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Division of Public Health

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**Memorandum**

**Date:** January 8, 2013

**To:** Megan M. Davies, MD  
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**Subject:** Outbreak Report: *Escherichia coli* O157:H7 Outbreak Associated with a County Fair —  
North Carolina, 2012

We are submitting the attached memorandum as the final outbreak report to health department officials in North Carolina.

**Summary**

In October 2012 three local health departments and hospitals notified the Division of Public Health of STEC infections in persons who had attended the Cleveland County Fair. Cleveland County Health Department personnel initiated an immediate investigation, and requested assistance with epidemiologic investigation, laboratory confirmation for human cases, and on-site environmental sampling. A site review of the fairgrounds and collection of environmental samples for bacteriologic analysis was performed on October 17. Laboratory testing identified *Escherichia coli* O157 in both human and environmental specimens. A case-control study was performed; data analysis indicated that visiting the petting zoo (in particular petting and feeding the animals) was a significant risk factor in initial disease acquisition. One hundred and six cases were identified; 7 developed HUS, and one died. The fair ended prior to the conclusion of the outbreak. Control measures for the prevention of secondary cases were provided. The outbreak ended on November 6.

**Background**

On October 8, the North Carolina Division of Public Health (NC DPH) was notified by Gaston Memorial Hospital and Carolinas Medical Center of four children who had been admitted with Hemolytic Uremic Syndrome (HUS) and a presumptive diagnosis of Shiga toxin-producing *Escherichia coli* (STEC). The children were unrelated residents of two adjacent counties; all children had attended the Cleveland

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County Fair (CCF). The risk of HUS following STEC infection is approximately 5-8% indicating these four cases were likely linked to a large associated outbreak<sup>1</sup>.

The CCF is a large county fair that in 2012 was held from September 27<sup>th</sup> — October 7<sup>th</sup> in Shelby, NC and was attended by 165,107 persons. It is sanctioned by the North Carolina Department of Agriculture and Consumer Services (NCDA&CS). The CCF provided a variety of events for attendees that are known or potential sources of STEC infection in people including:

- Seven designated animal contact exhibits including petting zoos and animal rides
- Three competition animal exhibits which were not intended for contact with the public
- Fifty-six temporary food service vendors

This is the second STEC outbreak to occur at a NC agricultural fair in as many years. In 2011 an outbreak at the NC State Fair associated with a permanent structure used for livestock competition caused illness in 25 persons, including eight who were hospitalized and four who developed HUS<sup>2</sup>.

In 2004 a large STEC outbreak at the NC State Fair associated with a petting zoo led<sup>3</sup> to the creation of Aedin's Law (<http://www.ncagr.gov/oep/AnimalContactExhibit.htm>). This law requires a permit from NCDA&CS for all animal contact exhibits at sanctioned agricultural fairs in NC; to obtain a permit exhibits must meet the requirements outlined in the NC Administrative code. Aedin's law is based, to large degree, on the NASPHV animal contact compendium<sup>4</sup>. However it has been demonstrated that even though petting zoos may adhere to published recommendations, STEC outbreaks can still occur<sup>5</sup>.

## **Methods**

### **Inspections prior to fair opening**

In compliance with Aedin's law, NCDA&CS staff inspected and permitted seven designated animal contact exhibits on September 26<sup>th</sup>. These exhibits included two petting zoos, a milking booth, a pony ride, a camel ride, a bull photo and a dog show. Additionally three non-contact animal exhibits were inspected. Cleveland County Environmental Health staff inspected 56 temporary food service establishments and inspected the municipal water supply to the fairgrounds.

### **Case finding**

Active and enhanced surveillance were performed to determine the extent of the outbreak. On October 9, a network of hospital-based public health epidemiologists began active surveillance for cases among persons diagnosed or treated in any of the 9 largest healthcare systems in North Carolina. To enhance reporting, the State Laboratory of Public Health (SLPH) sent an alert to all microbiology laboratories in North Carolina; local health departments were notified through the NC Health Alert Network (HAN, <http://www.nchan.org/>); state health department partners in South Carolina were notified via telephone; and local health departments were provided with a memo to distribute to healthcare providers regarding the identification, management and reporting of *E. coli* O157 infections. (Appendix A) A HAN advisory was issued by the SC Department of Health and Environmental Control (SCDHEC) to local health departments and health providers within the state. Information regarding the outbreak and the investigation was provided to the local media, posted on the NC DPH website, and distributed to local health departments. Daily media updates were provided for the duration of the outbreak.

Local health departments interviewed cases residing in their respective counties using the NCDPH STEC Confidential Communicable Disease Reporting Form Part 2. All cases reported attending the 2012 Cleveland County Fair. Based on this information, a case definition was developed on October 9, 2012:

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**Case:** An individual with HUS or laboratory evidence of infection with Shiga toxin-producing *E. coli* OR with bloody diarrhea with onset of symptoms on or after October 1, 2012 who attended the Cleveland County Fair during the 10 days prior to onset of symptoms.

