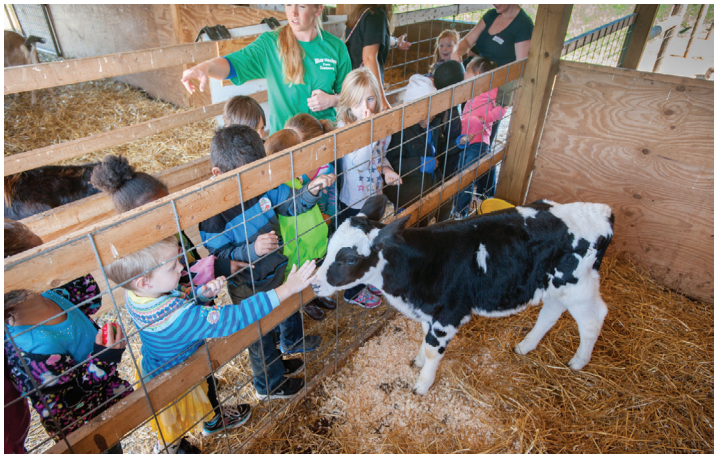
# Preventing Enteric Infections from Contact with Animals

Precautions when visiting petting zoos and state fairs.



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The late summer and early fall seasons bring state fairs, petting zoos, the appearance of classroom pets, and other opportunities to mingle with nonhuman animals. Such events can be educational and fun, but close contact with farm animals, birds, and other species is also associated with elevated infectious disease risk. Enteric pathogens, in particular, are frequently transmitted in such settings.

It's been estimated that almost 450,000 cases of illness from enteric organisms such as *Campylobacter*, *Salmonella*, *Cryptosporidium*, and Shiga toxin–producing *Escherichia coli* (STEC) can be attributed to contact with animals each year.[1] These infections can arise singly or in outbreaks and result in an estimated 4,900 hospitalizations and 76 deaths annually.[1]

Ringworm, parasites, tuberculosis, rabies, *Chlamydia psittaci* respiratory infections, and other zoonoses can also be transmitted to humans through contact with animals, but enteric organisms are the most common causes of zoonotic organisms outbreaks. There are many reasons why enteric pathogens are so frequently implicated in infections traced to animals and their environments.

## HOW ENTERIC ORGANISMS ARE SPREAD

Enteric organisms are commonly spread by the fecal–oral route, but direct contact with feces is not required for animal-to-human transmission. Fur, hair, skin, feathers, and saliva can also be laden with organisms that can be transferred by touching, petting, and feeding animals.

**Shedding.** Healthy animals can carry and shed enteric pathogens without showing signs of illness.[2,3] Because shedding is typically intermittent[1,4] and reinfection from the environment is possible, simply screening animals will not necessarily reveal the presence of pathogens.[5]

In family-friendly animal settings, additional transmission factors come into play. Baby animals are particularly popular in these settings, and young animals appear to shed more organisms.[3,6] Animals at fairs and in petting zoos can be stressed by transport, confinement, crowding, and increased handling, and stress may increase the shedding of organisms.[7] In tests of animals in feedlots, shedding of at least some enteric organisms is greatest during the summer and fall,[8,9] which may also be true for animals in fairs or petting zoos.

**Environmental contamination.** Animals, like humans, will quickly contaminate their environment with the organisms that they carry and shed. Outbreak investigators have matched DNA fingerprints of enteric pathogens isolated from infected patients to those isolated from environmental samples, including sawdust, fencing and other barriers, bedding, stroller wheels, and clothing worn while subjects were walking through animal exhibits.[2,10]

Enteric organisms that have caused outbreaks have been found to survive for weeks in the environment. Viable *E. coli* organisms that matched isolates from patients have been found in environmental surface samples taken several weeks[10] and even 10 months[11] after the initial investigation of the outbreak.

**Behavioral factors.** Behavioral factors affect a visitor's risk of illness after contact with animals or their environments. Handwashing is, of course, as important in animal settings as in health care facilities or any other public venue, and handwashing frequency and technique affect the extent of a visitor's exposure to these pathogens. Eating and drinking in or near animal venues has been shown to increase the risk

of enteric infection.[11,12] Investigation of an STEC outbreak during an agricultural fair revealed that the water system serving the fairgrounds had become contaminated in several different ways.[12] An outbreak of *Salmonella* occurred in an elementary school after owl pellets (regurgitated, undigested food parts) were dissected on a cafeteria table that was later used for snacks and the next day's school lunch.[13]

Children have their own additional risk factors. The frequent hand-to-mouth activities of the young children who visit these venues increase their risk of infection.[10] Thumb sucking, pacifiers, infant drinking cups, and the tendency of very young children to explore objects by putting them in their mouths increase a young child's risk of exposure to environmental contaminants. Also, children are more likely to sit or fall on the ground, and ground contact (including, as was seen in one outbreak, playing in an area downhill from a petting zoo) has also been linked to illness in outbreaks.[2]

## INFECTION PREVENTION

Although the risk of infection from close contact with animals can never be entirely eliminated, infection prevention measures can prevent most illnesses. These measures parallel our approach to infection control in health care facilities. The careful practice of standard precautions—in which it is assumed that all animals, like all patients, may carry infection—is an essential approach when visiting or handling nonhuman animals.

- People who are at higher risk for infection, such as infants and children, the elderly, and those who are immunocompromised as a result of drugs or disease, should take extra care when visiting animal venues, avoiding direct contact with animals or with surfaces in the animals' environment and employing careful handwashing technique with soap and water after their visit.
- Handwashing facilities with soap and running water that are accessible to all (including small children and people with disabilities) should be immediately available at the exit from the animal exhibit. Posted signs and frequent reminders from staff stationed at exits can enhance handwashing compliance. Because visible contamination of hands is not uncommon in animal venues, soap-and-water handwashing is superior to cleansing with alcohol-based hand sanitizers in these settings.[10] Also, alcohol is not effective against *Cryptosporidium* species.[14]
- Staff and visitors should be educated on disease risk and the importance of infection prevention measures. Experience with outbreaks has demonstrated that visitors who are aware of the infectious disease risks presented by settings with animals are less likely to become ill (as are young children whose parents are aware).[2,10]
- Separate "clean" from "dirty"! Animal exhibit areas should be totally separate from food preparation and eating areas.
- The flow of foot traffic through an area with animals should be designed so that those entering the

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### Resources

**Disease Prevention for Fairs and Festivals**
A publication of the Kansas Department of Health and Environment, Division of Public Health, with many helpful and reproducible signs and checklists to enhance infection prevention efforts
http://bit.ly/2rYgy1r

**Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2013**
A consensus document of the National Association of State Public Health Veterinarians Animal Contact Compendium Committee and the Centers for Disease Control and Prevention (CDC)
http://bit.ly/2rXW7Ss

**Guidelines for Animals in School and Child-Care Settings**
A 2009 summary of guidelines developed by the Alabama Department of Public Health, the Kansas Department of Health and Environment, and the CDC
http://bit.ly/2qEYpSx

**Healthy Pets Healthy People**
Infection information from the CDC related to a wide range of species, including pets and farm animals
http://bit.ly/2kpQKaW

exhibit don't cross paths with those who have been "exposed" (that is, those exiting the exhibit).
- The animals should be well cared for and their living areas kept clean.

See *Resources* for helpful information related to the prevention of infections stemming from contact with animals. ▼

## REFERENCES


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