaction with animals is a critical component of our society**

# Pet Ownership Statistics

## 2013-2014\*

- ❑ 82.5 million U.S. households (68%) include  $\geq 1$  pet(s)
- ❑ In 1988, only 56% of households owned a pet
- ❑ Household pet ownership in the United States (millions)

▪ Dog	56.7
▪ Cat	45.3
▪ Freshwater fish	14.3
▪ Bird	6.9
▪ Small mammal	6.9
▪ Reptile	5.6
▪ Equine	2.8
▪ Saltwater fish	1.8



\*2013-2014 American Pet Products Manufacturer's Association

# United States: Animal Exposure

- U.S. population animal exposure in past 7 days<sup>1</sup>
  - 61.1% report Dog exposure
  - 41% report Cat exposure

<sup>1</sup>FoodNet Population Survey. HHS, CDC, 2006-2007.

# Pets and animals

- ❑ Positive benefits of human-animal contact
- ❑ Provides opportunities for entertainment and education
- ❑ Important part of our food supply
- ❑ Millions of human-animal interactions each year, both at home and away
- ❑ **But...animals can also make people sick**



# ZOONOSES

E. coli

SALMONELLA

Tapeworms

Yersinia

Anthrax

Leprosy

MERS

Histoplasmosis

Coccidioidomycosis

Tularemia

Hantavirus

Pasteurella

Cryptococcosis

Q fever

Brucellosis

Listeria

Hookworms

Rat Bite Fever

Tuberculosis

Roundworms

Ringworm

Rabies

West Nile Virus

Giardia

Monkeypox

Blastomycosis

Get. Scratch Disease

Psittacosis

Pneumonia

Influenza

Leptospirosis

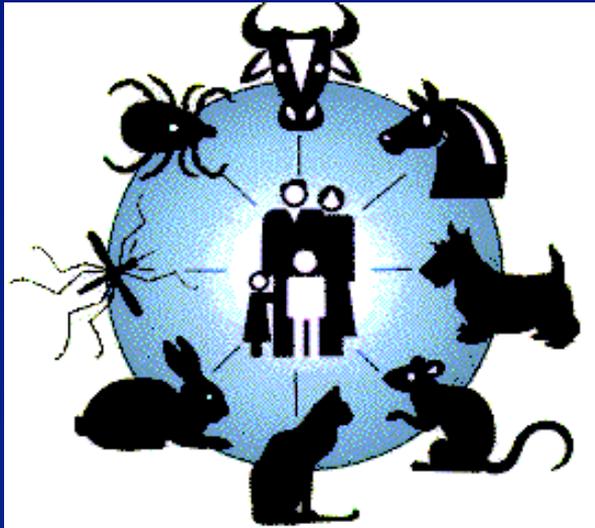
LCMV Bacteria

Cryptosporidium

Campylobacter Parasites

RMSF

# Impact of Zoonotic Disease



- ❑ Public health problem
- ❑ Reduced animal production capacity
- ❑ Food safety concerns
- ❑ Obstacle to domestic and international trade
- ❑ Affect environmental health
- ❑ Economic losses (private and commercial)
- ❑ Bioterrorism potential

# One Health

- ❑ Recognizes that health of humans is connected to health of animals and environment
  - We live in a globalized world
  - Animal-human interface will continue to be an important factor shaping human public health needs
  - Shared products and environment



# Transmission Between Animals and Humans

## ❑ Foodborne

- Eating contaminated animal products
  - Meat, milk, eggs, dairy
- Eating food contaminated by animals near growing fields
  - Fruits, vegetables



# Foodborne Infections: Common, Costly, and Preventable



- ❑ **Foodborne Illness<sup>1</sup>**
  - 48 million illnesses
  - 128,000 hospitalized
  - 3,000 deaths
  - Estimated cost \$77.7 billion<sup>2</sup>

<sup>1</sup>Scallan et al (2011) EID 17: 7-15, 16-22

<sup>2</sup>Hoffman et al (2012) J Food Prot 75:7, 1292-1302

# It is not only food: Zoonotic outbreaks becoming more common



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# Human Illness and Animal Contact

- 14% of all enteric illnesses, caused by seven major pathogens in US, attributable to animal contact<sup>1</sup>
  - *Salmonella* species (Nontyphoidal )
  - Shiga-toxin producing *Escherichia coli* (STEC) 0157
  - STEC non-0157
  - *Listeria monocytogenes*
  - *Campylobacter* species
  - *Cryptosporidium* species
  - *Yersinia enterocolitica*
- Enteric Zoonoses
  - About 6.7 million illnesses due to animal contact

<sup>1</sup>Hale et al. CID 2012; 54 (Suppl 5):S472-S479

# Zoonotic Salmonellosis

- ❑ **11% of *Salmonella* infections due to animal contact**
  - **Highest morbidity and mortality among enteric zoonoses**
    - 48% of hospitalizations
    - 62% of deaths
  - **Children disproportionately affected**



*Hale et al., 2012*

# Animal Hosts



- ❑ **Animals carrying enteric pathogens may not exhibit signs of illness**
  - **Typically appear healthy and clean**
- ❑ **Animals can shed intermittently**
- ❑ **Stress increases shedding**
- ❑ **Commingling of animals increases stress**
- ❑ **Young animals often have higher prevalence**
- ❑ **Infected animals can lead to long term environmental contamination**
  - ❑ **Both indoors and outside**

# Transmission Between Animals and Humans

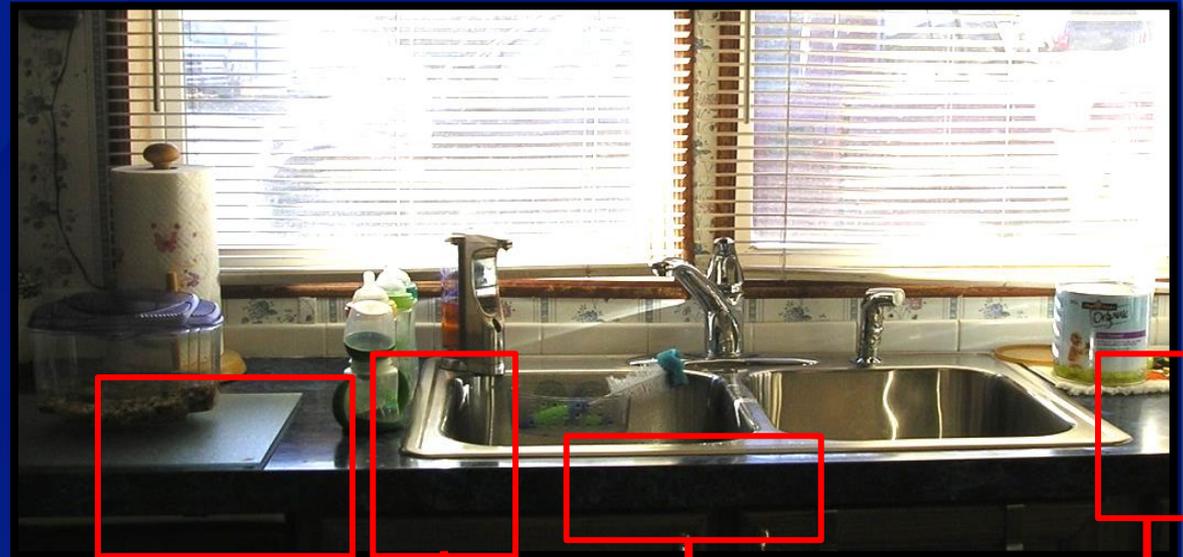
- ❑ **Direct contact with infected animals**
  - **May appear healthy and clean**
  - **Bodies (fur, feathers, scales) may be contaminated**
    - Fur, hair, feathers, scales, skin, saliva, feces
    - Animal bedding, flooring, barriers, shoes/clothing
  
- ❑ **Indirect contact with animals**
  - **Environment where animals live and roam**
  - **Barriers, tank water**



# People do not have to directly touch an animal to catch a zoonotic disease.



**Direct Contact**



**Aquarium**

**Baby  
Bottles**

**Bottle  
Brushes**

**Baby  
Formula**

**Indirect Contact**

# Enteric Zoonoses:

## More than just a few days of diarrhea...

- ❑ Acute gastroenteritis: fever, diarrhea (can be bloody), abdominal cramps, vomiting
- ❑ Serious illness: bloodstream infection, brain infection, joint infection, Hemolytic Uremic Syndrome, Guillain–Barré syndrome
- ❑ Hospitalizations and death can occur



# Populations at Highest Risk for Serious Illness

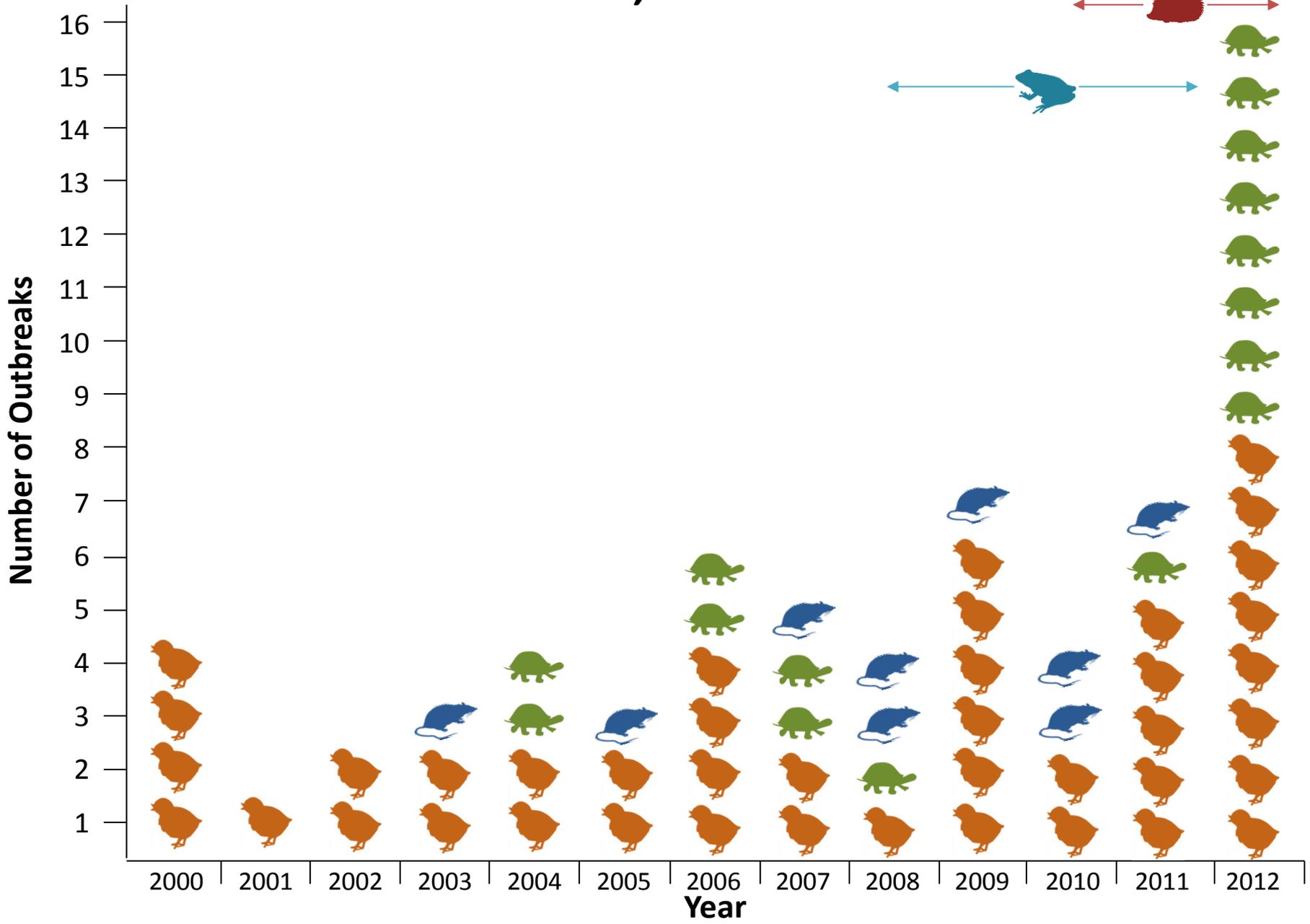
- ❑ Young children, < 5 years
- ❑ People with weakened immune systems
- ❑ Pregnant women
- ❑ Seniors >65 years
- ❑ Mentally impaired



# Outbreak investigations



# Salmonellosis outbreaks from commercially distributed animals, 2000-2012



# PulseNet

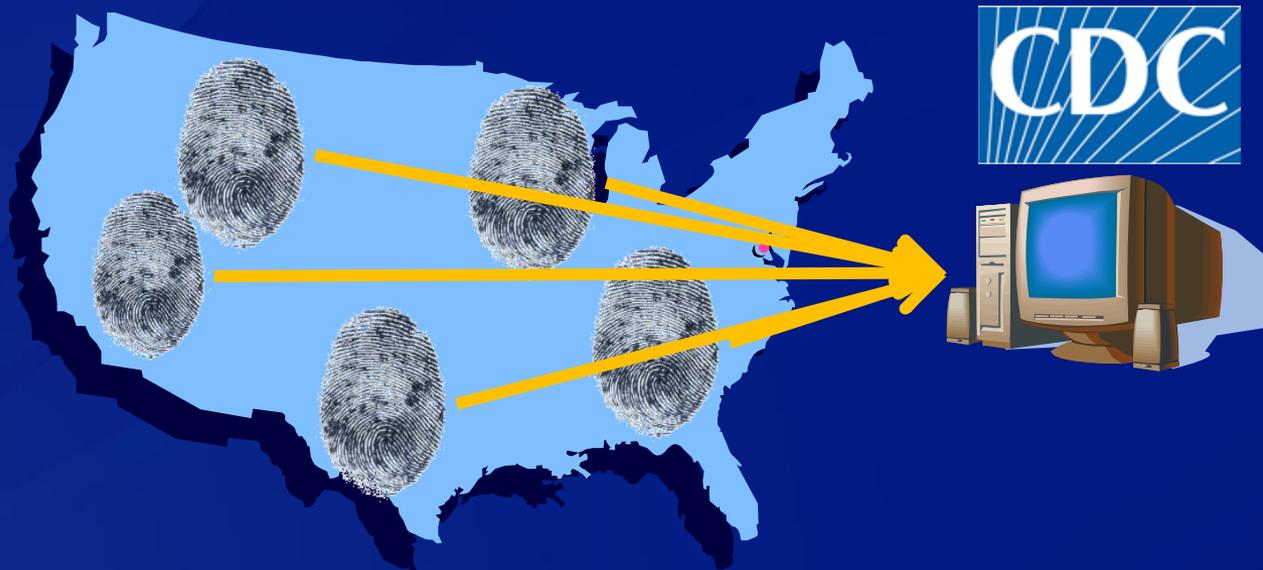
- ❑ National molecular subtyping network for enteric disease surveillance
  - >85 public health and regulatory laboratories
- ❑ Molecular subtyping of disease-causing bacteria
  - Pulsed-field gel electrophoresis (PFGE)
  - PFGE pattern = molecular fingerprint for each isolate