By October 11, 2012, 13 cases had been identified in three counties. The only common exposure was attendance at the 2012 Cleveland County Fair. No common food exposures, travel history, or other activities were found. A case control study was planned, and a questionnaire specific to the county fair was developed. The final case definition, developed on October 19, included categories for confirmed and probable cases:

Onset of illness in a person who attended the Cleveland County Fair held September 26 – October 7, 2012, OR in a person who did not attend the fair but who became ill after contact with a case, with illness meeting one of the following:

**Confirmed Case:**

Hemolytic uremic syndrome (HUS) or laboratory confirmation of *E. coli* O157 infection with two enzyme PFGE and MLVA matching the outbreak pattern with onset of symptoms on or after September 26, 2012,

**Probable Case:**

1) Laboratory confirmation of *E. coli* O157 infection with PFGE and MLVA pattern missing OR 2) diarrhea, bloody or otherwise, (consisting of 3 or more loose stools per day for at least 24 hours) with onset of symptoms on or after September 26, 2012, in the 10 days following fair attendance or contact with a case.

**Exclusion Criteria:**

Laboratory confirmation of *E. coli* with a PFGE or MLVA pattern NOT matching the outbreak strains.

### **Clinical Laboratory investigation**

On October 10, 2012, the North Carolina State Laboratory of Public Health (SLPH) received the first STEC isolates for confirmatory testing and characterization. As additional cases were identified, isolates and clinical specimens were collected and forwarded to SLPH for further testing.

DNA fingerprinting using pulsed field gel electrophoresis (PFGE) and multiple-locus variable number tandem repeat analysis (MLVA) were conducted on STEC isolates. PFGE and MLVA results were compared to isolates in the national PulseNet database to identify similar patterns occurring elsewhere<sup>†</sup>.

### **Environmental Investigation**

On October 17, staff from the DPH met with personnel from the Cleveland County Health Department and Cleveland County fair management to:

- Review the case control study and preliminary results thereof
- Visualize the fairgrounds including locations of animal exhibits, food vendors, and hand washing station locations
- Collect environmental specimens from animal exhibit and adjacent areas, food service areas, restrooms, and negative control areas

DPH staff collected 48 samples consisting of 28 composite soil samples of approximately 50 grams each, 18 hard surface swabs, and 2 composite sawdust samples from a variety of areas around the fairgrounds.

<sup>†</sup> Additional information at: <http://www.cdc.gov/pulsenet/>

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All environmental samples were sent to the USDA / Agricultural Research Service / Agroecosystem Management Research Unit in Lincoln, Nebraska, for selective enrichment, Immunomagnetic Separation using Dynabeads® anti-*E. coli* O157, and isolation. Unique *E. coli* O157 isolates were forwarded to the SLPH for confirmation, PFGE and MLVA testing.

### **Water Quality**

Water is supplied to the fairgrounds via City of Shelby municipal water supply and an existing well on the fair property. The water systems are completely separate; the municipal supply provides water to food vendors and hand washing stations during the fair. The well serves as a source for filling water tankers that sprays the race track for dust control, and a line from the well serves the competition and horse barns.

The City of Shelby public water utility collected water samples from both water systems during October 2–16. Samples were tested for total coliform and *E. coli*; total and free chlorine residual were not measured. Results were certified by Michael Mull, water treatment plant supervisor.

### **Case-Control Study**

NCDPH, in conjunction with local health departments, initiated a case-control study on October 11 to identify exposures associated with illness. To identify controls, as cases were interviewed, they were asked to provide names of other individuals who attended the fair and remained well. Controls were frequency matched to cases by age strata (<18 years of age, >18 years of age). All cases and controls were interviewed by phone or in person, using a scripted questionnaire. Cases and controls less than 18 years of age were interviewed with a parent or guardian present. For children too young to answer questions themselves, the parent or guardian was interviewed about the child's activities.

NCDPH partnered with Cleveland County, Cleveland County fair management, and NCDA&CS to obtain a list of vendors, food products, animal exhibitions, rides and activities. A schedule of events was obtained and a map of the fair layout was created. The questionnaire asked detailed questions about fair activities, food and beverage consumption, and animal exhibits. It also assessed pre-existing conditions and medication usage. (Appendix B)

### **Statistical Analysis**

The questionnaire responses were entered into Epi Info 7.1.0.6. Analyses were performed using SAS 9.3 (SAS Institute Inc. Cary, North Carolina). Odds ratios were calculated using the Cochran–Mantel–Haenszel method and a 95% confidence interval.

