

Hot Topics in Zoonotic Diseases

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

National Center for Emerging and Zoonotic Infectious Diseases
One Health Office



The health of humans is connected to the health of animals and the environment.



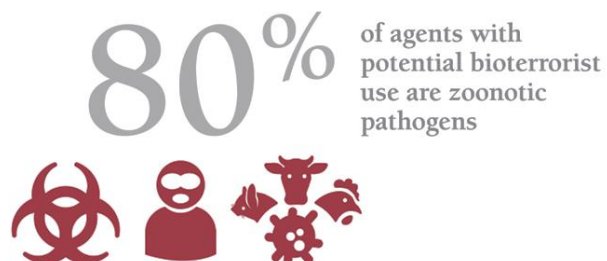
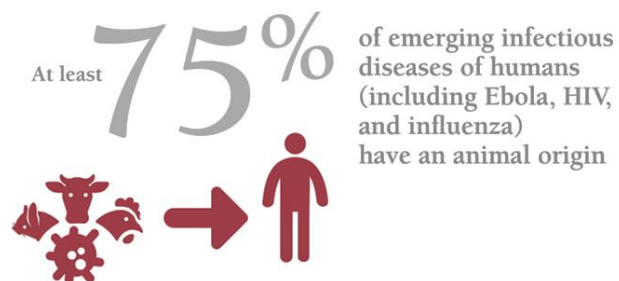
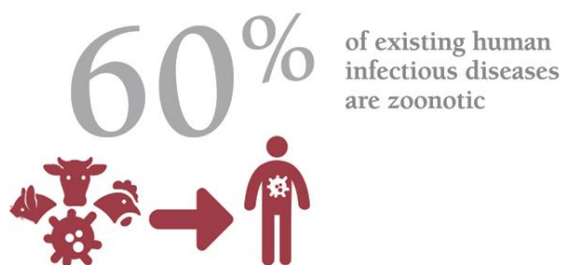
Animal-Human Interactions

- ❑ **Benefits of human-animal contact**
- ❑ **Provides opportunities for entertainment, education, companionship**
- ❑ **Important part of our food supply**
- ❑ **Millions of human-animal interactions each year, both at home and away**



Zoonotic Diseases

Zoonoses spread between animals and humans



Selected Zoonoses

Parasites

- *Intestinal parasites*
 - *Toxocara spp. and Ancylostoma spp.*
 - *Giardia*
 - *Cryptosporidium*
- *External parasites (fleas, ticks)*
 - *Exposure to Vector-borne diseases*
 - *Lyme, RMSF*
 - *Plague (Yersinia pestis)*
 - *Tularemia*
- *Toxoplasma gondii*

Skin conditions

- *Ringworm (Dermatophytes)*
- *MRSA (Methicillin-resistant Staphylococcus aureus)*

Enteric pathogens

- *Salmonella spp.*
- *Escherichia coli*
- *Campylobacter*
- *Listeria*

High Consequence Zoonoses

- *Rabies*
- *Brucellosis*
- *Leptospira spp.*
- *Rat Bite Fever*
- *LCMV*
- *Q fever*

For more information, visit the CDC
Healthy Pets Healthy People webpage:
www.cdc.gov/healthypets/

Transmission of Zoonoses

- **Direct Contact**
 - *Petting, handling, secretions, excretions*
 - *Bodies (fur, feathers, scales) may be contaminated*
 - *Bites, scratches*
- **Indirect Contact**
 - *Environment where animals live*
 - *Respiratory droplets, fomites*
- **Foodborne**
 - *Eating raw, undercooked, or contaminated animal products (milk, eggs, meat)*
 - *Eating food contaminated by animals near growing fields (fruits, vegetables)*
- **Vector-borne**
 - *Bite of infected flea, tick, or mosquito*



