

Notes from the Field

Shiga Toxin-Producing *Escherichia coli* O157:H7 Linked to Raw Milk Consumption Associated with a Cow-Share Arrangement — Tennessee, 2022

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Shiga toxin-producing *Escherichia coli* (STEC) causes food-borne illness that can result in life-threatening kidney failure from hemolytic uremic syndrome (HUS). On August 9, 2022, the Tennessee Department of Health (TDH) identified two cases of STEC infection in two infants aged 10 months who experienced diarrhea on July 25 and August 1. Stool specimens from both infants tested positive for STEC by polymerase chain reaction. One infant developed HUS requiring hemodialysis and hospitalization for 27 days. The second infant was hospitalized for 1 day and did not develop HUS. Both lived in households that consumed raw milk acquired from the same cow-share program, and at least one infant had reportedly consumed raw milk.*

To determine STEC source, TDH initiated an outbreak investigation, including a site visit to the cow-share dairy farm. Because the owner lived in a rural area without phone service or electricity, a TDH employee first visited the dairy farm to inform the owner of the investigation and collect a list of cow-share participants. On August 15, a site investigation and environmental assessment were conducted. The dairy farm included seven to 10 cows that were hand-milked daily. Observations identified possible routes of fecal contamination during milking and possible milk storage at temperatures higher than recommended, with cooling facilitated by mechanical circulation of cool spring water followed by immersion of milk containers in ice-filled coolers. Samples were taken from eight sites including a milk filter, a collection pail, barn posts, and four manure locations, as well as a sample of raw milk.

TDH conducted case finding among cow-share participants. The cow-share list included 125 participants from Georgia, Tennessee, and North Carolina. TDH obtained telephone numbers for 109 participants and successfully reached 50 participants (40% of total) from households that included 112 persons. Three probable cases from a single household were identified based on exposure and self-described resolved clinical symptoms that began on July 20, without laboratory

confirmation.[†] The two households with the two index cases in infants did not participate in the cow-share but obtained raw milk from participants. In total, five cases with two confirmed in hospitalized infants were identified; no deaths were reported.

The Tennessee Department of Health Laboratory Services (TDHLS) isolated STEC O157:H7 in the second index patient's stool specimen. STEC was not isolated in the first index patient's stool because of delayed specimen collection for testing by TDHLS. A U.S. Department of Agriculture laboratory identified two isolates of STEC O157:H7 from a single cattle manure sample in the dairy farm's milking barn. Whole genome sequencing conducted by TDHLS demonstrated that human and cattle stool isolates were highly related, with zero allele differences detected.[§]

In Tennessee, direct sale of raw milk is prohibited, and TDH advises against raw milk consumption; however, sharing of raw milk through cow-share arrangements is legally permitted.[¶] Because the cow-share intends to continue raw milk distribution, TDH requested the University of Tennessee Extension's Agriculture and Natural Resources Team visit the dairy farm on August 30 to provide education concerning best practices to reduce risk for milk contamination. Households participating in the cow-share were also mailed an educational letter about the risk for foodborne illness associated with raw milk.**

Raw milk consumption is associated with outbreaks and sporadic cases of foodborne illness (1,2). Children aged <5 years, adults aged ≥65 years, and persons with weakened immune systems are at greatest risk for severe illness. Although pasteurization reduces the risk of illness, raw milk regulation varies by state and point of sale.^{††} Environmental sampling is a useful tool for public health investigations; it permitted illness in this outbreak to be linked with STEC on the dairy farm. This outbreak highlights the risk for severe illness associated with cow-share arrangements, especially among young children,

[†] A confirmed case was defined as illness in a person who consumed or had access to raw milk from the cow-share, became ill with diarrheal illness, and received a positive STEC test result on a specimen collected after July 1, 2022. A probable case was defined as illness in a person who consumed or had access to raw milk from the cow-share and became ill with diarrheal illness, without laboratory confirmation.

[§] TDHLS performed testing on human stool samples using culture and polymerase chain reaction. The U.S. Department of Agriculture laboratory performed testing on environmental samples using brilliant green agar, anti-O157 immunomagnetic beads, and CHROMagar O157. Whole genome sequencing (cgMLST) was performed using CDC's PulseNet standard operating procedure to determine *E. coli* serotype and BioNumerics (version 7.60; Biomérieux) for bioinformatics analysis.

[¶] TN Code Sect. 53–3–119.

** <https://www.cdc.gov/foodsafety/pdfs/raw-milk-infographic2-508c.pdf>

^{††} <https://realrawmilkfacts.com/raw-milk-regulations>

* A cow-share program allows persons to purchase a share of a milk cow or dairy herd. Cow-share participants can use the milk obtained through the arrangement for personal use.

who are at increased risk for STEC-related HUS. The outbreak also demonstrated that households not formally participating in cow-share arrangements can be affected. Increasing awareness of inherent health risks of raw milk products in Tennessee could prevent further morbidity.

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