### **Interstate and Interagency Notification**

NCDA&CS was notified about this outbreak associated with an agriculturally sanctioned fair on October 9, 2012. It was known that an animal contact exhibit operator's state of residence was Tennessee. We notified the public health veterinarian at the Tennessee Department of Health via email on October 11, 2012, of the outbreak and of the animal contact exhibit operator's residence. Copies of the animal exhibit inspection reports (completed by NCDA&CS in accordance with Aedin's Law) were shared with DPH on October 17, 2012.

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## **Results**

### **Description of cases**

One hundred and six cases from six NC counties (101 cases) and two SC counties (5 cases) were identified with illness onsets during September 29–October 17. (Table 1) Of the 106, 25 (24%) were confirmed cases and 81(76%) were probable. One confirmed case acquired illness via secondary transmission while providing care for another confirmed case. Fifty-seven cases were female (53%) and 49 (47%) were male. The median age among cases was 15 years (range: 0–61 years) with 65 cases (61%) less than 18 years of age.

The average duration of illness was 5 days (range: 1–14). The most common symptoms reported were diarrhea (100%), abdominal cramps (92%), vomiting (63%), fever (58%), and bloody diarrhea (46%). Diarrhea lasted an average of 5 days (range: 1–13 days), with a median of 10 stools per day at the height of illness (range: 3–60). Bloody diarrhea lasted an average of 3 days (range: 1–10 days). Fifty-six percent experienced a fever ranging from 100–104 degrees Fahrenheit during their illness. (Table 2)

Sixty-nine cases (65%) visited a health care provider at least once during their illness. The average number of visits to a healthcare provider was 2 (range: 1–7 visits). Eleven (10%) cases were hospitalized with mean hospital duration of 12 days (range: 1–41 days). Eight (73%) of the hospitalized cases were under 18 years of age. Seven children (7%) developed HUS. Four of these children required dialysis with a median dialysis duration of 7 days (range: 1–28 days). One child died. (Table 2)

The dates of fair attendance spanned from September 26 (preview day) through October 7. Cases visited the fair throughout the time period the fair was open; multiple cases reported attending on multiple days. Illness onset dates ranged from September 29–October 17. The median interval from first day of fair attendance to onset of illness was 6 days (range: 0–19 days). (Figure 1)

### **Clinical Laboratory Results**

Sixty-four cases provided stool samples. Thirty-six of these samples were tested at SLPH. The remaining were reported negative at local laboratories. *E. coli* O157 with Shiga toxin type 2-production was confirmed in 23 samples submitted to SLPH; the remaining 13 samples were negative for STEC. PFGE and MLVA testing of the 23 STEC isolates revealed two outbreak patterns with a high degree of genetic similarity between the two. (Figure 3) The predominant outbreak pattern (EXHX01.0047 / EXHA26.0015) was identified in 19 isolates; the secondary pattern (EXHX01.3632 / EXHA26.0217) was identified in the remaining four isolates. The PFGE patterns identified were common patterns in PulseNet; however, the MLVA patterns were unique and had not been previously described in PulseNet.

### **Environmental Laboratory Results**

Ten of the 48 environmental samples yielded growth in the USDA laboratory. Eight (80%) of these samples were indistinguishable from the predominant outbreak pattern. The remaining two positive environmental samples were indistinguishable from the secondary outbreak pattern. Additional information about the specific MLVA pattern for the environmental samples is demonstrated in Figure 4.

The approximate locations of the positive samples are shown in the image of the fairgrounds. (Figure 5) The eight environmental samples with growth identical to the predominant outbreak pattern were collected at points 10, 11, 13, 15, 14, 16, 17 and 19.

- Point 10: an area near the animal contact exhibit camel ride;
- Points 11, 13, and 15: from the main petting zoo area;
- Points 14 and 16: an area near rainwater runoff co-located with the petting zoo;

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- Point 17: from an area which served as a deposition area for animal waste located directly adjacent to the petting zoo and behind the maintenance shop;
- Point 19: from the parking area behind (approximately northeast from) the petting zoo.

The two environmental samples with growth identical to the secondary outbreak pattern were collected at points 18 and 39.

- Point 18: from an area which served as a deposition area for animal waste located directly adjacent to the petting zoo and behind the maintenance shop;
- Point 39: a surface swab from a painted wooden fence in the Children's Barnyard where a goat and kid were on display in a non-contact exhibit.

## Water Quality Results

All samples were negative for Total Coliforms and *E. coli*.