Foodborne infections from contaminated foods: Common, costly and preventable



❑ Foodborne illness

- 48 million illnesses
- 128,000 hospitalized
- 3,000 deaths

Scallan et al (2011) EID 17: 7-15, 16-22

It is not only food: Zoonotic outbreaks becoming more common



Zoonotic Salmonellosis in Humans

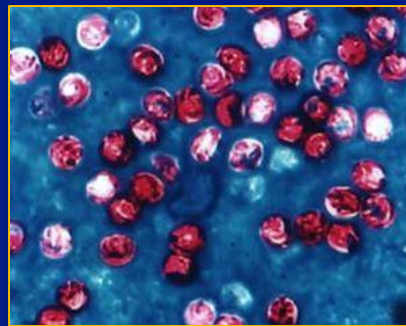
- ❑ Estimated 11% of human *Salmonella* infections from animal contact
 - Highest morbidity and mortality among enteric zoonoses
 - 48% hospitalizations
 - 62% deaths
 - Children disproportionately affected

Hale et al., 2012



Outbreaks and Animal Exhibits

- **200 outbreaks** reported to CDC (1996-2012)
 - **78%** of illnesses caused 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



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**
- ❑ Highest risk: Young children, people with weakened immune systems, pregnant women, seniors >65 years**
- ❑ Hospitalizations and death can occur**

Populations at Highest Risk for Serious Illness

- Young children aged < 5 years
- Older persons >65 years
- Immunocompromised persons
- Pregnant women



Animals can appear healthy and clean but be carrying germs that can make people sick.



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**
- **Long-term environmental contamination**

Salmonella



Learn More about Multistate Outbreak of *Salmonella* Agbeni Infections Linked to Pet Turtles



QUESTIONS & ANSWERS

FOR HEALTHCARE PROFESSIONALS

DIAGNOSIS & TREATMENT

SURVEILLANCE

PREVENTION

PUBLICATIONS

Every year, [Salmonella is estimated](#)  [PDF - 1 page] to cause one million foodborne illnesses in the United States, with 19,000 hospitalizations and 380 deaths. Most persons infected with *Salmonella* develop diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. The illness usually lasts 4 to 7 days, and most persons recover without treatment. However, in some persons, the diarrhea may be so severe that the patient needs to be hospitalized.

Salmonella Outbreaks

- Multistate Outbreak of *Salmonella* Urbana Infections Linked to Imported Maradol Papayas
- Multistate Outbreak of *Salmonella* Newport and Infantis Infections Linked to Imported Maradol Papayas
- Multistate Outbreak of *Salmonella* Anatum Infections Linked to Imported Maradol Papayas
- Multistate Outbreak of *Salmonella* Agbeni Infections Linked to Pet Turtles
- Multistate Outbreak of *Salmonella* Thompson, *Salmonella* Kiambu, *Salmonella* Agona, and *Salmonella* Gaminara Infections Linked to Imported Maradol Papayas
- Multistate Outbreak of Multi-drug Resistant *Salmonella* Heidelberg Infections Linked to Dairy Bull Calves
- Multistate Outbreaks of Human *Salmonella* Infections Linked to Live Poultry in Backyard Flocks

CDC
Salmonella
Website



Multistate Outbreaks of Human *Salmonella* Infections Linked to Live Poultry in Backyard Flocks, 2017 (Final Update)



- [Case Count Maps](#)
- [Live Poultry FAQ](#)

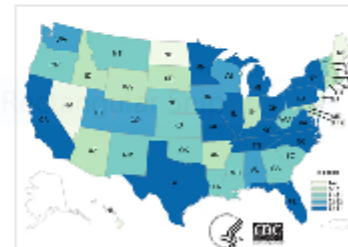
Posted October 19, 2017 11:00 AM ET

These outbreak investigations are over. However, people can still get a *Salmonella* infection from live poultry, including those in backyard flocks. Read [more information about *Salmonella* from live poultry](#) and how people can reduce the chance they or their children will get an infection.