# PulseNet



- ❑ DNA “fingerprints” electronically uploaded to national database at CDC
- ❑ Shared among members



# One Health Approach: Role of United States Government Officials



## State and local health departments



- Non-regulatory
- Disease detectives
- Disease surveillance
- Outbreak detection
- Epidemiologic investigations to determine outbreak source
- Laboratory assessments
- Prevention campaigns
- Epidemiologic research
- Public education



## Departments of Agriculture



- Regulatory authority
- Inspection and enforcement
- Investigation of farms and production facilities
- Laboratory assessments
- Traceback to point of origin
- Recalls
- Food safety policy
- USDA: Enforcement of Animal Welfare Act
- FDA: Enforcement of 1975 Turtle Ban, regulatory authority for animal feed
- Public education



# RECENT OUTBREAKS

Source: <http://runt-of-the-web.com/pet-shaming/2>

# Outbreaks of Human *Salmonella* Infections Caused by Frozen Rodents Used to Feed Reptiles

- ❑ 2008 – 2013 frozen rodent outbreaks  
>600 ill persons
- ❑ One protracted international outbreak;  
several smaller outbreaks
- ❑ Both pet and feeder rodents can be part  
of same outbreak



# Challenges in Frozen Rodent Investigations

- ❑ Frozen rodents covered in urine and feces when euthanized, not cleaned before freezing
- ❑ Frozen rodents can be imported from Asia
- ❑ **Cross-contamination in households**
  - Pet owners are thawing frozen rodents in microwaves
  - Storing frozen rodents next to human food
  - Sharing utensils used on frozen rodents and human food
- ❑ Awareness of *Salmonella* and rodents low
- ❑ Tracebacks to source difficult
  - No lot codes or tracking information
  - Rodents often purchased in bulk and repackaged
- ❑ No safe handling or hand washing messages on packaging



## After you feed and handle reptiles, wash your hands so you don't get sick!

Contact with live and frozen feeder rodents (mice and rats) and reptiles (turtles, snakes, and lizards) can be a source of human *Salmonella* infections.

- *Salmonella* germs can cause a diarrheal illness in people that can be mild, severe, or even life threatening.
- Rodents and reptiles can carry *Salmonella* germs and still appear healthy and clean.
- *Salmonella* germs are shed in rodent and reptile droppings and can easily contaminate their bodies and anything in areas where they live.
  - These germs can contaminate areas where rodents are housed or handled or where frozen rodents are prepared, thawed, and stored.
  - Reptiles that live in tanks or cages can contaminate their habitats, including water bowls, with germs, which can spread to people.



### Protect Yourself and Your Family from Germs

DO:

- Wash your hands thoroughly with soap and water immediately after handling live or frozen feeder rodents and reptiles, or anything in the area where they live.
  - Adults should supervise hand washing for young children.
  - If soap and water are not readily available, use hand sanitizer until you are able to wash your hands thoroughly with soap and water.
- To prevent contamination, keep rodents and reptiles out of kitchens and other areas where food and drink are prepared, served, or consumed.
- Clean and disinfect with bleach any surfaces where frozen rodents are prepared, thawed, and stored.

DON'T:

- Don't let children younger than 5 years of age, elderly individuals, or people with weak immune systems handle or touch frozen or live rodents and reptiles.
- Don't use microwave ovens used for human food to thaw frozen rodents. In addition, don't use kitchen utensils used for human food to provide feeder rodents to reptiles.
  - If you must use these items, make sure they are dedicated only for reptile/feeder rodent use, and cleaned and then disinfected after each use.
- Don't wash tanks and feed or water containers in the kitchen sink.
  - If bathtubs must be used for this purpose, they should be thoroughly cleaned and then disinfected with bleach.
- Don't keep reptiles or rodents in child care centers and households or in homes with children under the age of 5 years.
- Don't let reptiles roam free in homes.

For more information, call **1-800-CDC-INFO** or visit **www.cdc.gov**.



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CS233133-A | Photos (above) snake eating feeder mouse, (top, right) live mouse, (bottom, right) bag of frozen feeder mice (courtesy Backwoods Farm, Inc.)



## Luego de alimentar o tocar reptiles, ¡lávese las manos para que no se enferme!

El contacto tanto con roedores (ratones y ratas), congelados y vivos usados para alimento, como con reptiles (tortugas, serpientes y lagartijas) puede ser una fuente de infecciones por *Salmonella* en las personas.

- Los microbios de *Salmonella* pueden causar en las personas enfermedades diarreicas desde leves hasta graves y pueden llegar a poner en peligro su vida.
- Los roedores y reptiles pueden ser portadores de microbios de *Salmonella* aun cuando se vean limpios y sanos.
- Los microbios de *Salmonella* se liberan en las heces de estos animales y pueden contaminar fácilmente su cuerpo y cualquier otra cosa que se encuentre en las áreas donde habitan.
  - Estos microbios pueden contaminar las áreas donde los roedores habitan, donde son manipulados o donde los roedores congelados son preparados, descongelados y almacenados.
  - Los reptiles que viven en tanques o acuarios pueden contaminar estos lugares, inclusive el agua que toman, con microbios que se pueden propagar a las personas.



### Protéjase usted y proteja a su familia de los microbios

LO QUE DEBE HACER:

- Lávese bien las manos con agua y jabón inmediatamente después de tocar los roedores usados como alimento ya sea que estén vivos o congelados, los reptiles, o cualquier área donde vivan.
  - Los adultos deben vigilar que los niños pequeños se laven bien las manos.
  - Si no hay agua ni jabón, use un producto limpiador de manos hasta que se pueda lavar bien las manos con agua y jabón.
- Para evitar la contaminación, no permita que haya roedores o reptiles en las cocinas o en otras áreas donde se preparen, sirvan o consuman alimentos y bebidas.
- Limpie y desinfecte con cloro cualquier superficie donde se hayan preparado, descongelado o almacenado roedores congelados.

Para más información, llame al **1-800-CDC-INFO** o visite **www.cdc.gov**.

LO QUE NO DEBE HACER:

- No deje que los niños menores de 5 años de edad, las personas mayores o las que tengan sistemas inmunitarios debilitados toquen ni agarren roedores o reptiles vivos ni congelados.
- Para descongelar roedores no use hornos de microondas usados para calentar alimentos de personas. Además, nunca use utensilios de cocina usados para preparar alimentos para personas cuando alimente a los reptiles con roedores.
  - Si tiene que usar estos utensilios, asegúrese de que los usa exclusivamente para los reptiles y los roedores usados para alimento, y que los limpia y desinfecta después de cada uso.
- No lave los tanques ni los recipientes usados para comida o para agua en el lavaplatos de la cocina.
  - Si usa la tina de baño para este propósito, debe limpiarla cuidadosamente y desinfectarla con cloro.
- No permita que los reptiles anden libremente por su casa y no coloque los recipientes donde viven los reptiles o roedores en el dormitorio de los niños, especialmente si estos son menores de 5 años de edad.
- No deje que los reptiles anden sueltos por su casa.



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# Reptiles and Amphibians

## Iguanas



## Lizards



## Snakes



## Turtles



## Frogs and Toads



# Reptile Industry

- ❑ **\$1.0 to \$1.4 billion in earned revenues for reptile products**
- ❑ **U.S. reptile households**
  - 2013 – 2014 APPA Survey
  - 5.6 million (4.6%) own a reptile
  - 11.5 million reptiles total
  - Fastest growing sector



*cheezburger.com*

- The Modern Reptile Industry, Georgetown Economic Services LLC (2011)
- American Pet Products Association: <http://www.americanpetproducts.org>
- Descriptive Analysis Report of Wild Reptile Imports to the United States (2004 – 2009); USDA /APHIS/VS/CEAH

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# Reptile Industry

- Reptile exports and imports by type and number (Jan 2009 – Apr 2014)

Reptile Type	Exports	Imports
Lizard	1,014,617	3,303,039
Snake	319,935	596,940
Turtle	44,690,590	1,130,604
Crocodilian	3,236	60,419
<b>Total</b>	<b>46,028,378</b>	<b>5,091,002</b>

# Top 5 U.S. Reptile Ports

- **Wholesalers and Distributors**
  - **Concentrated in FL and CA**

Port City	State	Shipments (E & I)	Percent Total Shipments
Miami	FL	45,573	56
Los Angeles	CA	12,821	16
San Francisco	CA	7,845	10
Dallas / Fort Worth	TX	5,686	7
New Orleans	LA	4,511	6
Total:		76,436	95

# Turtle-associated *Salmonella*

## 1960-1970s

- Turtles were popular pets
  - 4% of households had at least 1 turtle
- 15 million turtles produced annually
- Estimated 280,000 cases of *Salmonella* attributed to turtle exposure each year

## 1975

- Federal law enacted prohibiting sale of turtles < 4 inches
- Intended to prevent children from treating turtles as toys or putting them in their mouths





## Turtlepocalypse - 2012



### ❑ CDC Investigation

- Began investigating 8 separate *Salmonella* serotypes
- Patients from all 8 investigations reported turtle exposure
- Environmental sampling of turtles and turtle tank water were positive

### ❑ 473 ill person from 41 states

- 29% of ill persons were hospitalized
- 70% were < 10 years of age
- 31% were 1 year of age or less



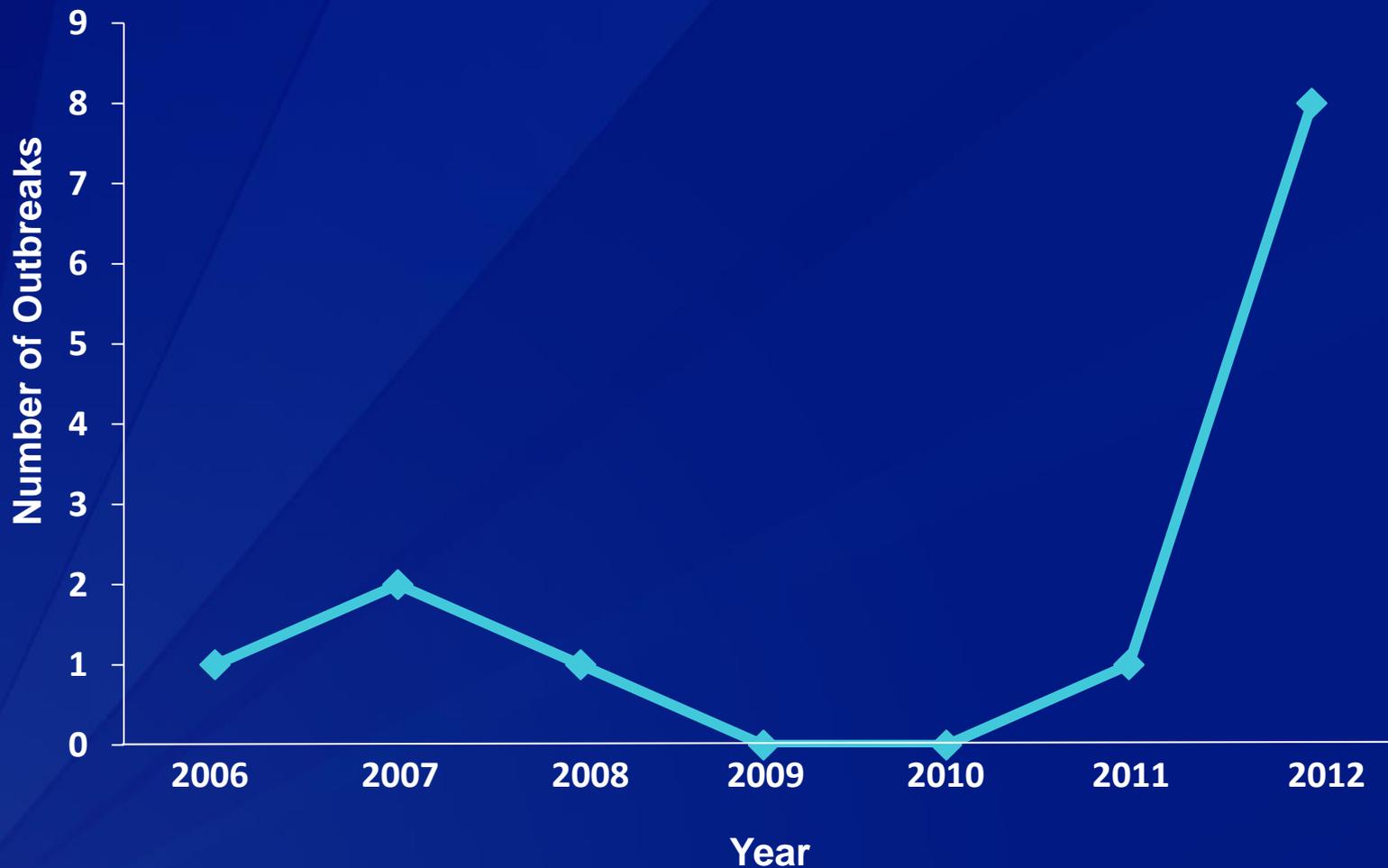
### ❑ Available in pet shops, souvenir shop, flea markets, street vendors, and **online sales**

# Small Turtles: Particular Risk for Young Children

- ❑ *Salmonella* are normal gut flora for turtles
- ❑ More likely than other reptiles to be given to young children
- ❑ Frequently in daycares and schools with young children
- ❑ Terrarium water can amplify *Salmonella*
  - Source of infection for young children who handle turtle or come into contact with its habitat