## Case-Control Study

All 106 cases were interviewed with the standard scripted questionnaire. One hundred sixty-one controls were enrolled, providing a 1.5:1 ratio of controls to cases. Case and control interviews were completed October 10—October 29. Cases and controls were similar with regard to age, sex, race and county of residence. (Table 3)

Illness was not associated with any specific exposures to foods or beverages or rides. Ten different animal exhibits (contact and non-contact) and competitions were evaluated. Among all exposures assessed, visiting the petting zoo was most strongly associated with illness (53% of all cases vs. 39% of controls, odds ratio: 1.8; 95% CI: 1.1–3.0). Analysis of confirmed cases and controls indicated a stronger association between visiting the petting zoo and illness: 74% of cases vs. 39% of controls, with an odds ratio of 4.4 (CI: 1.7–11.9). Among visitors to the petting zoo, petting or feeding animals in the petting zoo indicated the strongest association with illness, with odds ratios of 11.9 (CI: 1.5–95.4) and 22.2 (CI: 2.8–177.7) respectively. (Table 4)

Of confirmed cases, 92% reported any animal exposure, vs. 69% of controls (odds ratio: 5.0, CI: 1.1–21.9). Visiting the Children's Barnyard (a non-contact exhibit) was also associated with illness (odds ratio: 4.1, CI: 1.4–11.9); however only 16 / 21 confirmed cases reported this exposure, a smaller proportion of the overall number of confirmed cases.

## Conclusions

Our investigation suggests two methods of disease transmission occurred in this outbreak: point source (petting zoo and associated physical environment) and person-to-person. Laboratory results identified *Stx2* producing *E. coli* O157 with matching PFGE and MLVA patterns in both human and environmental specimens. Data analysis identified that exposure to the petting zoo, in particular feeding and petting the animals was associated with STEC infection. Also the finding of positive soil samples from sites distant to the petting zoo indicates widespread contamination of the area with the outbreak strain of STEC. The fact that a case occurred in a caregiver (who did not attend the fair) of a case patient who attended the fair indicates that person-to-person transmission occurred.

There is no indication that Aedin's Law was not followed in this instance. This outbreak occurred despite the provisions of Aedin's Law and the NASPHV animal contact compendium.

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## **Limitations**

This outbreak investigation was coordinated centrally by DPH while local health department personnel conducted the case interviews, enrolled controls, and conducted control interviews. Variation in questionnaire administration may have occurred.

Controls were selected from among names of individuals provided by cases. It is possible that these individuals may have different behaviors than other fair attendees. However, this approach to identifying controls is generally considered to bias towards the null hypothesis as well companions are thought to be more likely to share exposures with cases than randomly identified controls.

Responses from cases and controls may have been affected by recall bias, as some interviews were conducted 1–2 weeks after the fair. However, non-differential recall bias would likely bias estimates of association towards the null and therefore have no effect on our conclusion that visiting the petting zoo was associated with illness.

## **Discussion**

Both microbiologic and environmental findings support the findings of this case control study. The environmental samples demonstrate clearly that the outbreak strains of *E. coli* were found throughout the petting zoo and animal waste collection area. With the exception of the positive sample in the Children's Barnyard, positive samples were not found from other areas where animals were housed.

Heavy rain was reported on 6 of the 11 days of the fair. The predominant outbreak strain was found in rainwater runoff areas adjacent to the petting zoo and the more distant parking lot. This suggests not only widespread contamination with STEC, but also that persons who did not visit the petting zoo may still have been exposed to infectious organisms that had been dispersed by rainwater runoff or other mechanical means.

*E. coli* organisms are well known to be recovered from a wide range of areas when animal contact outbreaks have occurred. In the 2011 NC State Fair outbreak illness was associated with an entire building, suggesting widespread contamination of the physical environment<sup>2</sup>. In a similar outbreak in Ohio in 2001 the infectious strain was recovered from sawdust, rafters and other hard surfaces in a structure where a livestock exhibit had previously been<sup>6</sup>.

Environmental persistence of *E. coli* is similarly well documented. In the Ohio outbreak referenced above the outbreak strain was recoverable for 42 weeks following the outbreak<sup>6</sup>. Likewise other studies have demonstrated environmental persistence of STEC for months<sup>7,8</sup>. As a result, Aedin's Law requires that "Exhibit areas that are not impervious shall be cleaned of all manure at the end of the fair and shall not be used for human activities for at least six months after cleaning."

However this outbreak suggests that even those places not considered "exhibit areas" might become contaminated and serve as a source of infection to fair attendees. A more detailed review of the fair processes associated with the Cleveland County Fair is warranted to discover any additional control measures that may be needed.

## **Recommendations**

The requirements set forth in Aedin's Law have done a great deal to protect the public in venues such as the CCF. Nonetheless, Aedin's Law cannot guard against all possibilities. Ruminant animals are a known reservoir for STEC; environmental contamination in outbreak settings is not uncommon; and the provisions of the NASPHV animal contact compendium may not be adequate to prevent illness in certain situations.

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A multiagency locally-driven task force has been developed similar to the 2011 state fair study commission, with the intent to protect the public in the future by evaluating the preventive measures that were in place during the 2012 Cleveland County Fair and identifying additional interventions that may be applied to prevent disease transmission in such venues.