Outbreak Summary

1120	48	249	1
Cases	States	Hospitalizations	Death

- This year saw the largest number of illnesses linked to contact with backyard poultry ever recorded by CDC. Contact with live poultry or their environment can make people sick with *Salmonella* infections. Live poultry such as chickens and ducks can be carrying *Salmonella* bacteria but appear healthy and clean, with no sign of illness.
 - As raising backyard flocks becomes more popular, more people are having contact with chickens and ducks – and may not know about the risk of *Salmonella* infection.
- These outbreaks are a reminder to follow steps to keep your family healthy while enjoying your



[CLICK TO VIEW CASE COUNT MAPS](#)

Enteric Zoonoses Outbreak Announcements

Multistate Outbreak of Multidrug-Resistant *Campylobacter* Infections Linked to Contact with Pet Store Puppies



Posted October 3, 2017 2:00 PM ET

Outbreak Advisory

55 Cases	12 States	13 Hospitalizations	0 Deaths
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- [Read Advice to Pet Owners and Advice to Pet Store Workers.](#)
- [Read Advice to Clinicians and Advice to Veterinarians.](#)
- The Ohio Department of Health, several other states, the Centers for Disease Control and Prevention (CDC), and the U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) are investigating a multistate outbreak of human *Campylobacter* infections linked to puppies sold through Petland, a national pet store chain.
- 16 more ill people with a *Campylobacter* infection linked to the outbreak have been reported since September 11, 2017. The most recent illness began on September 12, 2017.
- As of October 3, a total of 55 people with laboratory-confirmed infections or symptoms consistent with *Campylobacter* infection who live in 12 states (Florida, Kansas, Maryland, Missouri, New Hampshire, New York, Ohio, Pennsylvania, Tennessee, Utah, Wisconsin, and Wyoming) have been linked to this outbreak.
 - 14 people are Petland employees from 5 states.
 - 35 people either recently purchased a puppy at Petland, visited a Petland, or visited or live in a home with a puppy sold through Petland before illness began.
 - 1 person had sexual contact with a person with a confirmed illness linked to Petland.
 - 4 people were exposed to puppies from various sources.
 - 1 person had unknown puppy exposure.
- Ill people range in age from <1 year to 86 years, with a median age of 23 years; 38 (69%) are female; and 13 (24%) report being hospitalized. No deaths have been reported.
- Epidemiologic and laboratory evidence indicates that puppies sold through Petland stores are a likely

Language: English (US) ▼

Multistate Outbreak of Multidrug-Resistant *Salmonella* Heidelberg Infections Linked to Contact with Dairy Bull Calves



Posted August 2, 2017, 3:00 PM ET

Outbreak Advisory

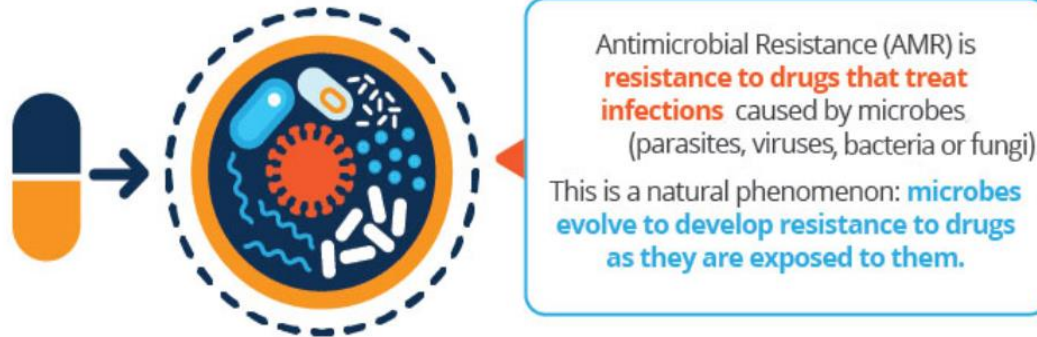
46 Case Count	14 States	0 Deaths	14 Hospitalizations
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- [Read the Advice to Calf Handlers and Veterinarians](#)
- [Read the Information for Health Care Providers](#)
- CDC, several states, and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) are reopening the investigation of a multistate outbreak of multidrug-resistant *Salmonella* Heidelberg infections.
- Ten more people infected with the outbreak strains of *Salmonella* Heidelberg have been reported since March 20, 2017, when CDC closed the outbreak investigation.
 - Whole genome sequencing on clinical samples from ill people showed a close genetic relationship between the bacteria that sickened people after March 20, 2017, and the bacteria that sickened people before that time. This means that people in both groups were more likely to share a common source of infection and that this outbreak is ongoing.
- A total of 46 people infected with the outbreak strains of *Salmonella* Heidelberg have been reported from 14 states.
 - 14 (30%) people have been hospitalized. No deaths have been reported.
 - Illnesses started on dates ranging from January 27, 2015 to July 11, 2017.
 - 15 (33%) people in this outbreak are children under the age of 5.
- Epidemiologic and laboratory investigations linked ill people in this outbreak to contact with calves