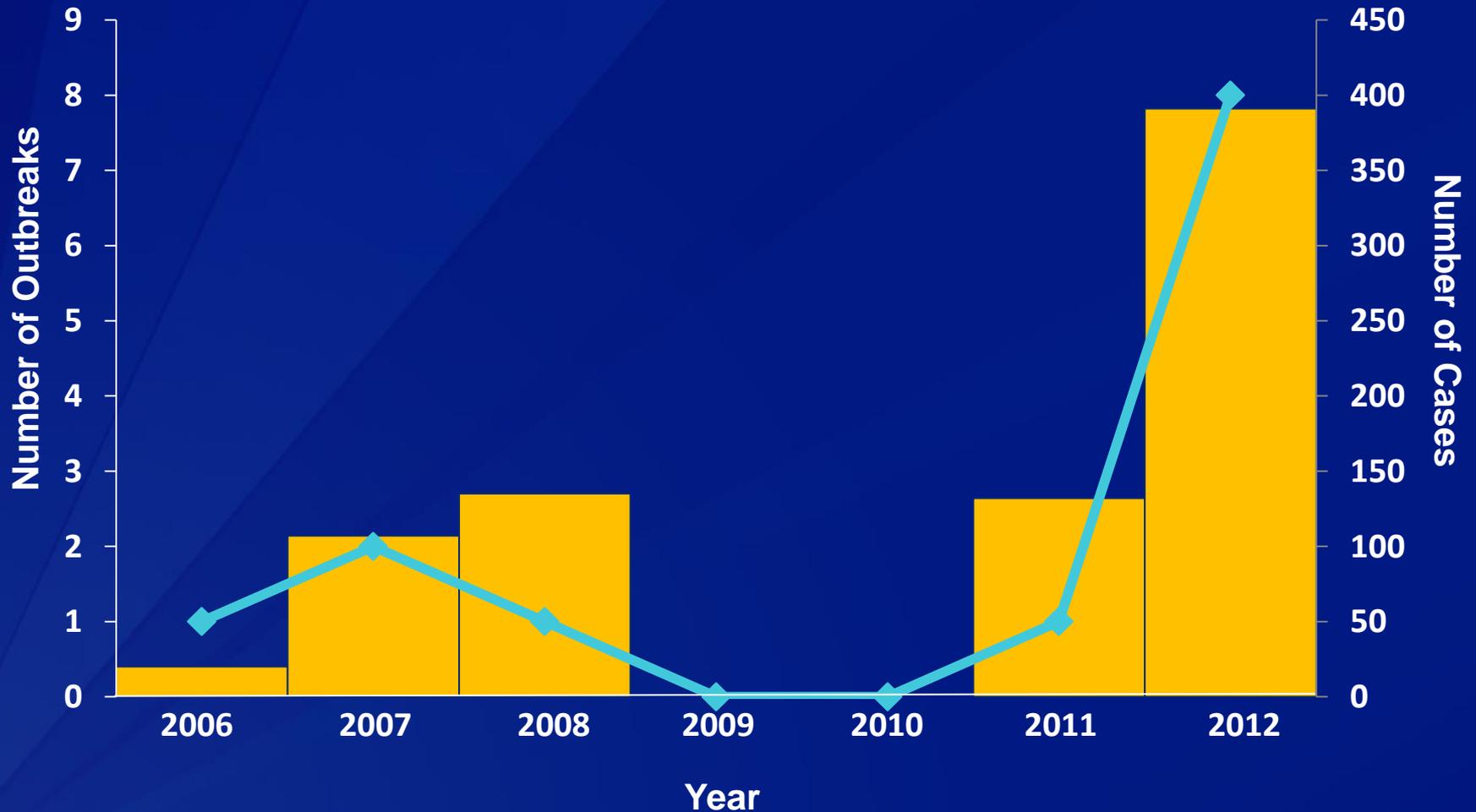


# Multistate Turtle-Associated Outbreaks — United States, 2006–2012



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# Multistate Turtle-Associated Outbreaks and Cases — United States, 2006–2012



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# WATER FROGS



# African Dwarf Frogs

- ❑ Small, delicate frogs, exclusively aquatic
- ❑ Live 5-18 years
- ❑ Found in pet stores, educational stores, toy stores, fairs, carnivals, from online retailers and other venues
- ❑ Marketed toward children



# Nationwide Outbreak of *Salmonella* associated with African Dwarf Frogs

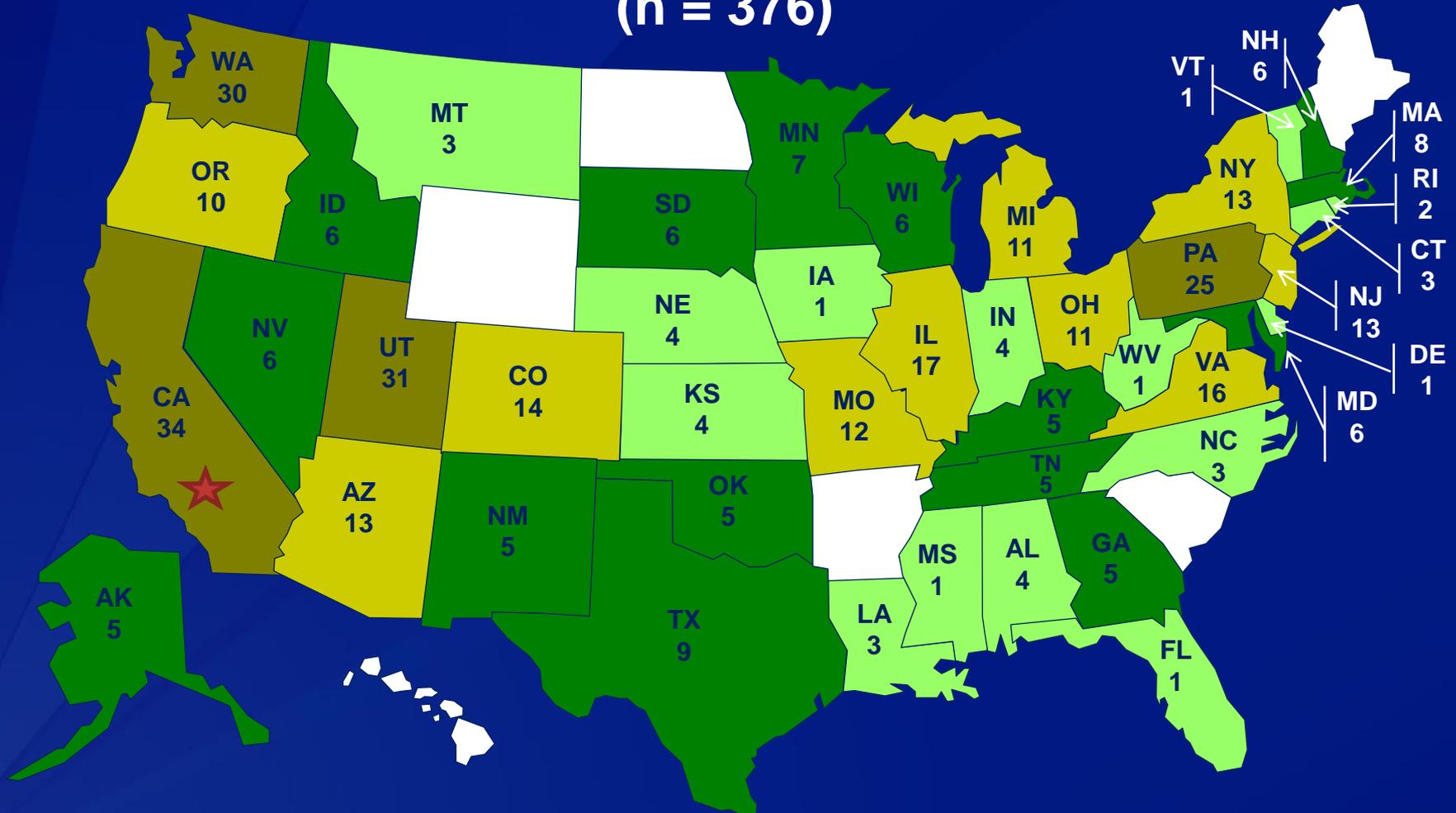
- ❑ 376 illnesses from 44 states
- ❑ Predominantly children
- ❑ Likely spanned from 2008-2011 (4 years)
- ❑ First outbreak of human salmonellosis linked to water frogs
- ❑ Indirect frog contact
  - Exposure to contaminated water, habitats
  - Other aquatic pets
  - Environmental contamination, cleaning in kitchen
- ❑ Infected frogs originated from single California frog breeding facility
- ❑ County health officials and pet industry worked with breeder to improve breeding facility operations



# Nationwide Outbreak of *Salmonella* associated with African Dwarf Frogs

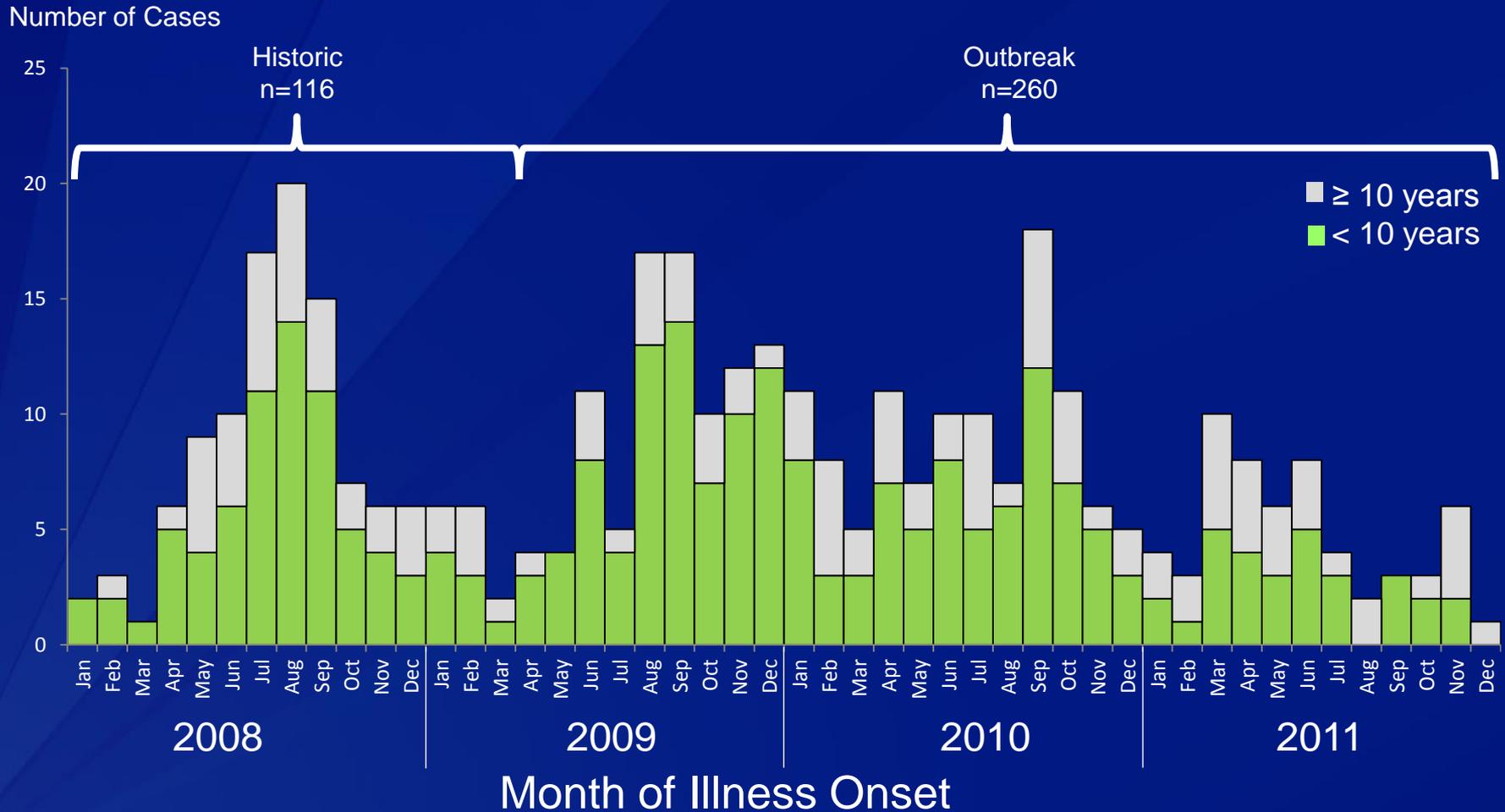
April 1, 2009 – December 31, 2011

(n = 376)



