



ANTECH

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News

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PETTING ZOOS

Contact with animals in public venues such as fairs and petting zoos has important benefits including education concerning animals and animal husbandry, encouraging compassion for animals, and entertainment. However, contact can also lead to transmission of zoonotic disease. During 1991-2005, 55 outbreaks associated with animals in public settings were reported. Despite national recommendations aimed at preventing disease associated with animals in public settings, outbreaks continue to occur.

A certain percentage of healthy cattle harbor human pathogenic *E. coli* O157:H7. [The widely publicized Jack-in-the-Box incident of people becoming ill from eating undercooked hamburger meat contaminated with *E. coli* O157:H7 revealed that cattle can harbor this human pathogen.] Consequently, public health officials now recommend culturing every animal visiting county fairs and engaged in other animal activities for *E. coli* O157:H7.

Pathogenic Properties of *E. coli* O157:H7

Some strains of *Escherichia coli*, such as *E. coli* O157:H7, belong to serotypes which can produce potent cytotoxins called Shiga toxins (Stx). The natural hosts of Shiga toxin-producing *E. coli* (STEC) are farm and wildlife ruminants, i.e. cows, sheep, and goats.

The most prominent symptom of infection with *E. coli* O157:H7-producing Shiga toxins is *hemorrhagic colitis*. Symptoms include painful, bloody diarrhea and abdominal cramps. In some patients, HC can progress into one of the two syndromes, *hemolytic uremic syndrome* (HUS) or *thrombotic thrombocytopenic purpura* (TTP). HUS and TTP are serious illnesses which in many cases can be fatal. Thus *E. coli* O157:H7 has been considered as a causative agent for producing serious health threats, especially for children.

Rate of *E. coli* O157:H7 Caused Illnesses

According to the CDC estimates, *E. coli* O157:H7 causes 73,500 illnesses, 2,000 hospital stays, and 60 deaths in the United States every year. The *E. coli* O157:H7 infection can be transmitted by contaminated food, water and contact with fecal material from infected persons or animals. Many of the infections are associated with consumption of contaminated food or drink, as well as contact with farm animals.

Prior cases of zoonotic disease outbreaks in petting zoos or county fairs indicate that washing hands with soap and water or a sanitizing gel should be performed after contact with farm or other animals. Further, because children will undoubtedly place their fingers or other objects such as toys, baby bottles,

PREVENTING FAIR AND PETTING ZOO OUTBREAKS

The following are prudent public health measures to promote the safety of fair or petting zoo visitors and prevent outbreaks:

- **Source control:** Animals actively shedding human pathogens should not be exhibited in fairs and petting zoos.
- **Effective manure management:** A single cow produces about 30 kilograms (66 pounds) of manure per day. Sanitary removal of animal manure, followed by sanitation of bins and traffic areas, is an essential part of an environmental control program.
- **Dust control:** If manure is not removed on a timely basis, it will be dried by air, and subsequent air movement can result in airborne spread of dust, which could spread infectious agents onto surfaces.
- **Clean up and sanitize:** All contact surfaces must be kept clean and sanitized.
- **Environmental sanitation:** Prevent cross contamination of areas adjacent to animal holding areas, particularly food courts and drinking fountains. Farm animal contact areas should be separated from the food service area.
- **Hand washing and sanitation facilities:** At each entrance and exit to animal holding areas and petting zoos, warn visitors of the potential risks and require visitors to wash and sanitize upon entry and exit to the areas. Hand washing stations should be available in both the animal-free area and the interaction area.
- **Protocol for petting zoo and animal contact areas.** Hand-mouth activities should be prohibited: eating, drinking, smoking, carrying toys and pacifiers, or any hand to mouth activities should be strictly prohibited in the interaction area.
- **Information** should be provided about the risk associated with the transmission of pathogens wherever situations arise where there is public access to farm animals.
- **Heightened precautions** should be applied to high risk groups, including children under age 5, immunocompromised people, and pregnant women.

PETTING ZOOS (CONT'D)

pacifiers, or sippy cups in their mouths, these objects should not be allowed in an area with animals. It is almost impossible to avoid contact with animal waste when children or other people attend a farm with a petting zoo. After all, the primary purpose of a petting zoo is to allow children, especially, to interact with and pet the animals. Even strollers taken into animal areas can pick up and carry animal feces, regardless of the degree of sanitation of the premises. Despite these obvious implications, as recently as June 2000, a survey of 44 state and territorial public health departments indicated that none had laws to control exposure of humans to enteric pathogens at venues where the public comes into contact with farm animals!