### **Acknowledgements**

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## References

1. Thorpe C. Shiga Toxin-Producing *Escherichia coli* infection. *Clinical Infectious Diseases* 2004;38:1298-1303
2. Notes from the field: *Escherichia coli* O157:H7 gastroenteritis associated with a State Fair - North Carolina, 2011. *MMWR Morb Mortal Wkly Rep* 2012;60:1745-1746.
3. Goode B, O'Reilly C, Dunn J, et al. Outbreak of *Escherichia coli* O157: H7 infections after Petting Zoo visits, North Carolina State Fair, October-November 2004. *Arch Pediatr Adolesc Med* 2009;163:42-48.
4. CDC. Compendium of measures to prevent disease associated with animals in public settings, 2011: National Association of State Public Health Veterinarians. *MMWR Recomm Rep* 2011; 60(RR04);1-24.
5. Outbreak of Shiga toxin-producing *Escherichia coli* O157 infection associated with a day camp petting zoo--Pinellas County, Florida, May-June 2007. *MMWR Morb Mortal Wkly Rep* 2009;58:426-428.
6. Varma JK, Greene KD, Reller ME, et al. An outbreak of *Escherichia coli* O157 infection following exposure to a contaminated building. *JAMA* 2003;290:2709-2712.
7. Maule A. Survival of verocytotoxigenic *Escherichia coli* O157 in soil, water and on surfaces. *Symp Ser Soc Appl Microbiol* 2000:71S-78S.
8. Rahn K, Renwick SA, Johnson RP, et al. Persistence of *Escherichia coli* O157:H7 in dairy cattle and the dairy farm environment. *Epidemiol Infect* 1997;119:251-259.

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Table 1: Distribution of Cases by County

County	Cases
Cleveland	61
Gaston	15
Lincoln	14
Rutherford	7
Cherokee (SC)	3
Union	2
Catawba	2
York (SC)	2

Table 2: Clinical Manifestations of Cases (N=106)

Symptoms	#	%
Diarrhea	106	100
Abdominal Cramps	95	90
Vomiting	67	63
Fever	59	56
Bloody Diarrhea	44	42
HUS	7	7
Dialysis	4	4
Died	1	1
<b>Hospitalization for this illness</b>	<b>#</b>	<b>%</b>
Ever Hospitalized	11	10
Range (days)	1 to 41	
Average (days)	12.3	
<b>Hospitalized by Age Strata (n=11)</b>	<b>#</b>	<b>%</b>
<18 yrs Hospitalized	8	73
> 18 yrs Hospitalized	3	27
<b>Hemolytic Uremic Syndrome (n=7)</b>	<b>#</b>	<b>%</b>
Required Dialysis	4	57
Range (days)	1 to 28	
Average (days)	10.75	

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Figure 1: First Date of Fair Attendance, Stratified by Confirmed and Probable