# Cases by Illness Onset & Age

## January 1, 2008 – Dec 31, 2011





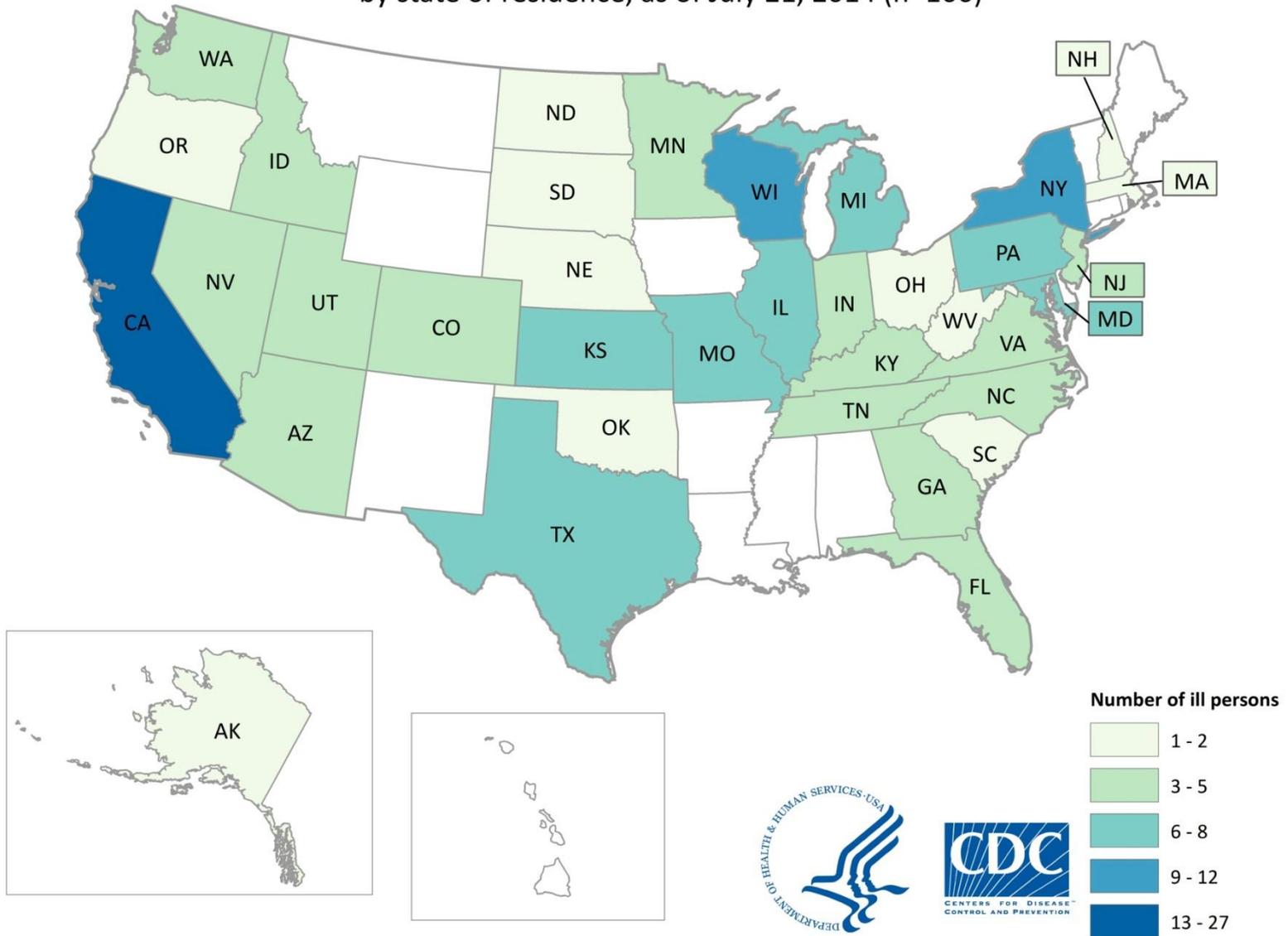
**Pet Bearded Dragons**

# Outbreak of *Salmonella* Infections Linked to Bearded Dragons

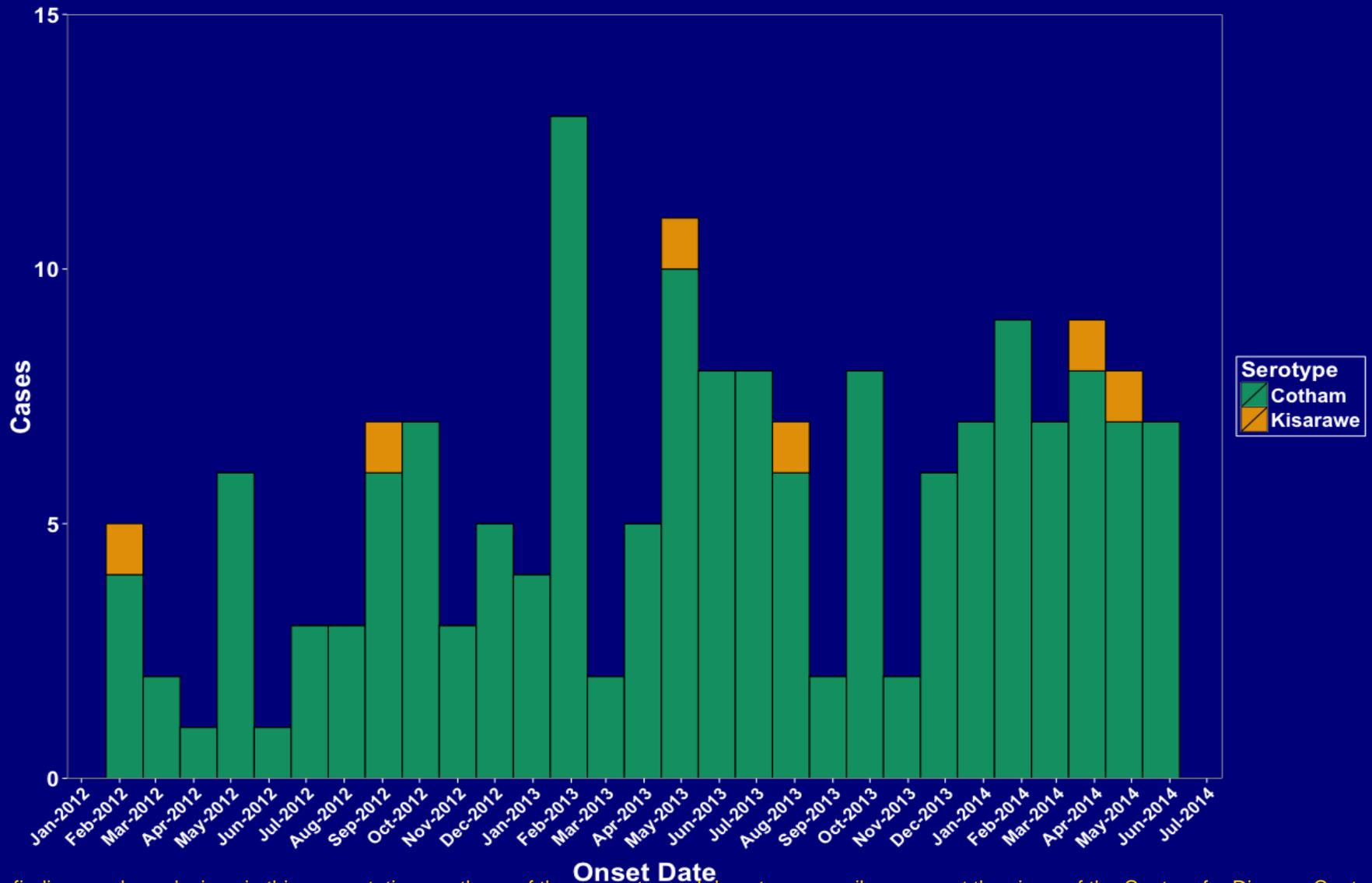
- **April 2014 Wisconsin contacted CDC**
  - 11 patients with *Salmonella* Cotham, a very rare serotype
  - Majority (10/11) reported contact with bearded dragons
- **International Investigation**
  - 166 ill persons from 36 states, additional cases in Canada
  - 2 serotypes: *Salmonella* Cotham and Kisaware
  - 37% of ill persons were hospitalized
  - 56% of ill persons were  $\leq 5$  years old
  - Spanned from 2012-2014
  - Bearded dragon breeders in three countries



Persons infected with the outbreak strains of *Salmonella* Cotham or Kisaware, by state of residence, as of July 21, 2014 (n=166)

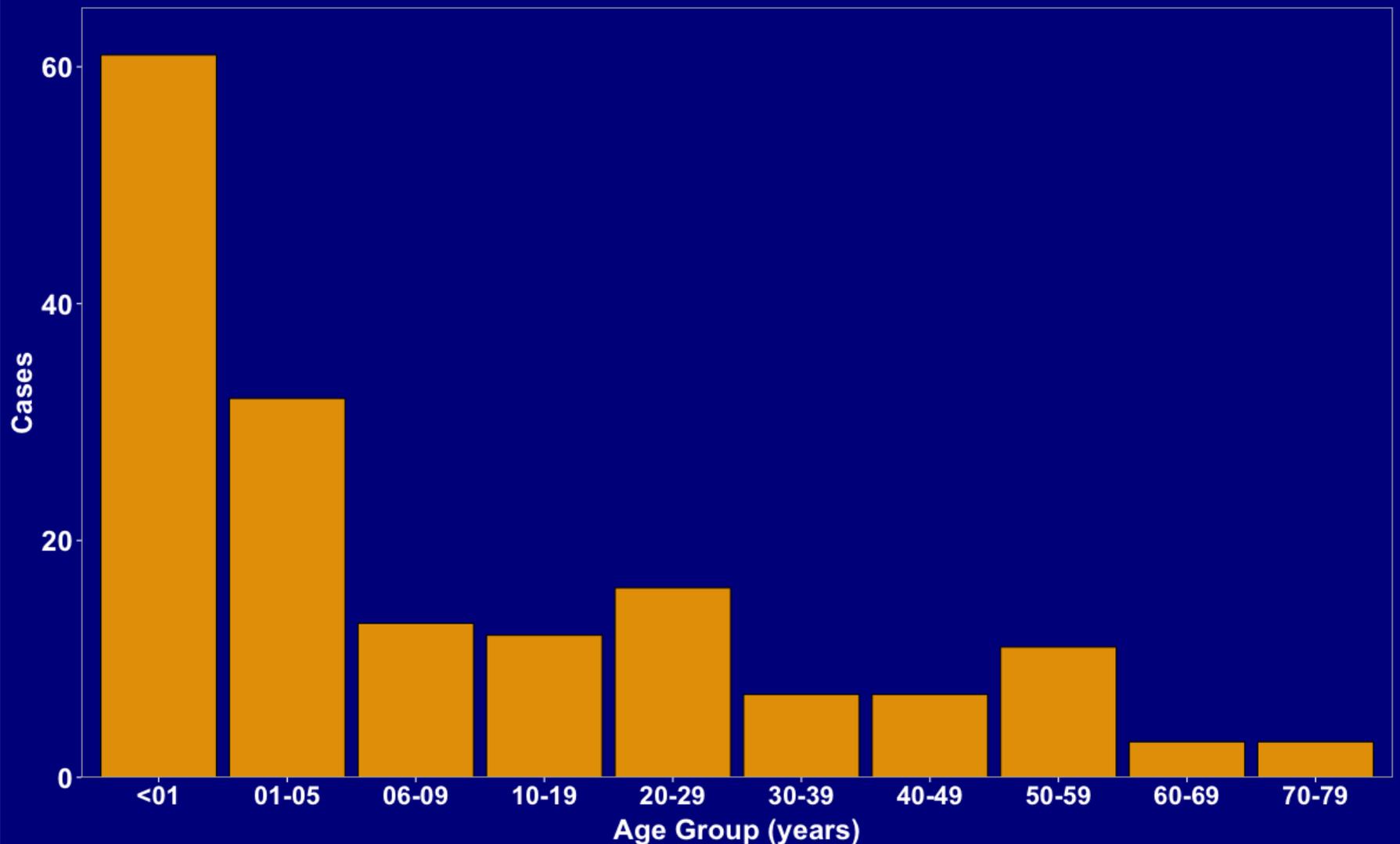


# Persons Infected with *Salmonella* Cotham or *Salmonella* Kisarawe, by Date of Illness Onset\*



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# Salmonella Cotham and Kisarawe Case Age Distribution (n=166): Jan 2012 - Jul 2014

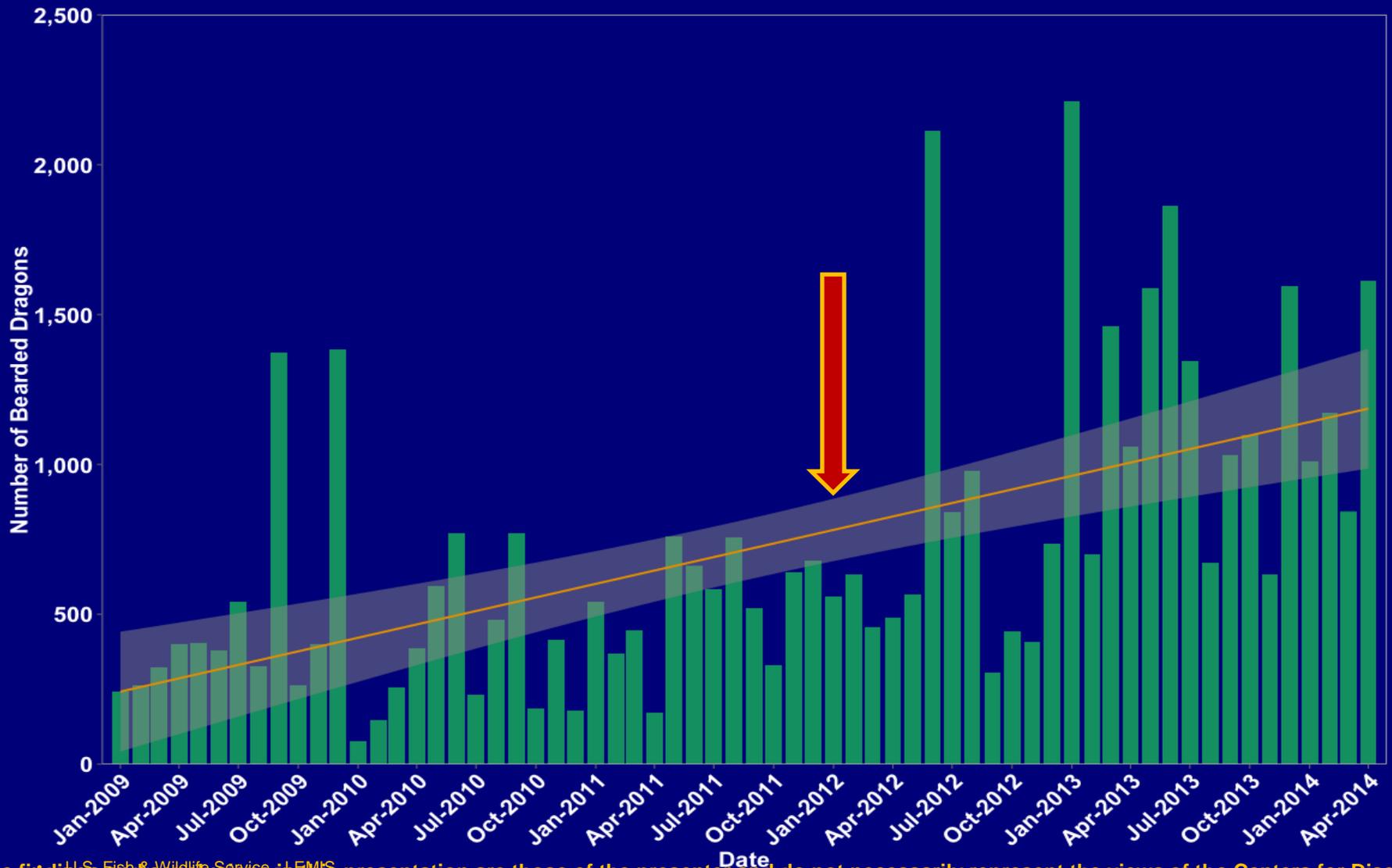


# Traceback Investigation: Where were Bearded Dragons coming from?

- ❑ **Collected member cards**
  - Used with permission
- ❑ **Communicated with retailers during investigation**
- ❑ **Provided details to store**
  - Store name, location or phone number, date of purchase, type of animal, shopper card, other details
- ❑ **Identified 3 reptile breeding facilities in 3 countries**
- ❑ **Next steps...investigation of breeding facilities**