Tips to Stay Healthy While Working with Farm Animals

- Always wash your hands thoroughly with soap and water right after touching livestock, equipment for animals, or anything in the area where animals live and roam.
 - Use dedicated clothes, shoes, and work gloves when working with livestock. Keep and store these items outside of your home.
 - Work with your veterinarian to keep your animals healthy and prevent diseases.
- [Read more information](#) about how to stay healthy while handling livestock.

Antibiotic Resistance and One Health



Why is Antibiotic Resistance a One Health Problem?



Antibiotic Resistance and One Health

CDC is working to prevent Antibiotic Resistance and Promote Antibiotic Stewardship



Detect and describe resistant bacteria rapidly.

Increase state laboratory capacity to rapidly uncover foodborne drug-resistant bacteria, including *Campylobacter* and *Salmonella*, using whole genome sequencing (WGS).



Find outbreaks faster by increasing lab testing.

Test every *Salmonella* isolate for drug resistance.



Improve health outcomes.

With increased lab capacity, track and investigate life-threatening *Salmonella* infections to prevent outbreaks and provide rapid response.



Promote responsible antibiotic use in food-producing animals.

Ensure practicing veterinarians have the tools, information, and training to prevent drug resistance by promoting responsible use of antibiotics.

Brucellosis

Brucellosis

Brucellosis Homepage

Transmission

Signs & Symptoms

Risk of Exposure



Treatment

Prevention

Clinicians



Exposure to RB51 through Raw Milk or Milk Products

Patients with Suspected Infection

Bacterial Isolation

Serology

Humans & *Brucella* Species

Laboratory Personnel



Veterinarians



References & Resources



[CDC](#) > [Brucellosis Homepage](#) > [Clinicians](#)

Exposure to RB51 through Raw Milk or Milk Products: How to Reduce Risk of Infection



People who have consumed raw milk or raw milk products that are potentially contaminated with RB51 are at **high risk** for brucellosis infection. For these people, symptom monitoring and antibiotics to prevent infection (also called post-exposure prophylaxis (PEP)) is recommended.

PEP for RB51 should include:

- Doxycycline, in addition to trimethoprim-sulfamethoxazole or another suitable antimicrobial, for 21 days

Those with contraindications to doxycycline or trimethoprim-sulfamethoxazole should consult with their health care provider.

Prophylaxis for exposure to *Brucella* species other than RB51 routinely consists of a combination of doxycycline and rifampin. RB51, however, is resistant to rifampin *in vitro* and to penicillin, so rifampin and penicillin are not recommended.

Symptom Monitoring

Routine serologic tests for brucellosis are not effective for diagnosing or monitoring RB51 infections. So those at high risk should be monitored for the development of symptoms of brucellosis. Monitoring should include:

- For 4 weeks from last exposure, check temperature for fever
- For 6 months from last exposure, watch for broader [symptoms of brucellosis](#)

People potentially exposed to RB51 who develop symptoms should consult a health care provider.

If brucellosis occurs despite prophylaxis, treatment regimens should be selected based on antimicrobial susceptibility results.