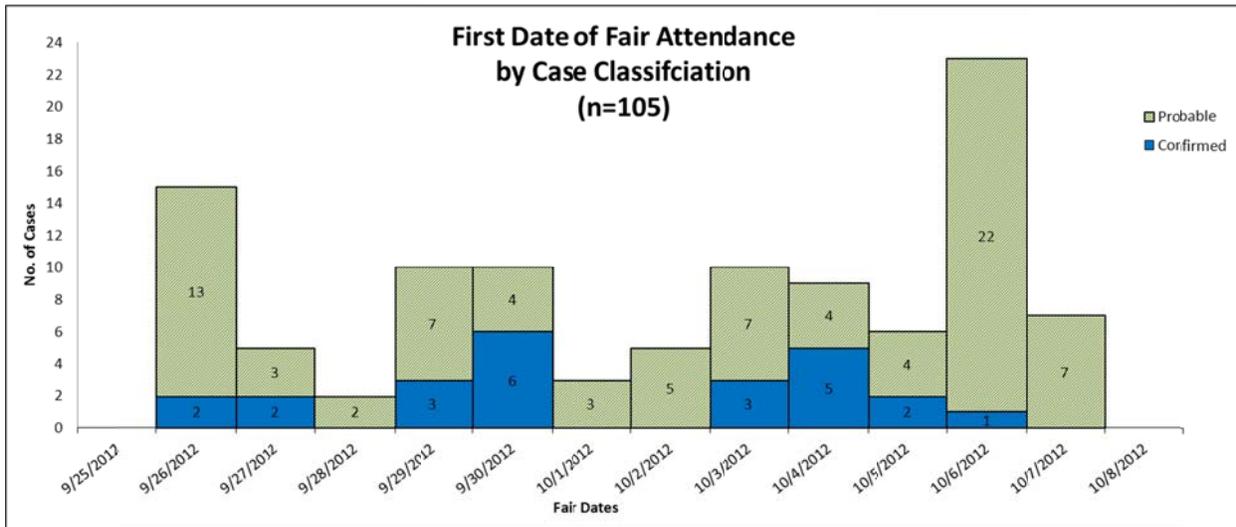
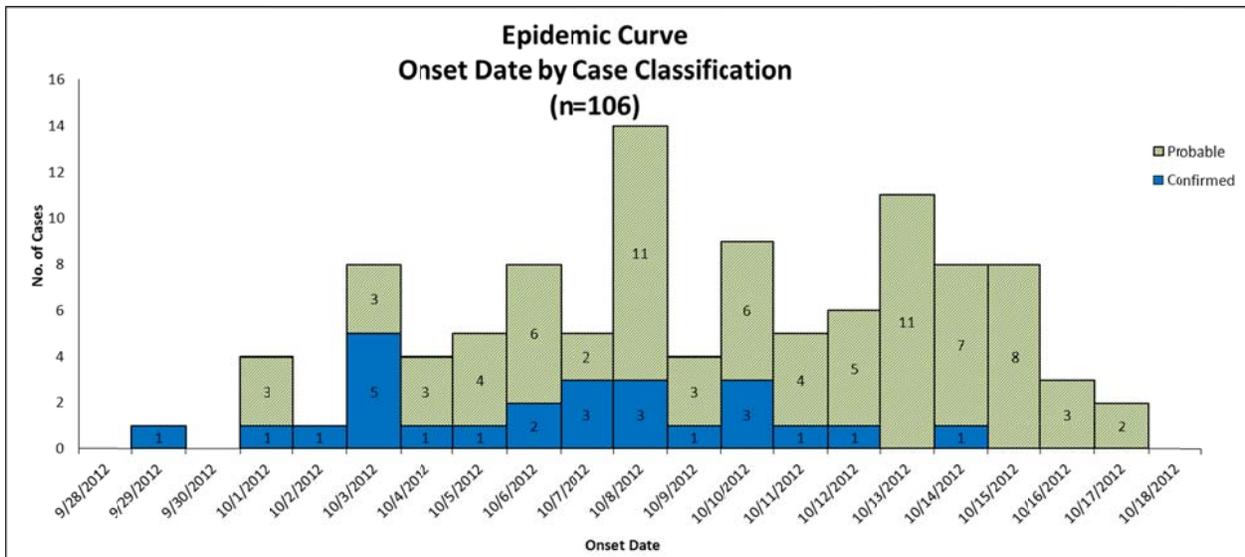


Figure 2: Epidemic Curve by Date of Illness Onset, Stratified by Confirmed and Probable



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Figure 3: PFGE Patterns (EXHX01.0047 / EXHA26.0015 & EXHX01.3632 / EXHA26.0217) Identified in CCF Outbreak

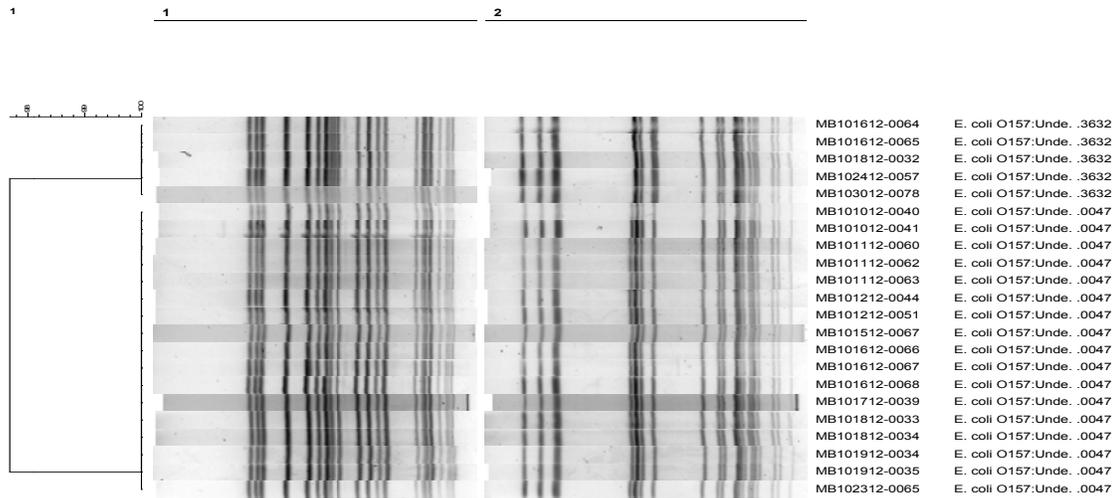
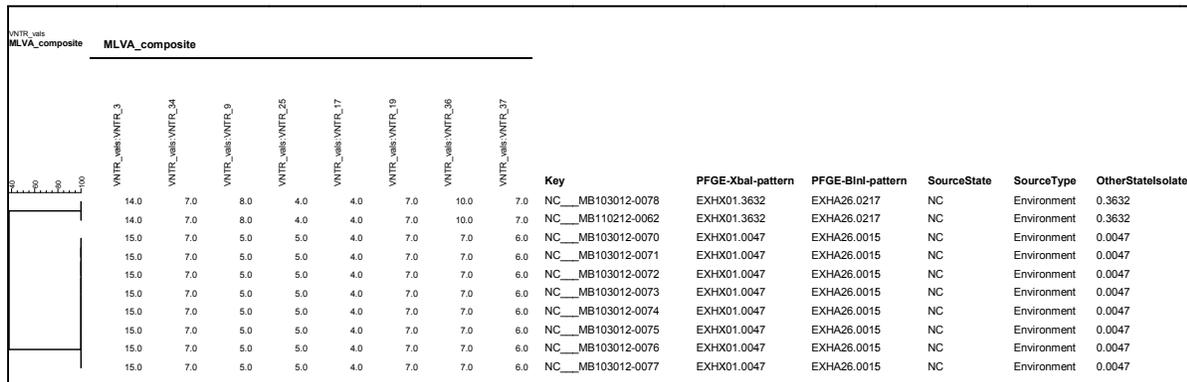