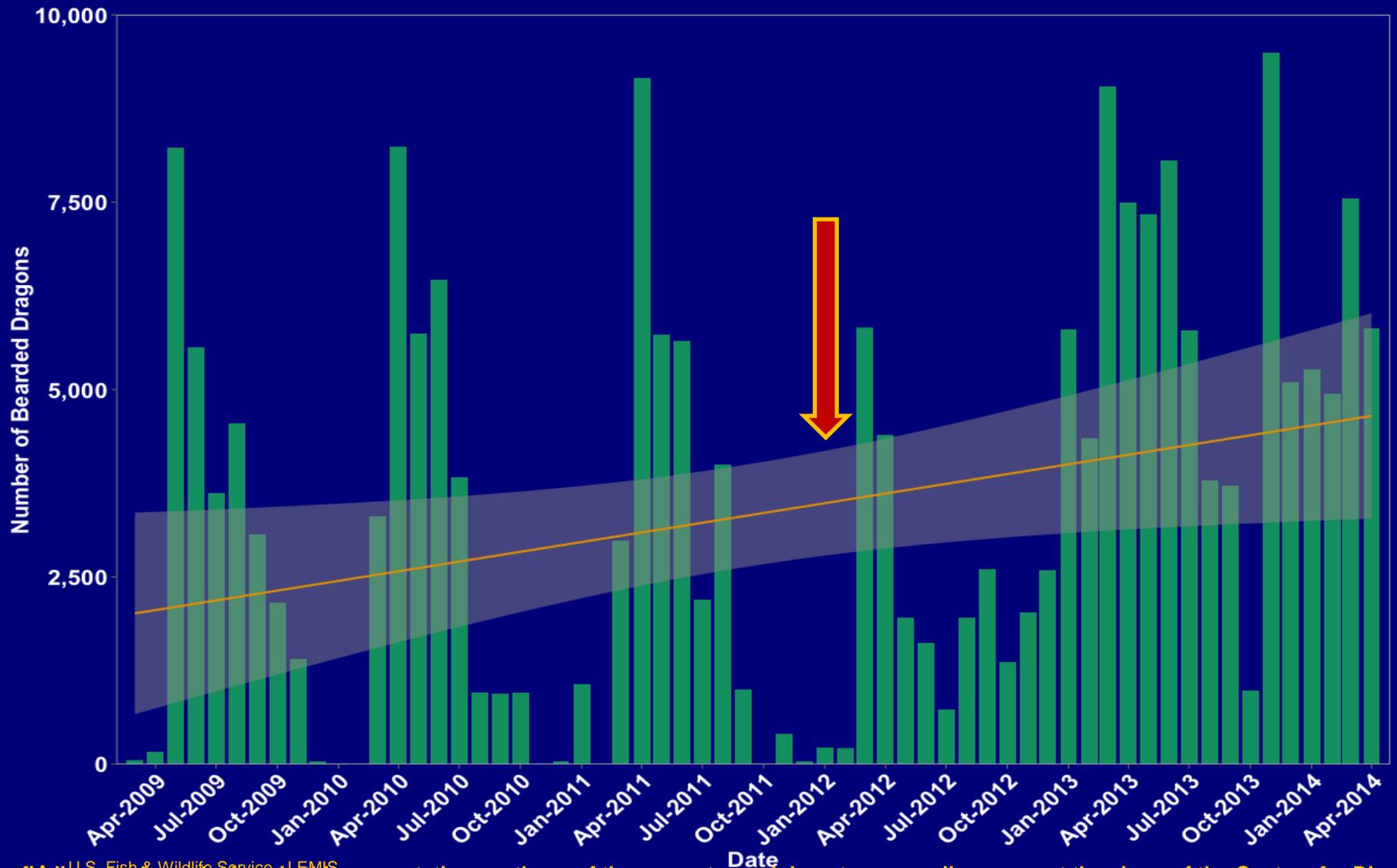


# Bearded Dragon Exports by Number of Animals (n=45,688) and Date, United States: Jan 2009 – Apr 2014



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# Bearded Dragon Imports by Number of Animals (n=214,279) and Date, United States: Mar 2009 – Apr 2014



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# National Veterinary Services Laboratory (NVSL)

- ❑ One Health investigation
- ❑ Offer of assistance for specimen testing
  - *Salmonella* isolation
  - Serotyping
  - PFGE
  - Antimicrobial resistance testing



# Investigation of Breeding Facilities



# Sampling Results

## *Salmonella* spp.

<b>Sample Location</b>	<b># Pos</b>	<b>n</b>	<b>%</b>
<b>Breeder A</b>	<b>77</b>	<b>89</b>	<b>87</b>
<b>Breeder B</b>	<b>154</b>	<b>186</b>	<b>83</b>
<b>Breeder C</b>	<b>30</b>	<b>108</b>	<b>28</b>
<b>Retail A</b>	<b>59</b>	<b>71</b>	<b>83</b>
<b>Total</b>	<b>320</b>	<b>454</b>	<b>71</b>

# Sampling Results

Sample Location	<i>Salmonella</i>			
	Cotham		Kisarawe	
	# Pos	%	# Pos	%
Breeder A (n=89)	14	16	8	9
Breeder B (n=141)	13	9	7	5
Breeder C (n=108)	2	2	2	2
Retail A (n=71)	17	24	6	9
Total (n=409)	46	11	23	6

# Outbreak of *Salmonella* Infections Linked to Bearded Dragons

- ❑ Epidemiologic, laboratory, and traceback findings linked outbreak to bearded dragons purchased from multiple stores in different states
- ❑ First outbreak of human salmonellosis linked to bearded dragon lizards in USA
- ❑ Infected lizards originated from multiple breeding facilities
- ❑ One Health approach including public health, pet industry and breeders ongoing for prevention



## Where We Stand Now

- ❑ Bearded dragon population/breeding issue
- ❑ Continue work with breeders, pet retail companies, trade organizations, and public
- ❑ Identify critical control points to decrease *Salmonella* Cotham and Kisarawe in breeder stock
- ❑ New mechanisms for education and public outreach



# After you touch amphibians or reptiles, wash your hands so you don't get sick!

Contact with amphibians (such as frogs and toads) and reptiles (such as turtles, snakes, and lizards) can be

Small turtle  
human Salmonella  
Food and

Salmonella germs  
life threatening

Amphibians are

Salmonella germs  
anything in air

Reptiles and amphibians  
germs, which can

## Protect Yourself

### Do:

Wash your hands  
amphibians or  
housing or hat

Adults should  
If soap and water  
wash your hands

To prevent contact  
where food is

Tanks, feed or  
caring for amphibians  
equipment and other gear

### Don't:

Don't let children  
systems handle

Don't keep hats  
younger than 5

Don't let reptiles

Don't bathe in  
if bathtubs are  
thoroughly cleaned  
other place where

For more information, contact

National Center for Emerging and Zoonotic  
Division of Foodborne, Waterborne, and Environmental

C5223414-A Photo Credit: Jim Capaldi September, 2010 www.flickr.com/photos/jcapaldi

# Si toca anfibios o reptiles, ¡lávese las manos para no enfermarse!

El contacto con anfibios  
puede ser una fuente de

Las tortugas pueden  
conocer a infecciones  
razón, la Administración  
tortugas desde 197

Los gérmenes de Salmonella  
leves hasta graves, e incluso

Los anfibios y reptiles pueden  
vean limpios y sanos.

Los gérmenes de Salmonella  
fácilmente su cuerpo y

Los anfibios y reptiles que  
gérmenes capaces de transmitir

## Protéjase usted

### Lo que debe hacer:

Lávese las manos cuidadosamente  
o reptiles o después de haber  
frecuentan

Los adultos deben

Si no hay agua ni jabón,  
bien con agua y jabón

Para evitar la contaminación  
áreas donde se preparan

Los tanques, recipientes  
para cuidar de los anfibios  
estos materiales, hasta e incluso

### Lo que no debe hacer:

No deje que los niños  
sistemas inmunitarios de

No mantenga las peceras  
niños, especialmente

No deje que los anfibios

No lave a estos animales  
lavan en la bañera, limpie  
blanqueador para desinfectar  
los recipientes de los anfibios

Para más información, llame al 1-8

National Center for Emerging and Zoonotic  
Division of Foodborne, Waterborne, and Environmental

Crédito de la fotografía C5223414-D: Jim Capaldi, septiembre de 2010

# Lavez vos mains, après avoir touché des amphibiens ou des reptiles, pour ne pas tomber malade!

Le contact avec des amphibiens  
(comme les tortues, les salmonelles pour les humains)

Les petites tortues, de contamination : éviter ce risque, les produits alimentaires

Des microbes de la salmonelle  
moins sérieuse, et même

Les amphibiens et les reptiles  
apparaître propres et

Des microbes de la salmonelle  
contaminer leurs corps

Les reptiles et les amphibiens  
contaminer l'eau avec

## Protégez votre

### À faire:

Lavez vos mains avec du  
amphibiens ou reptiles ou aquariums.

Un adulte devrait

Si l'eau et le savon  
lavez-vous bien les

Pour prévenir la contamination  
ou d'autres endroits où

Les réservoirs, aquariums  
les amphibiens et reptiles  
que l'eau des réservoirs  
microbes.

### À ne PAS faire:

Ne laissez pas les jeunes  
système immunitaire affaibli

Ne gardez pas les réservoirs  
surtout les jeunes de moins

Ne laissez pas des reptiles

Ne nettoyez ni les animaux  
Si la baignoire est utilisée  
soigneusement nettoyée

Pour plus d'information,  
www.cdc.gov.



C5223414-A Photo Credit: Jim Capaldi September, 2010 www.flickr.com/photos/jcapaldi

National Center for Emerging and Zoonotic  
Division of Foodborne, Waterborne, and Environmental

# 為了避免生病，在接觸兩棲或爬行動物之後請洗手！

接觸兩棲動物（例如青蛙和蟾蜍）和爬行動物（例如烏龜、蛇和蜥蜴）可導致人類沙門氏菌感染。

殼長小於4英寸的小烏龜是著名的人類沙門氏菌感染源，尤其是幼兒容易感染。

由於這種風險，食品藥物管理局從1975年起禁止銷售這類烏龜。

沙門氏菌可引起程度不同程度的腹瀉，從輕度至重度時甚至可能危及生命。

即使看似健康乾淨的兩棲動物和爬行動物可能攜帶沙門氏菌。

沙門氏菌隨動物的排泄物排出，很容易沾染到它們的身體以及這些動物生活區中的任何物體。

糞在水池或玻璃箱中的兩棲和爬行動物會導致水被細菌污染，並由此傳染給人。

## 請保護您和您的家人不受細菌侵襲

### 應當：

在接觸或餵養兩棲動物或爬行動物、它們生活和爬過的區域中的任何物體或他們棲息的水之後立即用肥皂和水徹底清洗雙手。

成年人應該監督兒童洗手。

如果找不到肥皂和水，應當立即使用消毒手液，然後在能找到肥皂和水的時候盡快徹底清洗雙手。

為了防止污染，應當讓兩棲和爬行動物遠離廚房，以及與食品飲料加工、服務、和飲用有關的其它區域。

應當在室外清洗餵養箱、水箱以及用於餵養或攜帶兩棲動物和爬行動物的任何設備或物品。

請注意，這些設備和材料，包括水箱中的水，可能已被沙門氏菌及其他細菌污染。

### 切勿：

不要讓5歲以下兒童、老年人或免疫力弱的人觸摸兩棲動物或爬行動物。

不要將裝有兩棲動物或爬行動物的容器放在兒童的臥室，尤其是5歲以下兒童。

不要讓兩棲動物和爬行動物在家裏自由爬行。

不要在廚房水槽內清洗動物或其棲身容器。

如果使用浴缸清洗動物或其棲身容器，事後應當進行徹底清洗。

使用漂白劑，對浴缸或清洗兩棲動物或爬行動物棲身容器的其他地方進行消毒。

如果需要更多的資訊，請打電話1-800-CDC-INFO，或瀏覽 www.cdc.gov。



C5237042-A Photo Credit: Jim Capaldi September, 2010 www.flickr.com/photos/jcapaldi

美國國立新興與人畜共患傳染病中心  
食物傳播、水傳播和環境傳播疾病控制處



# Backyard Flocks



# Increasing Popularity of Live Poultry



Google Trends: “backyard chickens” as of August 28, 2013

# Urban Chickens



# Chicken Accessories



<http://www.npr.org/blogs/thesalt/2013/04/30/180135026/chicken-diapers-urban-fa>

# “Celebrity” Pets



# Therapy Chickens





## Neiman Marcus Beau Coop Heritage Hen Mini Farm

[http://www.neimanmarcus.com/christmasbook/media.jsp?itemId=cat45440759&icid=product\\_beaucoop](http://www.neimanmarcus.com/christmasbook/media.jsp?itemId=cat45440759&icid=product_beaucoop)

# Live Poultry-Associated Salmonellosis Outbreaks

## □ Past (1955–1990)

- Few outbreaks
- Spring
- Young children
- Dyed birds, pets



## □ Present (1990–2013)

- Multiple multistate outbreaks
- Year-round
- Adults and children
- Backyard flocks, pets



# Mail-Order Hatchery Industry, United States

- ❑ ~20 mail-order hatcheries supply baby birds
- ❑ >50,000,000 chicks sold annually
- ❑ One hatchery may supply across USA
- ❑ Baby poultry
  - Sold at feed stores
  - Ordered through the mail
  - Sold over the internet
- ❑ Business is booming due to increased demand
  - Backyard flocks
  - Urban chicken phenomenon