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

2013 Compendium
located at:

<http://avmajournals.avma.org/toc/javma/24/3/9>



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 2003.¹ 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.²

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.³ 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.^{4,5} Although not specifically addressed here, the general principles

The NASPHV Animal Contact Compendium Committee: Kirk E. Smith, DVM, PhD, (Co-Chair), Minnesota Department of Health, 625 Robert St N, Saint Paul, MN 55109; John R. Dunn, DVM, PhD, (Co-Chair), Tennessee Department of Health, 425 9th Ave N, Nashville, TN 37243; Louisa Castrodale, DVM, Alaska Department of Health and Social Services, 3601 C St No. 340, Anchorage, AK 99503; Russell Daly, DVM, Department of Veterinary and Biomedical Sciences, College of Agriculture and Biological Sciences, South Dakota State University, Brookings, SD 57007; and Ron Wolke, DVM, Washington State Department of Health, PO Box 47853, Olympia, WA 98504. Consultants to the Committee: Casey Barton Behravesh, MS, DVM, DPHI, CDC, 1600 Clifton Rd, Atlanta, GA 30333; Karen Beck, DVM, PhD, North Carolina Department of Agriculture and Consumer Services, 2 W Edenton St, Raleigh, NC 27601; Maria J. Calton, International Association of Fairs and Expositions, 3043 E. Cairo, Springfield, MO 65802; Allan Hargrett, DVM, DABVP, 1205A, 4700 River Rd, Riverdale Park, MD 20737; Christine Hahn, MD, General of State and Territorial Epidemiologists, Idaho Division of Public Health, 400 W State St, Boise, ID 83720; Thomas Hargrett, DVM, American Association of Extension Veterinarians, Kieberg Center, Room 133, 2471 TAMU, College Station, TX 77843; Thomas P. Mezhans, DVM, Association of Zoos and Aquariums, 8403 Gokaville Rd, Ste 710, Silver Spring, MD 20910; and Kendra Stauffer, DVM, AVMA Council on Public Health and Regulatory Veterinary Medicine, 1931 W Meacham Rd, Schaumburg, IL 60173. This article has not undergone peer review; opinions expressed are not necessarily those of the AVMA. Address correspondence to Dr. Smith (kirk.smith@state.mn.us).

Know that animals carry germs that can make people sick

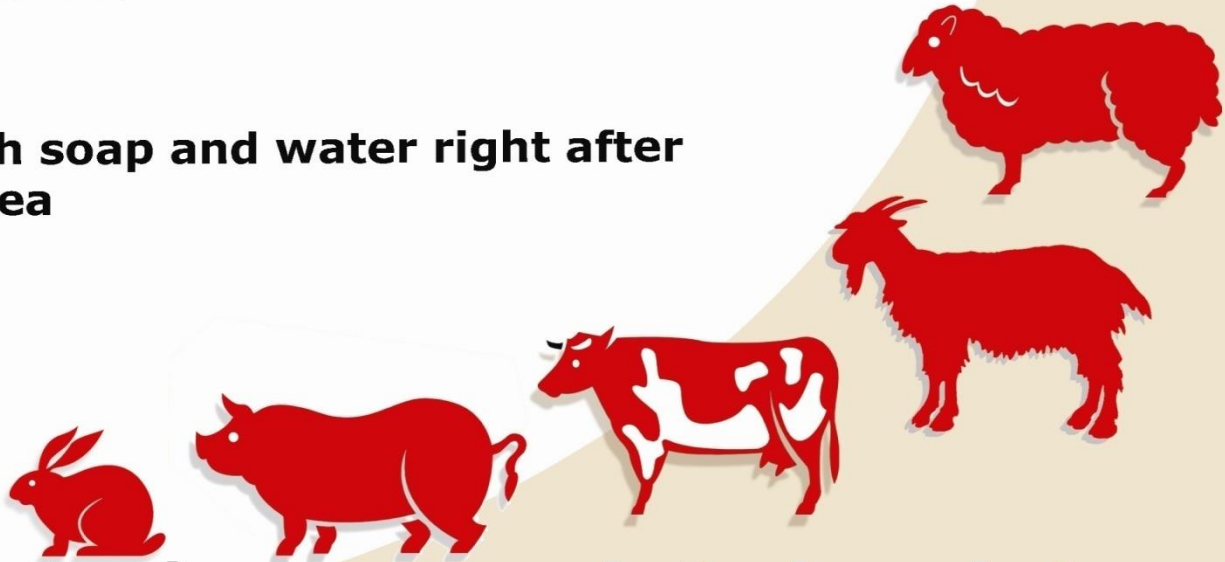
Never eat, drink, or put things into your mouth in animal areas