Figure 4: MLVA Patterns Identified in CCF Outbreak



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Figure 5: Map of Cleveland County Fairgrounds, Environmental Samples with *E. coli* Shown in Red

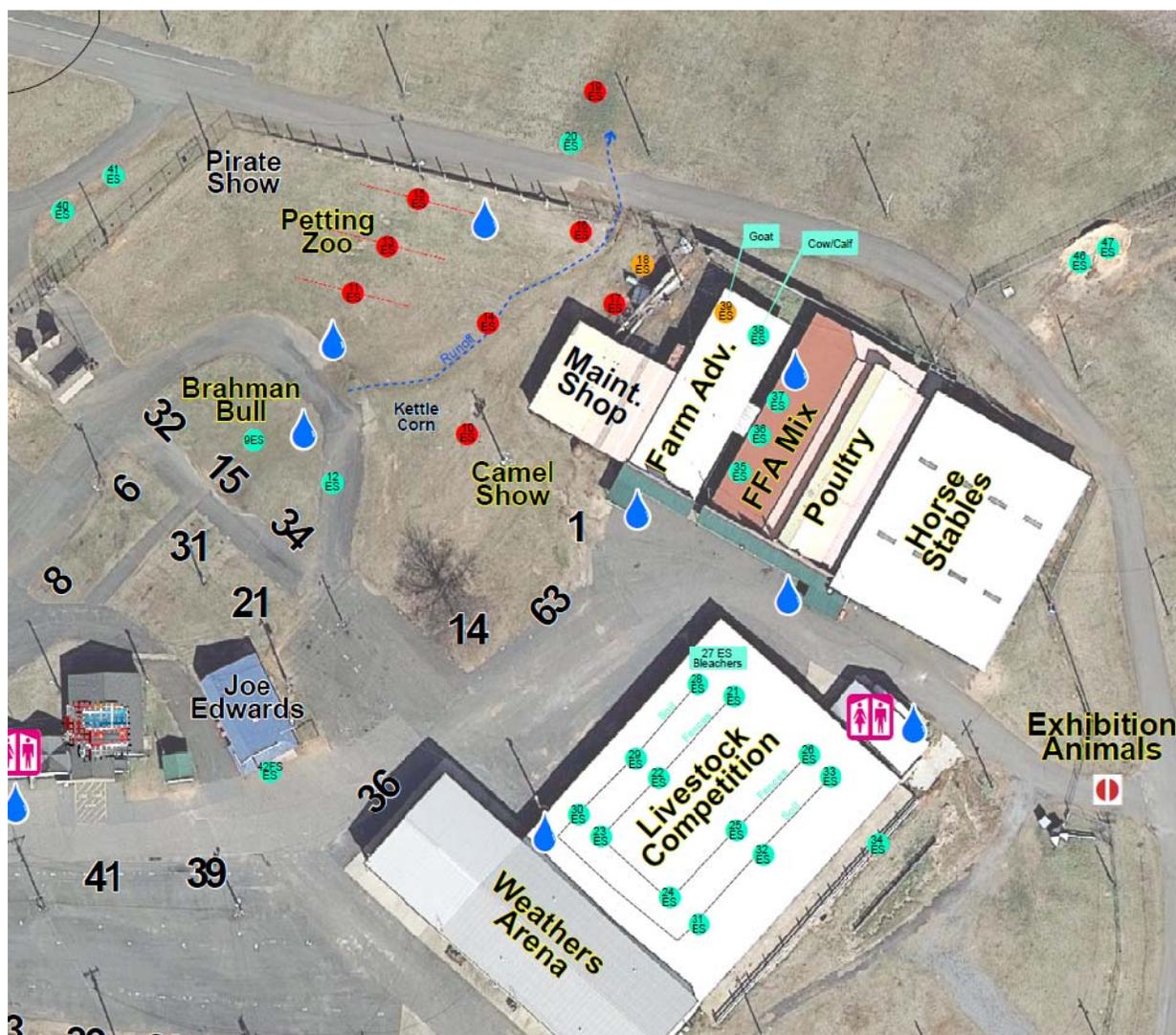


Table 3: Demographics of Cases and Controls

Age	Cases		Controls	
	n	%	n	%
Median	14		15	
Sex	n	%	n	%
	Male	49	53	57
Female	57	47	104	65
Race	n	%	n	%
	White	23	92	66
County of Residence	n	%	n	%
	Cleveland	61	58	91

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Table 4: Case Control Results – Select Animal Exhibits  
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<b>Variable</b>	<b>Cases n (%)</b>	<b>Controls n (%)</b>	<b>OR</b>	<b>LL</b>	<b>UL</b>
Any Animal Exposure	22 (94)	111 (69)	5.0	1.1	21.9
Camel Ride	7 (29)	10 (6)	6.2	1.7	20.6
Milking Booth	8 (38)	26 (16)	2.9	1.7	11.9
Children's Barnyard	16 (76)	68 (44)	4.1	1.4	11.9
Petting Zoo	17 (74)	62 (39)	4.4	1.7	11.9
Pet Any Animal	17 (94)	35 (57)	11.9	1.5	95.4
Fed Any Animal	16 (94)	26 (42)	22.2	2.8	177.7

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## Appendix A: Memo to Health Care Providers

October 10, 2012

To: XXXXXX County Health Care Providers  
From:  
Re: **Identification, management and reporting of *E. coli* O157 infections**

Public health officials are investigating a cluster of *E. coli* O157 infections and hemolytic uremic syndrome (HUS) cases that have been identified among people who attended the 2012 Cleveland County Fair, which was held September 27–October 7 in Shelby, NC. Investigations are ongoing to determine the source (or sources) of infection.

This memo is intended to enhance your awareness and to encourage reporting of suspected *E. coli* O157 infections among patients in your practices. It is also intended to remind you of the medical literature on nephroprotection to prevent hemolytic uremic syndrome (HUS) in susceptible individuals<sup>1</sup>.

### Clinical Issues

- **Early recognition and IV hydration may help prevent renal failure.**
- Consider *E. coli* O157 infection in any individual presenting with acute onset of severe or bloody diarrhea. Fever might be present but is not a prominent sign. HUS is most likely to develop in young children and the elderly several days after the onset of gastrointestinal symptoms.