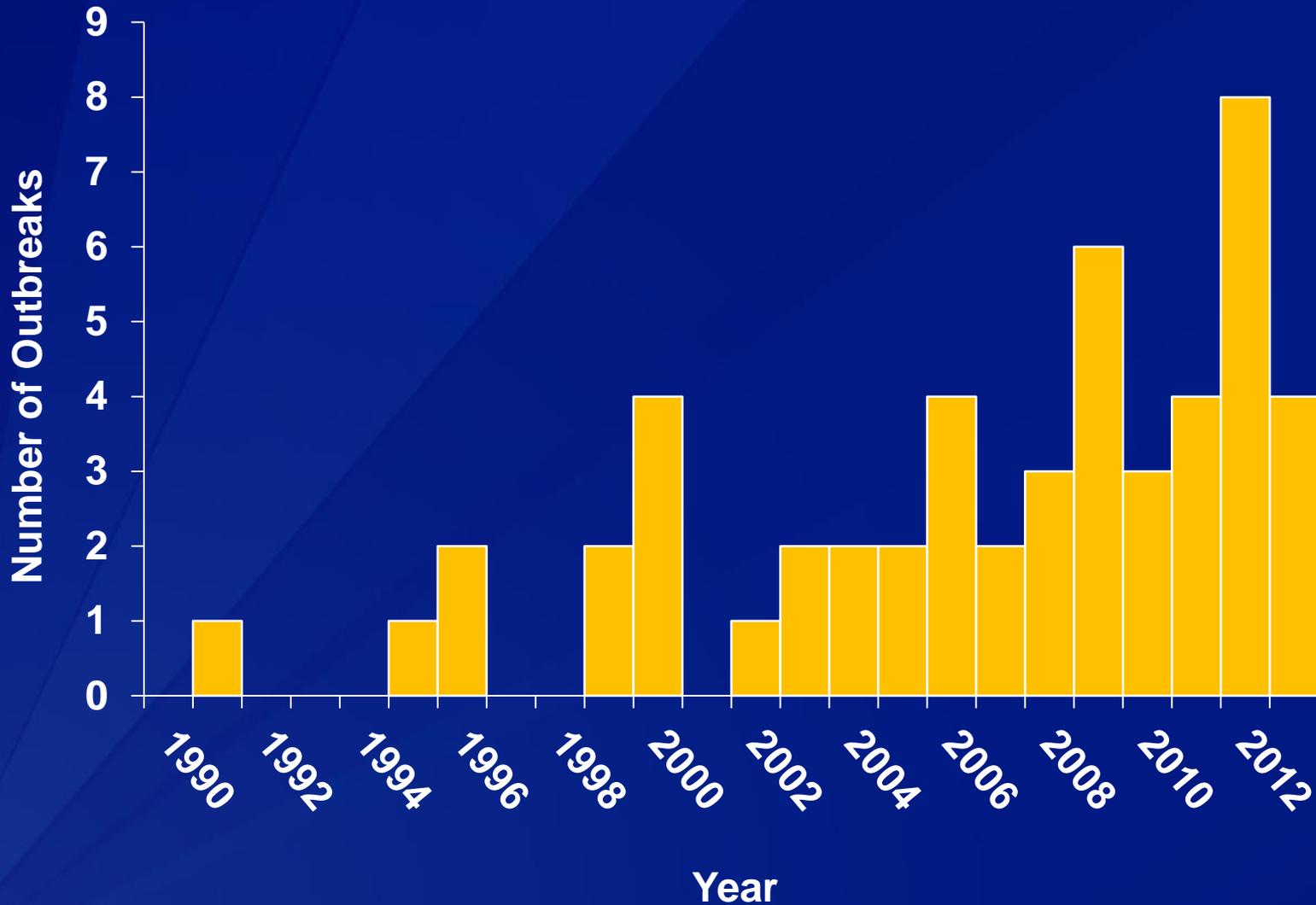


# Shipment of Live Baby Poultry

- ❑ **Cardboard boxes**
  - 100-120 chicks
  - 80 turkey poults
  - 60 ducklings
  - 32 goslings
  
- ❑ **One box may contain multiple species**
  
- ❑ **Opportunities for cross-contamination during shipment**

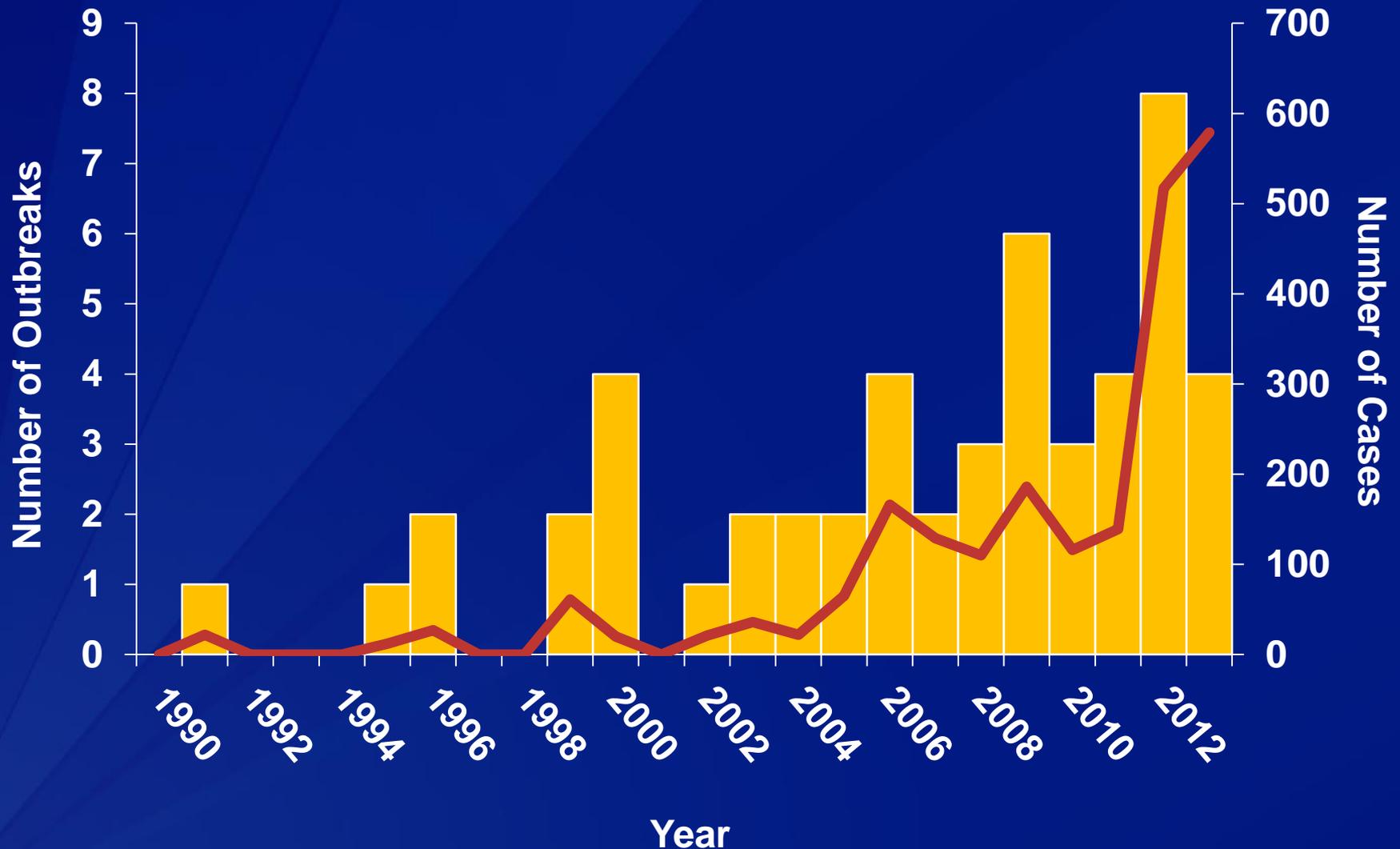


# Live Poultry-Associated Outbreaks — United States, 1990–2013



The findings and conclusions in this presentation are those of the presenter and do not necessarily represent the views of the Centers for Disease Control and prevention. Data are preliminary and subject to change.

# Live Poultry-Associated Outbreaks and Outbreak Associated Cases — United States, 1990–2013



The findings and conclusions in this presentation are those of the presenter and do not necessarily represent the views of the Centers for Disease Control and prevention. Data are preliminary and subject to change.

# Results

## Outbreaks

---

**n=51**

**Illnesses**

**2,228**

**Hospitalizations**

**306**

**Deaths**

**5**

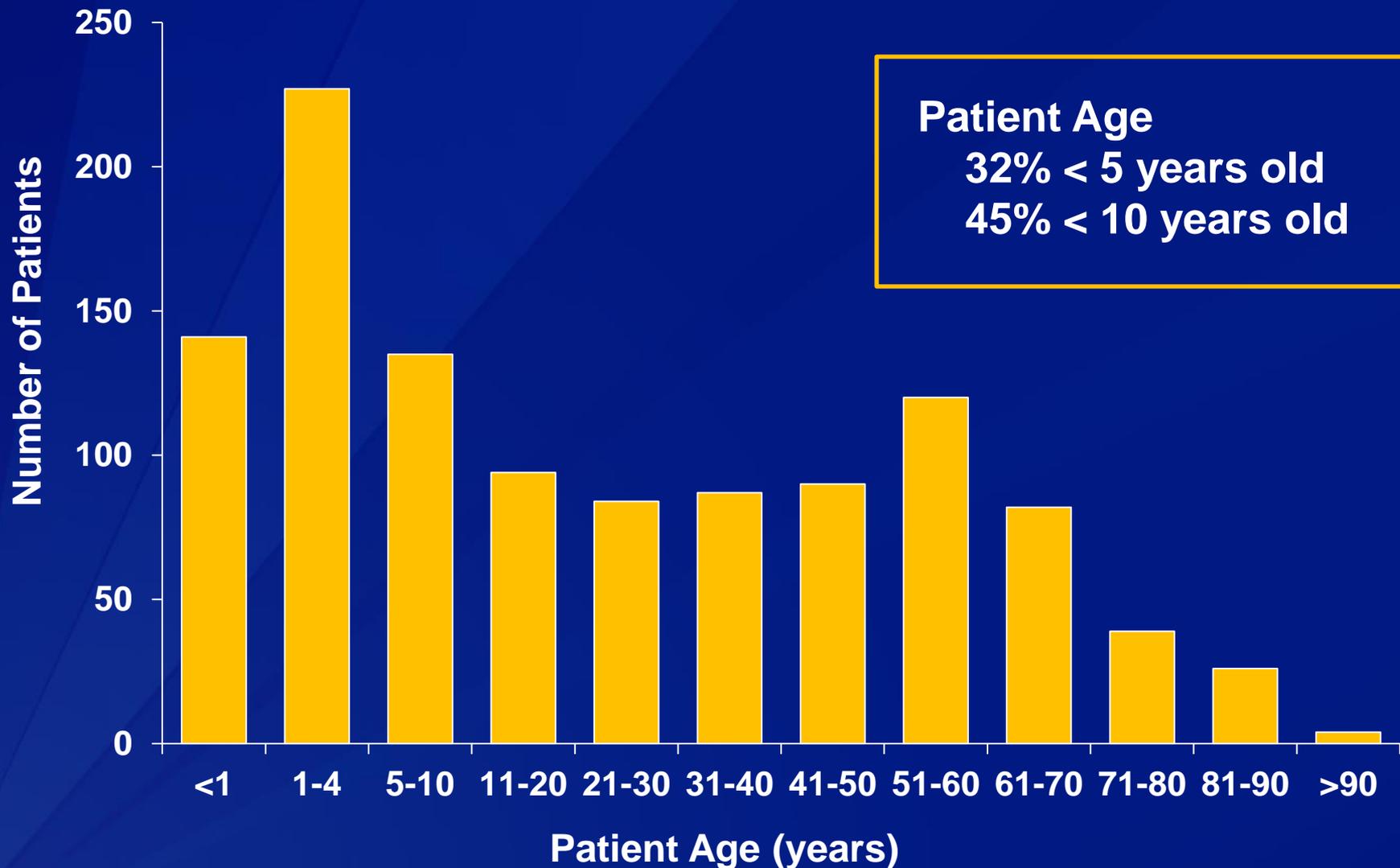
**Median number of illnesses  
(range)**

**25  
(4–356)**

**Median outbreak duration  
(range)**

**4.7 months  
(1–12)**

# Age Distribution of Persons with Poultry Associated Salmonellosis n=1,129



# Live Poultry Exposure Type

<b>Exposures</b>	<b>n=582</b>
<b>Adult poultry</b>	<b>117 (20%)</b>
<b>Baby poultry</b>	<b>373 (64%)</b>
<b>Chicks only</b>	<b>214 (57%)</b>
<b>Ducklings only</b>	<b>64 (17%)</b>
<b>Chicks and ducklings</b>	<b>83 (22%)</b>

# Baby Poultry Contact

**n=373**

---

## Contact location

<b>Home</b>	<b>277 (74%)</b>
<b>Other home</b>	<b>41 (11%)</b>
<b>Feed store</b>	<b>57 (15%)</b>

## Type of poultry contact

<b>Touched</b>	<b>281 (75%)</b>
<b>Held/snuggled</b>	<b>183 (49%)</b>
<b>Kissed</b>	<b>52 (14%)</b>

# Baby Poultry Exposure at Home

## Location of Chickens n=413

---

**Indoors** 188 (46%)

## Indoor Location n=188

**Living room** 29 (15%)

**Basement** 23 (12%)

**Kitchen** 22 (12%)

**Bedroom** 18 (10%)

**Bathroom** 18 (10%)

**Utility/Laundry Room** 17 (9%)

**Other Indoor** 44 (23%)

# Baby Poultry Exposure at Home

## Location of Chickens n=413

---

**Indoors** **188 (46%)**

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**Living room** **29 (15%)**

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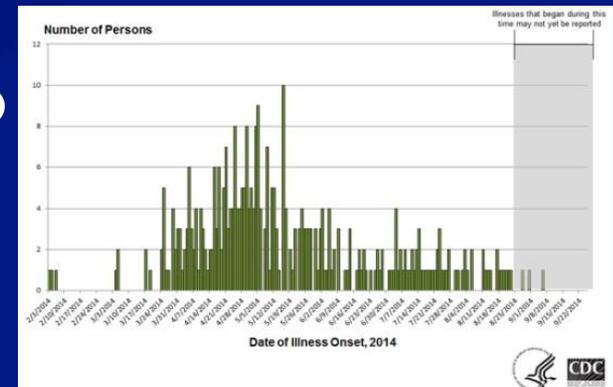
**Utility/Laundry Room** **17 (9%)**

**Other Indoor** **44 (23%)**

# 2014 Ongoing Multistate Outbreaks of Human *Salmonella* Infections Linked to Live Poultry\*

\*preliminary data, subject to change; as of December 07, 2014

- ❑ 363 illnesses in 43 states and Puerto Rico
- ❑ *Salmonella* Infantis, Newport, Hadar
- ❑ 33% hospitalized, no deaths
- ❑ Epidemiologic, laboratory, and traceback findings linked outbreak to contact with chicks, ducklings, and other poultry from Mt. Healthy Hatcheries in Ohio
- ❑ Same mail-order hatchery associated with multiple outbreaks since 2009



# Highlights from Recent Outbreak Investigations (2006-2013)

- ❑ Caterer contaminated food, caused outbreak in people with no direct live poultry contact
  - Caterer had backyard flock with chicks from implicated mail-order hatchery
- ❑ Chicken contact leading to a foodborne outbreak associated with infected delicatessen workers
- ❑ Poultry flock in daycare cause outbreak
- ❑ Death in nursing home resident, chicks from implicated hatchery brought into nursing home to improve morale
- ❑ Feed store employees become cases in outbreaks
- ❑ One sick postal worker who only handled chicks in the mail

# One Health Approach

- **Prevention Recommendations**
  - Mail-order hatchery interventions
  - Consumers
  - Feed stores
  - Human and animal health professionals





## USDA-National Poultry Improvement Plan



- ❑ Established in 1930's improvement of poultry and poultry products
- ❑ Voluntary partnership between industry and state and federal government
- ❑ Program to eliminate poultry diseases from breeder flocks – pathogens that cause illness in the poultry
  - *Salmonella enterica* serotypes Pullorum , Gallinarium and Enteritidis
  - *Mycoplasma, Mycoplasma, Mycoplasma,* and Avian Influenza
- ❑ Hatchery industry proposed a voluntary *Salmonella* monitoring program under NPIP for serotypes that make people sick

## One Health Success Stories

- ❑ **Multiple hatcheries have successfully eliminated certain outbreak strains of *Salmonella* that were repeatedly associated with their specific hatchery**
  - Improved biosecurity
  - Working with vet consultant
  - Routine environmental testing
  - Autogenous vaccines
  - Following NPIP guidance
  - Important to customize to the individual hatchery-unique operations



## After you touch ducklings or chicks, wash your hands so you don't get sick!



- Contact with live poultry (chicks, chickens, ducklings, ducks, geese, and turkeys) can be a source of human illness.
- Salmonella* germs can be found in people that are sick with salmonellosis, which is threatening.
- Chicks, ducklings, and ducklings can carry *Salmonella* germs that can make you sick.
- Salmonella* germs can easily contaminate areas where they live.