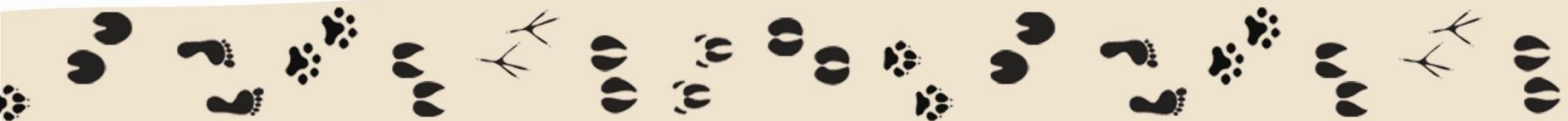
Older adults, pregnant women, and young children should be extra careful around animals



Wash your hands with soap and water right after visiting the animal area



How to be Safe Around Animals!





Seen in North Georgia, October 15, 2017

Increasing Global Attention on One Health

❑ Core health sectors

- *Human*
- *Animal*
- *Environment*

❑ Foundation

- *Communication*
- *Coordination*
- *Collaboration*
- *Maximizing resources to best address health threats*

❑ Ultimate goal

- *Achieving optimal health outcomes for people and animals*



One Health Challenges

- ❑ **Increasing numbers of zoonotic outbreaks and illnesses affecting children with close animal contact**
 - *Influenza, Salmonella, E. coli, other zoonoses*
- ❑ **Young people with close animal contact at increased risk for infection and more likely to have serious complications**
- ❑ **Need to promote zoonotic disease education for youth, family, and communities**
- ❑ **Key stakeholders at state and national levels identified need for better collaboration between human and animal health, and members of the agriculture community to better prevent, detect, and respond to zoonoses**

One Health Teams



- ❑ Should be formed before emergency
- ❑ Multi-disciplinary, cross-sector teams enhance preparedness and response, prevention
- ❑ Allows us to have the biggest impact on improving health for all

Healthy Pets, Healthy People Website

www.cdc.gov/healthypets

**Centers for Disease Control and Prevention**
CDC 24/7: Saving Lives. Protecting People™

SEARCH 

CDC A-Z INDEX ▾

Healthy Pets Healthy People





 **Pets ▸**

 **Diseases ▸**

 **Specific Groups & Settings ▸**

Keeping Pets Healthy Keeps People Healthy Too!

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.

Pets sometimes carry germs that can make people sick. The diseases people get from animals are known as zoonotic (zoe-oh-NOT-ic) diseases.



U.S.-Based Outbreaks

- Multi-state Outbreak of Seoul Virus
- Eight Multistate Outbreaks of Human *Salmonella* Infections Linked to Live Poultry in Backyard Flocks (Final Update)
- Four Multistate Outbreaks of Human *Salmonella* Infections Linked to Small Turtles
- Cuatro brotes multiestatales de infecciones por *Salmonella* en seres humanos vinculadas a tortugas pequeñas

Healthy Pets Healthy People

Healthy Pets Healthy People

Health Benefits of Pets

Pets +

Animal Tales +

Diseases +

Specific Groups & Settings -

Public Settings

Organ Transplant Patients

Infants and Young Children

Publications & Materials +

Pet Safety in Emergencies

Announcements

Connect With Us +

[CDC](#) > [Healthy Pets Healthy People](#) > [Specific Groups & Settings](#)

Contact with Animals in Public Settings



Contact with animals in public settings (e.g., fairs, educational farms, petting zoos, schools) provides opportunities for entertainment and education. There are many wonderful benefits of human-animal contact. However, it is important to know that animals sometimes carry germs that could make people sick—even animals that look clean and healthy can still carry these harmful germs. Many outbreaks of illnesses spread between animals and people have been documented. These outbreaks have substantial medical, public health, legal, and economic effects.

