

**An *E. coli* O157:H7
Outbreak Associated with
an Animal Exhibit**

Middlesex-London Health Unit Investigation and Recommendations

Executive Summary



December 1999

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I. Executive Summary

E. coli O157:H7 is a bacterial infection which can produce abdominal cramps and diarrhea that can sometimes be bloody. The hemolytic-uremic syndrome, a complication of *E. coli* O157:H7 infections, occurs in 2 to 7% of cases and can cause serious blood, kidney and neurologic problems. Spread of *E. coli* O157:H7 is known to occur from eating contaminated food, or drinking or swimming in contaminated water. Spread from contact with animals has also been shown to occur. As well, *E. coli* O157:H7 can spread easily from person-to-person by the fecal-oral route.

In Ontario, all cases of *E. coli* O157:H7 must be reported to local public health units. In Middlesex-London, the health unit receives 6 to 23 case reports per year. Within a 10-day period from September 27, 1999 to October 6, 1999, the health unit received four reports of people with *E. coli* O157:H7. No common food source was identified among the four people, but all reported having touched animals in the Agriculture Pavilion at the Western Fair in the seven days before the onset of diarrhea.

On October 8, 1999, a media release was issued asking the public to contact the health unit if they had developed diarrhea after visiting the pavilion. The health unit received 443 calls over a 10-day period, and identified 159 people with diarrhea that had developed within 1 to 10 days of visiting the pavilion. An additional three primary cases of *E. coli* O157:H7 were identified. As well, four cases of *E. coli* O157:H7 occurred within families of the primary cases.

A case of *E. coli* O157, which was diagnosed in a child who attended a child care centre, was also investigated. Although there were several children ill with diarrhea at the centre, it was later determined that the *E. coli* O157 identified in this child was non-H7, a subtype that does not produce a verotoxin and so does not usually cause a serious type of infection. The diarrhea in the child and child care centre appeared to be unrelated to the pavilion.

A thorough investigation was undertaken to determine the cause of the outbreak of *E. coli* O157:H7 in order to prevent similar situations from occurring in the future. Subtyping of the human samples of *E. coli* O157:H7 revealed that five of the seven were phage type 27, a very rare subtype in Canada. In addition, numerous animals that were in the pavilion at the fair were tested. Testing of the petting zoo animals revealed that a goat and a sheep had the same unusual phage type. A pigmy goat, which was part of the petting zoo but had not been at the fair, was also found to have *E. coli* O157:H7

phage type 27. Eighteen of the cattle that had been present in the pavilion were also tested but were not found to be positive for *E. coli* O157:H7.

An Order was issued under the Health Protection and Promotion Act to the owner of the petting zoo precluding him from allowing the public to have contact with the specific animals. The animals that the public would not be allowed to touch were those with confirmed *E. coli* O157:H7 infections and any animals that had been in the same pen as these animals.

An epidemiologic case control study was conducted to thoroughly examine factors associated with this outbreak. Sixty-one people met the case definition. A case was defined as someone with at least 24 hours of severe or bloody diarrhea that developed within 2 to 8 days of visiting the pavilion. Eighty-nine people who visited the pavilion but did not become ill were identified as controls.

The analysis revealed that the cases were over eight times more likely than controls to have visited the petting zoo, almost four times more likely to have touched the goats in the petting zoo, almost three times more likely to have walked among these goats and almost three times more likely to have touched the sheep in the petting zoo. Cases spent a significantly longer period of time in the pavilion when compared to controls. Lack of appropriate handwashing before eating and eating while in the pavilion may have been associated with infection. Food histories from cases and controls did not indicate that food was a cause of this outbreak.

The human and animal laboratory testing and the epidemiologic case control study provide very strong evidence that one or more of the goats in the petting zoo was the source of this outbreak. There is also evidence that the sheep in the petting zoo was a source of transmission. The following recommendations are intended to prevent future transmission of diseases from animals in petting zoos and other animal exhibits to humans.

Recommendations

These recommendations are for use in an animal exhibition or agricultural fair context which involves an owner or operator and contributing participants. The recommendations have been subdivided according to who should be responsible for their implementation in the above circumstances. Different circumstances may require the application of recommendations from several subsections.

Not all of the points highlighted in the recommendations were features of this outbreak, but all are felt to be prudent in protecting the health of the public.

Recommendations pertaining to owners and operators of animal exhibitions and agricultural fairs:

1. Ensure that there are signs near the animal exhibit that include the following messages:
 - Wash hands with soap and water after touching the animals;
 - Wash hands with soap and water before eating;
 - Avoid touching your face and mouth before washing your hands with soap and water; and
 - Do NOT eat or drink while touching animals.
2. Distribute pamphlets or flyers with information on preventing illness to visitors as they enter the animal exhibit.
3. Provide sufficient handwashing stations with running water, pump soap and disposable towels in several locations throughout the animal exhibit. In the case where a petting zoo is part of the animal exhibit, at least one handwashing station should be immediately adjacent to the petting zoo area.
4. Ensure that handwashing stations and bathrooms are kept clean and fully stocked with pump soap and disposable towels.
5. Ensure that signage clearly indicates which animals can and cannot be touched.
6. Ensure that barriers are adequate to impede touching of animals that should not be touched.
7. Ensure that any manure is quickly and thoroughly cleaned up, and appropriately discarded.
8. Do not allow the public to milk cows or drink unpasteurized milk.
9. If calves or other young animals are permitted, ensure that they cannot be touched by the public.
10. If animal births occur, ensure that the public has absolutely no contact with the animals or the environment. The environment must be

thoroughly cleaned after each birth and all waste products appropriately discarded.