### Protect Yourself and Your Family from Salmonella

#### DO:

- Wash your hands thoroughly with soap and water right after touching live poultry or anything in the area where they live and roam.
- Adults should supervise hand washing for young children.
- If soap and water are not readily available, use hand sanitizer until you are able to wash your hands thoroughly with soap and water.
- Clean any equipment or materials associated with raising or caring for live poultry outside the house, such as cages or feed or water containers.

For more information, call 1-800-CDC-INFO or visit [www.cdc.gov](http://www.cdc.gov).



#### DON'T:

- Don't let children, elderly persons, or immunocompromised persons handle live poultry.
- Don't let live poultry enter your home, especially in a prepared, served, or outdoor patios.
- Don't snuggle or kiss live poultry, or eat or drink around them.

## Si toca pollitos o patitos, ¡lávese las manos para no enfermarse!



- El contacto con aves de corral vivas (como pollitos, gallinas, patitos, patos, gansos y pavos) puede ser una fuente de infección humana.
- Las bacterias de *Salmonella* pueden ser portadas por personas enfermas con salmonellosis, lo que puede ser grave o incluso la muerte.
- Los pollitos, los patitos y los patos pueden ser portadores de *Salmonella* y estar sanos y limpios.
- Las bacterias de *Salmonella* pueden contaminar áreas que parecen limpias, como las áreas que rodean a las aves.

### Protéjase usted y su familia de los microbios

#### LO QUE DEBE HACER:

- Lavarse las manos cuidadosamente con agua y jabón inmediatamente después de tocar aves de corral vivas o cualquier objeto ubicado en el área en que habitan o frecuentan.
- Los adultos deben vigilar que los niños pequeños se laven bien las manos.
- Si no hay agua ni jabón, use un producto limpiador para manos hasta que se las pueda lavar bien con agua y jabón.
- Limpe todos los equipos o materiales fuera de la casa que use en el cuidado y crianza de las aves de corral, como las jaulas o los recipientes para agua o alimentos.

Para más información, llame al 1-800-CDC-INFO o visite [www.cdc.gov](http://www.cdc.gov).



#### LO QUE NO DEBE HACER:

- No deje que los niños pequeños, los ancianos o las personas con sistemas inmunitarios debilitados toquen a los patitos o cualquier otra ave de corral viva.
- No mantenga aves de corral en los baños y en espacios que se preparan, sirven o almacenan alimentos, como la cocina o los comedores.
- No abra ni bese a las aves de corral, ni coma o beba cerca de ellas.

## Lavez vos mains après avoir touché des canetons ou des poussins pour ne pas être malade!



- Le contact avec la volaille (poussins, poulets, canetons, canards, oies et dindes) peut devenir une source d'infections à la *salmonelle* pour les humains.
- Des microbes de la *salmonelle* peuvent provoquer chez les humains une diarrhée, plus ou moins sévère ou même entraîner un risque vital.
- Poussins, canetons et autres volailles peuvent être contaminés par des microbes de la *salmonelle* et apparaître propres et en bonne santé.
- Des microbes de la *salmonelle* se retrouvent dans leurs déjections et peuvent facilement contaminer leurs corps et leur environnement.

### Protégez votre famille et vous-même contre les microbes

#### À FAIRE:

- Lavez vos mains avec de l'eau et du savon immédiatement après avoir touché de la volaille ou n'importe quoi dans leur environnement.
- Un adulte devrait apprendre aux jeunes enfants à se laver les mains.
- Si l'eau et le savon font défaut, utilisez du gel hydroalcoolique en attendant. Ensuite, lavez-vous bien les mains avec de l'eau et du savon dès que vous le pouvez.
- Nettoyez tous les équipements ou le matériel utilisés pour élever ou soigner la volaille à l'extérieur: cages ou récipients pour l'eau ou la nourriture, car les uns et les autres peuvent être une source d'infection.

#### À NE PAS FAIRE:

- Ne laissez pas les jeunes enfants de moins de 5 ans, les personnes âgées ou les personnes au système immunitaire affaibli toucher ou tenir des poussins, canetons ou autres volailles.
- Ne laissez pas la volaille entrer dans la maison, dans les salles de bains et surtout dans les endroits où la nourriture ou les rafraîchissements sont préparés, servis ou conservés comme la cuisine ou la terrasse.
- Ne câlinez pas ni embrassez les oiseaux, ne touchez pas votre bouche, ne mangez pas et ne buvez pas près de la volaille.



# Shipping *Salmonella* Education



The findings and conclusions in this presentation are those of the presenter and do not necessarily represent the views of the Centers for Disease Control and prevention. Data are preliminary and subject to change.

# Feed Store Poultry Sales - Past



# Feed Store Poultry Sales - Present



United States  
Department of  
Agriculture



Animal and Plant  
Health Inspection  
Service

Veterinary Services

National Poultry  
Improvement Plan

March 2014

# Best Management Practices Handbook



**A Guide to the Mitigation of  
*Salmonella* Contamination  
at Poultry Hatcheries**

[http://www.poultryimprovement.org/documents/  
BestManagementPracticesHatcheries.pdf](http://www.poultryimprovement.org/documents/BestManagementPracticesHatcheries.pdf)

# CDC Feature: Keeping Backyard Poultry

The screenshot shows a web browser window displaying the CDC website page for 'Keeping Backyard Poultry'. The browser's address bar shows the URL <http://www.cdc.gov/Features/SalmonellaPoultry/>. The page has a navigation menu on the left with categories like 'Current Features', 'Data & Statistics', and 'Diseases & Conditions'. The main content area features a title 'Keeping Backyard Poultry' with a sub-header 'CDC Features > Features by Date'. Below the title is a social media sharing section with 'Recommend' (375), 'Tweet', and 'Share' buttons. A large image of white chickens is shown, followed by a text box that reads: 'Live poultry, such as chickens, ducks, geese, and turkeys, often carry harmful germs called *Salmonella*. After you touch a bird, or anything in the area where they live and roam, wash your hands so you don't get sick!'. Below this, a paragraph explains that an increasing number of people are keeping live poultry, and another paragraph states that it's common for poultry to carry *Salmonella*. A smaller image of chickens is shown to the right of the text. The page also includes a sidebar with social media links for Facebook, Twitter, and RSS, and a 'CDC 24/7' logo with the tagline 'Saving Lives. Protecting People.' and a 'Get email updates' form. The browser's status bar at the bottom indicates 'Trusted sites | Protected Mode: Off' and '100%' zoom.

# Increasing Awareness among Health Professionals



Meet your new neighbors

Chickens are moving from the henhouse to the backyard and looking for veterinary care

By Joe Kaiser

JAVMA 2013; Vol. 234, No. 4



THE OFFICIAL NEWSMAGAZINE OF THE AMERICAN ACADEMY OF PEDIATRICS

## AAP News

Volume 34 • Number 7  
July 2013  
[www.aapnews.org](http://www.aapnews.org)

### Focus On Subspecialties

## How to protect patients, families from enteric zoonoses

by Karen P. Neil, M.D., M.S.P.H., FAAP

Pediatricians can alert children and their families to emerging issues they may not be aware of that can help prevent illness. One such issue is an increased number of enteric illness outbreaks detected by public health surveillance that are linked to pet ownership and animal contact.

Roughly 74 million U.S. households have one or more pets, according to the American Veterinary Medical Association. Pet ownership and other types of animal contact provide many benefits to people. However, certain animals are not appropriate pets for high-risk groups, including children under 5 years of age, immunocompromised persons and adults over 65 years of age.

Enteric illnesses such as *Salmonella*, *Escherichia coli* O157:H7 and *Campylobacter* are most commonly transmitted through contaminated food. However, these bacteria are among the many zoonotic pathogens that pets and other animals can spread to people. Illnesses and outbreaks of enteric zoonotic diseases (i.e., zoonoses) have been linked to exposure to many different kinds of animals in public and private settings (*MMWR Recomm Rep*. 2011;60[RR-04]:1-24).

In addition to pet ownership, public venues such as animal exhibits, farms, stores, schools and child care facilities offer opportunities for children to contact animals. Petting zoos and backyard poultry flocks also are becoming increasingly popular.



While pets can provide many benefits, some animals can carry enteric zoonotic pathogens that can spread to people. Pediatricians have a role in educating patients and their families about the risks for contracting *Salmonella* infection associated with certain pets, including rodents such as mice, hamsters and guinea pigs.

Cats and dogs, particularly puppies and kittens. Infected animals can appear clean and healthy while still shedding pathogens that can lead

AAP News 2013; Vol. 34, No. 7

# Spreading the word to backyard flock owners

facebook Search for people, places and things

**The Chicken Whisperer** Timeline Now

**Bonnie Jean Moore LaPier** I can't wait till ge rid of this stupid dial-up so I can tune in to listen!!! They said by August!!! Yeah, I can't wait!!!!!!!!!!!!!! 😊  
May 4 at 9:59pm · Like

Write a comment...

**The Chicken Whisperer** shared a link.  
May 3

As the National Spokesperson for the USDA-APHIS Bio-Security for Birds Program, I was informed by my contact at the CDC that there is currently another outbreak of salmonella linked to live poultry. They are actively checking the DNA of the... [See More](#)

 **Salmonella | Infections Linked to Live Poultry | Apr, 2013 | CDC**  
www.cdc.gov  
Multistate Outbreak of Salmonella Infections Linked to Live Poultry

Like · Comment · Share 13

25 people like this.

**Linda Krueger Moore** Where is the outbreak?  
May 3 at 10:23am · Like · 6

**Becky White Ballard** yes what are the locations ? Do you know?  
May 7 at 7:50pm · Like

Write a comment...

**The Chicken Whisperer**  
May 2

Kidneys, Urine and Salt Excretion in Birds is today's topic with

ACREAGE LIFE presents

# Chicken Whisperer

magazine

Featuring Andy Schneider

Chicken Scratch

## Summer chicken challenges

Plain Talk  
Bird banding and your flock

Hot Topics  
Egg washing: When and how

Healthy Flock  
Outside for a reason

Pitovsky's Poultry  
Understanding wild

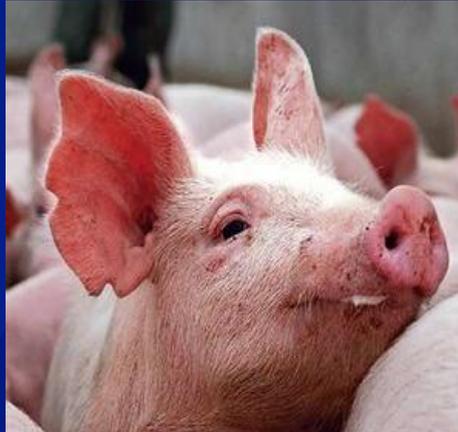
Learning Wagon  
Setting up a school flock

Ask the Doctor  
Vaccine supplements basics

REAL REVIEWS  
The Chicken Fountain



# Farm Animals



# Outbreaks and Animal Exhibits

- ❑ **200 outbreaks reported to CDC since 1996\***
  - **78% of illnesses by *E. coli*, *Salmonella*, and *Cryptosporidium***
  - **49% of illnesses associated with fairs, farm visits, and petting zoos**
  - **13% of settings involved daycares, schools and universities**

*\*Unpublished data – preliminary and subject to change*

# Outbreak Trends



- ❑ Small ruminants, pre-weaned calves
- ❑ Long-term environmental contamination
- ❑ Improper animal facility design
- ❑ Lack of awareness of risks
- ❑ Inadequate hand-washing facilities
- ❑ Food/drinks near animal exhibits
- ❑ Lack of close supervision of children
- ❑ Hand-to-mouth activities of children
- ❑ School and nursery settings

# Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2013

2013 Compendium  
located at:

<http://avmajournals.avma.org/toc/javma/243/9>



## Public Veterinary Medicine: Public Health

### Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2013

National Association of State Public Health Veterinarians Animal Contact Compendium Committee 2013

#### Preface

The Compendium of Measures to Prevent Disease Associated with Animals in Public Settings has been published by the NASPHV and CDC since 2003.<sup>1</sup> The compendium provides standardized recommendations for public health officials, veterinarians, animal venue operators, animal exhibitors, visitors to animal venues and exhibits, and others concerned with control of disease and with minimizing health risks associated with animal contact in public settings. The report has undergone several revisions, and this document substantially updates information provided in the 2011 compendium.<sup>2</sup>

#### Introduction

Contact with animals in public settings (eg, fairs, educational farms, petting zoos, and schools) provides opportunities for entertainment and education. The NASPHV understands the positive benefits of human-animal contact. However, an inadequate understanding of disease transmission and animal behavior can increase the likelihood of infectious diseases, rabies exposures, injuries, and other health problems among visitors, especially children, in these settings. Zoonotic diseases (ie, zoonoses) are diseases transmitted between animals and humans. Of particular concern are instances in which zoonotic disease outbreaks result in numerous persons becoming ill. During 1991 through 2005, the number of enteric disease outbreaks associated with animals in public settings increased.<sup>3</sup> During 1996 through 2012, approximately 200 human infectious disease outbreaks involving animals in public settings were reported to the CDC. Such outbreaks have

#### ABBREVIATIONS

HUS	Hemolytic-uremic syndrome
NASPHV	National Association of State Public Health Veterinarians
STEC	Shiga toxin-producing <i>Escherichia coli</i>

substantial medical, public health, legal, and economic effects.