State public health veterinarians are the local and state professionals who regularly consult with physicians, emergency rooms, legislators, local officials, schools, health departments, and the general public on preventing and controlling diseases that people can get from animals and animal products.

CDC works closely with the [National Association of State Public Health Veterinarians \(NASPHV\)](#) ¹. NASPHV, in partnership with CDC and others, collaborate on a variety of [guidance and recommendations](#) ² related to the prevention and control of zoonoses.

The [Compendium of Measures to Prevent Diseases Associated with Animals in Public Settings](#) ³ provides standardized recommendations for use by public health officials, veterinarians, animal venue operators, animal exhibitors, and others concerned with disease control and with minimizing risks associated with animals in public settings. To help prevent zoonotic diseases associated with animals in public settings, a [toolkit of selected resources](#) ⁴ are available. This toolkit contains examples of regulations on animal exhibitions, printable posters with messages on how to stay safe while enjoying animals, and a check list of petting zoo best practices.



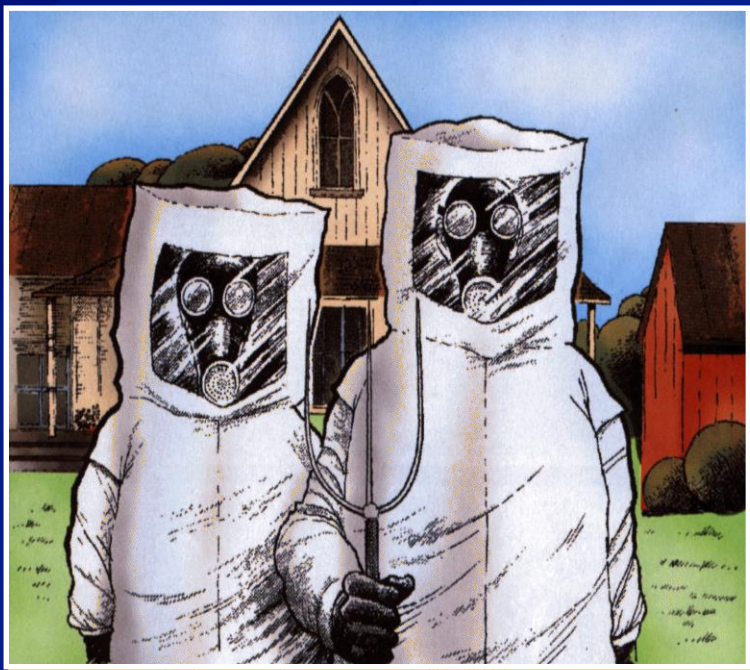
Zoonoses & One Health Updates

CONNECTING HUMAN, ANIMAL and ENVIRONMENTAL HEALTH



Centers for Disease Control and Prevention | National Center for Emerging and Zoonotic Infectious Diseases | One Health Office

- ❑ **1st Wednesday of month, 2pm ET (exceptions January and July)**
- ❑ **>1,200 invitees from local, state, & federal human and animal health departments, organizations, academics, and many other partners**
- ❑ **Call topics include timely updates on**
 - *Companion animals, livestock, and wildlife zoonoses*
 - *Emerging infectious diseases*
 - *Vector-borne, foodborne, and waterborne diseases*
 - *Updates on recent outbreak investigations*
 - *Environmental health issues*
 - *Prevention programs, guidance, and resources*
 - *Upcoming public health events and activities*
- ❑ **To sign up or suggest topics, contact ZOHUCall@cdc.gov**



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www.cdc.gov/onehealth

One Health Office
National Center for Emerging and Zoonotic Infectious Diseases

One Health: The Way Forward

Is the collaborative effort of multiple disciplines and sectors

– working locally, nationally, regionally, and globally–

with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and our shared environment.