11. Ensure that the local public health unit is notified of the existence of the animal exhibit 30 days prior to its opening.

Recommendations pertaining to petting zoo owners:

12. Ensure that any manure is quickly and thoroughly cleaned up, and appropriately discarded.
13. At least once daily, ensure that the rails in the petting zoo are appropriately disinfected and that the floors in the petting zoo are thoroughly cleaned.
14. Ensure that food is not fed to the animals in containers that can be eaten by people (e.g., ice cream cones or other edible products).
15. Ensure, with animal exhibit operators, that handwashing facilities are immediately adjacent to the petting zoo area and are well stocked with pump soap and disposable towels.
16. Ensure that signage with the messages outlined in recommendation #1 is prominently displayed around the petting zoo area.
17. Do not display ill animals or those known to be positive for *E. coli* O157:H7 or other infectious zoonotic agents.

Recommendations pertaining to livestock and other animal owners or exhibitors:

18. Ensure that any manure is quickly and thoroughly cleaned up, and appropriately discarded.
19. At least once daily, ensure that the rails in the animal exhibit are appropriately disinfected and that the floors in the animal exhibit are thoroughly cleaned.
20. Ensure that signage clearly indicates which animals can and cannot be touched.
21. Ensure that barriers are adequate to impede touching of animals that should not be touched.
22. If calves or other young animals are permitted, ensure that they cannot be touched by the public.

23. If animal births occur, ensure that the public has absolutely no contact with the animals or the environment. The environment must be thoroughly cleaned after each birth and all waste products appropriately discarded.
24. Do not display ill animals or those known to be positive for *E. coli* O157:H7 or other infectious zoonotic agents.

Recommendations pertaining to physicians:

25. Obtain stool cultures on any patient who presents with bloody, severe, or ongoing diarrhea.
26. Monitor patient with suspected and confirmed verotoxin producing *E. coli* (VTEC) for the development of the hemolytic-uremic syndrome by performing urinalysis, and examination of the peripheral smear, a complete blood count and a serum creatinine 7 to 10 days after the onset of diarrhea.

Recommendations pertaining to public health units:

27. Inspect animal exhibits prior to beginning operations to ensure that handwashing facilities, signage, cleaning and waste management procedures are adequate.
28. Inspect animal exhibits while operating to ensure that the area is being appropriately cleaned, that handwashing facilities are clean and well stocked with pump soap and disposable towels, and that manure is thoroughly cleaned up and appropriately discarded.
29. Document the subsequent locations of a travelling petting zoo for a 30 day period after leaving the health unit's jurisdiction.
30. Develop educational materials with information regarding prevention of infections while attending animal exhibits. Distribute these materials to schools, childcare centres and visitors to these animal exhibits.
31. Use mass media to provide information regarding prevention of infections while attending animal exhibits.
32. Provide educational materials to the public on proper handwashing.
33. Ask all people reported to the health unit with VTEC and other enteric infections about

exposure to animals, including animals at animal exhibits.

34. Provide educational materials to physicians regarding the need to obtain stool cultures on patients presenting with bloody, severe or ongoing diarrhea.
35. Provide educational material to physicians regarding the importance of monitoring patients with confirmed or suspected VTEC for the development of the hemolytic-uremic syndrome.

Recommendations pertaining to the Ministry of Health and Long Term Care:

36. Establish protocols for the operators of petting zoos, animal exhibits and open farms which provide tours for childcare centres, schools and the general public.
37. Consider the appropriateness of animal screening before placement in petting zoos or animal exhibits.
38. Ensure that laboratories culturing stool for enteric pathogens submit isolates of *E. coli* O157 for confirmation of *E. coli* O157:H7, verotoxin production, and further reference studies including subtyping.

Recommendations pertaining to the general public:

39. Wash hands with soap and water after touching the animals.
40. Wash hands with soap and water before eating.
41. Avoid touching your face and mouth before washing your hands with soap and water.
42. Do NOT use baby wipes in place of handwashing as they do not kill germs like *E. coli* O157:H7.
43. Pay attention to any signs that indicate which animals can and cannot be touched.
44. Do NOT drink unpasteurized milk.
45. Do NOT eat or drink while touching animals.
46. Visit the doctor if you develop unusual or bloody diarrhea.

Conclusion

In conclusion, infections spread by animals in petting zoos have the potential to make many people ill. The identification and investigation of this outbreak led to recommendations intended to prevent future transmission of infectious agents, including *E. coli* O157:H7, in petting zoo and animal exhibit environments. An outbreak and investigation of this magnitude highlight the need for an effective public health infrastructure at the local, provincial and federal levels.