Current Study Findings

A recently published observational survey evaluated risk behaviors for transmission of zoonotic diseases at petting zoos, during a period without a recognized disease outbreak. Attendees at six petting zoos were observed for animal and environmental contact, eating or drinking, hand-to-face contact, and use of a hand sanitizer. Hands were examined via bacteriologic culture on some attendees. Environmental samples were collected at 3 petting zoos.

Results included observations on 991 attendees. Of these, 74% had direct contact with animals, 87% had contact with potentially contaminated surfaces in animal contact areas, 49% had hand-to-face contact, and 22% ate or drank in animal contact areas. Thirty-eight percent used a hand sanitizer, and children had better compliance than adults. Results of bacteriologic cultures of hands were negative for *Salmonella* spp and *E. coli* O157; but *Salmonella* spp were isolated from 63% and *E. coli* O157 from 6% of the environmental samples.

The identification of *Salmonella* spp and *E. coli* O157 in petting zoos in the absence of an outbreak confirms that petting zoo settings should be assumed to be contaminated. Animals infected with enteric pathogens may have no signs of illness, and pathogens may be shed intermittently. Resulting environmental contamination can be widespread and persistent, although

routine testing or treating of animals is not recommended as a reliable means of preventing the spread of infection.

National recommendations to prevent disease associated with animals in public settings are available, and most venues included in the present study were implementing those guidelines to various degrees. Nevertheless, it was of substantial concern that even with such vigorous efforts on the part of operators to encourage compliance, a third of visitors ignored warnings and did not sanitize their hands.

Rates of eating and drinking varied widely, despite signs prohibiting it in all animal contact areas. In one setting at which half the attendees were observed eating or drinking, an unrelated fair exhibit was offering free ice cream treats at the entrance to the petting zoo.

Recent outbreaks associated with petting zoos have substantial legal implications for the industry. Anecdotal reports of difficulty obtaining insurance and of fairs discontinuing petting zoo exhibits are increasingly common, leading to concerns that important opportunities for education and experience with animals may be lost. While contamination of animal environments cannot be eliminated entirely, more effective implementation of disease-prevention recommendations is critical to ensure these opportunities to interact with animals can continue as safely as possible.

The study findings concluded that high-risk behaviors were common among petting zoo visitors, and disease prevention guidelines were inconsistently followed. The high proportion of visitors observed eating or drinking, having hand-to-face contact in animal contact areas, and failing to sanitize their hands after visiting the petting zoo was disturbing. Veterinarians, venue operators, and public health authorities must work together on targeted education to improve implementation of existing disease prevention guidelines.

References: McMillian et al, *J Am Vet Med Assoc* 231:1036-1038, 2007; *Epi-Log Newsletter* 45 (7): 2005; *MMWR Weekly, CDC*. 54:1277-1280, 2005; Warshawsky et al, *Can J Infect Dis*. 13: 175-181, 2002; Sargeant et al, *Am J Vet Res* 61 : 1375-1379, 2000.

Journal Resource

Potential impact of introducing foot-and-mouth disease into the California State Fair

An epidemic model was developed to estimate the potential spread of foot-and-mouth disease (FMD), if infected livestock had been exhibited at the 2005 California State Fair.

The model used dairy cattle, dairy goats, and pygmy goats exhibited by 195 exhibitors in August 24-28, 2005. Two (2) stochastic models were used to simulate epidemics of FMD that might originate from 1, 3, 5, 7, or 10 index cases at the state fair. Data obtained from state fair exhibitors were used to determine the spatial distribution and types of herds to which livestock visiting the state fair returned.

Mean estimated numbers of latently infected animals on day 5 were 12.3 and 75.9, respectively, when it was assumed that there were 1 and 10 index cases. Regardless of the number of index cases, mean estimated numbers of sub-clinically infected and clinically infected animals were low throughout the 5-d study period. Mean estimated duration of the resulting epidemic ranged from 111-155 d, mean number of infected premises ranged from 33 to 244, and mean probability that at least one animal infected with FMD would subsequently leave the state ranged from 28-96% as the number of index cases increased from 1 to 10, respectively.

Conclusions and Clinical Relevance Results of this model study suggested that following introduction of FMD at the California State Fair, infection would likely go undetected until after animals left the fair and that the subsequent outbreak would spread rapidly.

Reference: Carpenter et al, *J Am Vet Med Assoc* 231:1231-1235, 2007.