Although eliminating all risk from animal contacts is not possible, this report provides recommendations for minimizing associated disease and injury. The NASPHV recommends that local and state public health, agricultural, environmental, and wildlife agencies use these recommendations to establish their own guidelines or regulations for reducing the risk for disease from human-animal contact in public settings. Public contact with animals is permitted in numerous types of venues (eg, animal displays, petting zoos, animal swap meets, pet stores, feral stores, zoological institutions, nature parks, circuses, carnivals, educational farms, livestock birthing exhibits, agricultural fairs, child-care facilities or schools, camps, agritourism venues, and live animal markets) and other situations (eg, wildlife photo opportunities). Managers of these venues should use the information in this report in consultation with veterinarians, public health officials, or other professionals to reduce risks for disease transmission.

Guidelines to reduce risks for disease from animals in health-care facilities, veterinary facilities, and various other occupational settings and from service animals (eg, therapy dogs) have been developed.<sup>4,5</sup> Although not specifically addressed here, the general principles

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## Appendix 3

### Guidelines for Exhibition of Animals in School and Child-Care Settings

#### General Guidelines

- Animals are effective and valuable teaching aids, but safeguards are required to reduce the risk for infection and injury. Other groups have developed recommendations similar to those provided here.<sup>174,202,204</sup>
- Ensure that teachers and staff know which animal species are inappropriate as residents or visitors to the facility and which animals should not be in direct contact with children (See animal-specific guidelines in this Appendix).
- Ensure that personnel providing animals for educational purposes are knowledgeable regarding animal handling and zoonotic disease issues. Persons or facilities that display animals to the public should be licensed by the USDA.
- Inform parents of the presence of animals as well as the benefits and potential risks associated with animals in school classrooms. Consult with parents to determine special considerations needed for children who are immunocompromised, have allergies, or have asthma.
- Educate children about germs and proper hand-washing technique.
- Wash hands after contact with animals, animal products or feed, or animal environments.
- Supervise human-animal contact, particularly involving children < 5 years of age.
- Display animals in enclosed cages or under appropriate restraints.
- Do not allow animals to roam, fly free, or have contact with wild animals.
- Designate specific areas for animal contact. Do not allow food or drink in animal contact areas; do not allow animals in areas where food and drink are stored, prepared, served, or consumed.
- Clean and disinfect all areas where animals and animal products have been present. Children should perform this task only under adult supervision.
- Do not clean animal cages or enclosures in sinks or other areas used to store, prepare, serve, or consume food and drinks.
- Obtain a certificate of veterinary inspection, proof of rabies vaccination, or both according to local or state requirements for the species being exhibited. Also, ensure veterinary care, including preventive health programs for endo- and ectoparasites, as appropriate for the species.

#### Animal-Specific Guidelines

Refer to the general guidelines for animals that do not have specific recommendations provided in this section (eg, nonsittacine birds; domestic dogs, cats, rabbits, and rodents [including mice, rats, hamsters, gerbils, guinea pigs, and chinchillas]).

- Guide, hearing assistance, or other service animals and animals used in law enforcement: These may be used in accordance with recommendations from the sponsoring organizations when they are under the control of a person familiar with the specific animal.
- Psittacine birds (eg, parrots, parakeets, and cockatiels): Consult the psittacosis compendium<sup>174</sup> and seek veterinary advice.
- Reptiles (eg, turtles, snakes, and lizards): Do not keep reptiles in facilities with children < 5 years of age, and do not allow children < 5 years of age to have direct contact with these animals.
- Amphibians (eg, frogs, toads, salamanders, and newts): Do not keep amphibians in facilities with children < 5 years of age, and do not allow children < 5 years of age to have direct contact with these animals.
- Live poultry (eg, chicks, ducklings, and goslings): Do not keep live poultry in facilities with children < 5 years of age, and do not allow children < 5 years of age to have direct contact with these animals.
- Ferrets: Do not keep ferrets in facilities with children < 5 years of age, and do not allow children < 5 years of age to have direct contact with these animals to avoid bites. Ferrets should be up to date for rabies vaccination.
- Farm animals: Certain animals (eg, calves, goats, and sheep) intermittently excrete substantial numbers of germs; therefore, these farm animals are not appropriate in facilities with children < 5 years of age and should not be displayed to older children in school settings unless meticulous attention to personal hygiene can be ensured.
- Fish: Use disposable gloves when cleaning aquariums, and do not dispose of aquarium water in sinks used for food preparation or for obtaining drinking water.
- Animal products: Assume that products such as owl pellets and frozen rodents used to feed reptiles are contaminated with *Salmonella* organisms. Dissection of owl pellets should not be performed in areas where food is stored, prepared, served, or consumed. Children < 5 years of age should not be allowed to have direct contact with animal products unless the products have been treated to eliminate germs.

#### Animals Not Recommended in School or Child-Care Settings

- Inherently dangerous animals (eg, lions, tigers, cougars, and bears).
- Nonhuman primates (eg, monkeys and apes).
- Mammals at high risk for transmitting rabies (eg, bats, raccoons, skunks, foxes, and coyotes).
- Aggressive or unpredictable wild or domestic animals.
- Stray animals with unknown health and vaccination history.
- Venomous or toxin-producing spiders, insects, reptiles, and amphibians.
- Animals that present a high risk for zoonotic disease transmission (eg, reptiles, amphibians, and live poultry) or bites (eg, ferrets).



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## Animals in Schools and Daycare Settings

Recommend Tweet Share

**Animals can provide important opportunities for entertainment and learning. However, there is also a risk for getting sick or hurt from contact with animals, including those in school and daycare classrooms.**

Animals can be effective and valuable teaching aids for children, but there is a risk of illness and injury from contact with animals. Young children are especially at risk for illness because their immune systems are still developing and because they are more likely than others to put their fingers or other items into their mouths, a behavior that can spread germs. Also, infectious disease outbreaks have been caused by contaminated animal products used for educational activities in schools, such as owl pellets for dissection. Many adults and children have become very ill from infections they caught while visiting [animal exhibits or farms](#) during field trips or from animals kept in classrooms. When people forget to [wash their hands](#) right after touching an animal or its habitat, or bring food or drinks into areas where animals live or roam, they increase their risk for becoming ill.



To learn more about infectious diseases that are associated with animals and to help reduce the risks of getting sick or hurt from them, read the questions and answers below.

### What types of diseases can animals spread? Can they cause injuries?

In the United States, the biggest risk of human illnesses from animals, especially to young children, is getting infected with germs like [Salmonella](#), [E. coli O157:H7](#) and others that cause vomiting, diarrhea, fever, and abdominal cramping. Animals can also carry germs that cause other kinds of diseases, such as [rabies](#). Animals may have germs on their bodies and in their droppings, even when they appear clean and healthy. The germs can also get on cages, bedding, and wherever animals roam or walk around, and can contaminate these areas.

Injuries caused by animals in public settings include bites, kicks, scratches, and others. Most injuries from animals can be prevented if schools and daycare classrooms follow proper safety precautions.

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What's this?



# Some pets are not right for some people.

- ❑ Risky pets, linked to many outbreaks
  - Reptiles
  - Amphibians
  - Poultry
  
- ❑ People at highest risk for serious illness
  - Children aged < 5 years
  - Pregnant women
  - People with weakened immune systems
  - Senior citizens, >65 years

**Where can I get more information on outbreaks and zoonoses?**



# Pet-related *Salmonella* Outbreaks

## <http://www.cdc.gov/zoonotic/gi/>

CDC Home



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## Zoonotic Diseases (Diseases from Animals)

### Gastrointestinal (Enteric) Diseases from Animals

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## Gastrointestinal (Enteric) Diseases from Animals

Animals provide many benefits to people. However, some animals can carry diseases that can be shared with people. Zoonotic diseases or zoonoses are diseases caused by germs (pathogens) that can be spread between animals and humans. Many germs have been responsible for illnesses and outbreaks, including *Salmonella*, *E. coli* O157:H7, and *Cryptosporidium*. These germs can come from many types of animals, including pets, wild animals, and farm animals. Did you know that infected animals can make you sick, even if they appear healthy and clean?

Zoonotic diseases can cause many different illnesses in people. Gastrointestinal (enteric) zoonoses are one type of illness that can upset the digestive system (stomach and intestines) and can make people sick.

### Additional Resources

[Healthy Pets Healthy People](#)

[Reports of Selected \*Salmonella\* Outbreak Investigations](#)

[Multistate Foodborne Outbreak Investigations](#)

[Compendium of Measures to Prevent Disease Associated with Animals in Public](#)

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### Keeping Pets Healthy Keeps People Healthy Too!

The pets sharing our world provide love, comfort, and companionship. Pets are not only fun to play with but also important to our lives. Studies have shown that the bond between people and their pets can increase fitness, lower stress, and bring happiness to their owners. But there's something else you should know.

In recent years, thousands of people have become sick because of contact with animals. Although the spread of diseases from animals to people is rare, pets do sometimes carry germs that can make people sick. The diseases people get from animals are known as zoonotic (zoe-oh-NOT-ic) diseases.

It is hard to know which animals could be carrying zoonotic diseases, especially since pets carrying these germs often look healthy and normal. Here are some simple actions that can help you and your pets stay healthy:

- Take your pet to its veterinarian regularly so it stays in good health.
- Practice good hygiene around your pets so they don't unintentionally pass germs to you.
- Learn about diseases different types of pets can spread - just in case.

[More](#) >

### U.S.-Based Outbreaks

[Live Poultry - \*Salmonella\* Infantis and Newport](#)  
Announced May 2014

[Pet Bearded Dragons - Human \*Salmonella\* Cotham Infections](#)  
Announced April 2014

### CDC Experts Talk About Pets and Your Health

Facts and details help you, or your patients, live happily with your pets - while staying healthy. In collaboration with Medscape.

[Risks From Pets and Pet Food: Major Outbreaks of Enteric Zoonoses in 2012](#) #P

This slideshow presents information on major outbreaks of enteric

## Final Remarks...

- ❑ Some people are at higher risk for serious illness.
- ❑ It's not always the food!
- ❑ Zoonotic outbreaks are becoming more common.
- ❑ **Ask the right questions, ask them early.**
- ❑ Work with One Health team to solve outbreak and continue working together to identify gaps, make recommendations for improvement, and help prevent the next outbreak.
- ❑ This can be done in the absence of regulation.

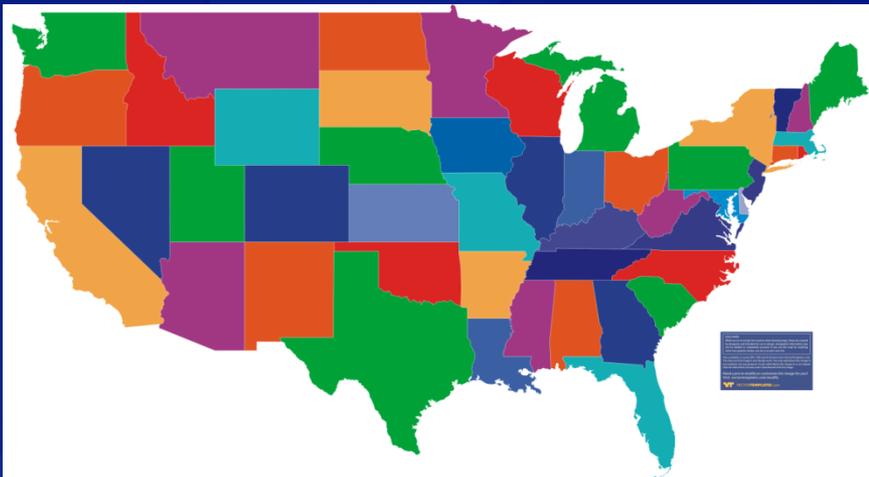
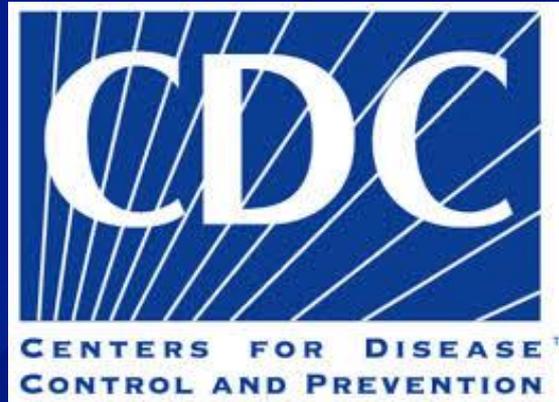
## Final Remarks...

- ❑ Develop collaborative prevention campaigns to educate the public that healthy animals can carry germs that can make people sick.
- ❑ **Involve industry: breeders, distributors, retailers, industry organizations.**
- ❑ Document every outbreak to highlight recurring problems, drive long term goals to make changes.
- ❑ Inform policy makers about recurring problems, high risk practices, areas for improvement, and recommendations.
- ❑ Partner with stakeholders to share information and recommendations with goal of preventing illnesses and death.

**There is a right pet out there for everyone...  
but not all pets are right for all people.**

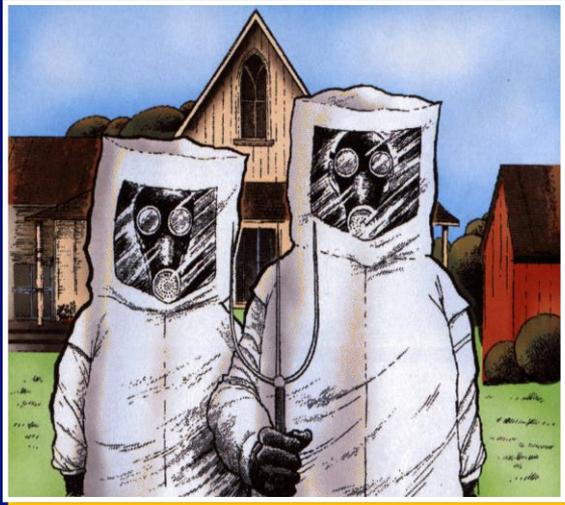


# Acknowledgements



**State and local health departments**

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