- Young children with severe diarrhea may appear euvolemic or “puffy” when in fact they may be severely dehydrated. This puffiness or edema results from the severe protein loss from diarrhea.
- Have a low threshold for admitting young children or the elderly for IV hydration if they have presented with severe diarrhea. Careful monitoring is needed during IV hydration.
- Antimicrobial therapy is not routinely indicated in the treatment of gastroenteritis due to *E. coli* O157:H7.

### Laboratory Issues

- Use your usual clinical lab resource to send stool for culture. Specifically order testing for *E. coli* O157:H7.
- Clinical labs should send all isolates (or broth from shiga toxin positive samples if culture was not performed) to the State Lab of Public Health for additional testing, which may include pulsed-field gel electrophoresis (PFGE) or “DNA fingerprinting” to look for related isolates.

### Public Health Issues

- By law, all suspected shiga toxin-producing *E. coli* infections and HUS cases must be reported within 24 hours to your local health department.
- Report all suspect cases. **Do not wait for laboratory confirmation.**

**To report suspected cases, please contact (health department phone number and/or DPH ) epidemiologist on call number, 919-733-3419.**

1. Ake JA et al. Relative Nephroprotection During Escherichia coli O157:H7 Infections: Association with Intravenous Volume Expansion. *Pediatrics*. 2006;115:e673–680.

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Appendix B: Case Questionnaire

**Case Name:**  
**Parent / Guardian:**

**Age:**  
**Phone Number:**

**NORTH CAROLINA DHHS DIVISION OF PUBLIC HEALTH**  
**NC CLEVELAND COUNTY FAIR OUTBREAK: CASE QUESTIONNAIRE**

Phone attempts:  
Interviewer:

Date of interview:

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“Hi, my name is \_\_\_\_\_; I’m calling from the \_\_\_\_\_ (Gaston/Cleveland) County Health Department.

(If case is less than 18 years of age) “May I speak with \_\_\_\_\_’s (CASE NAME) parent or guardian?”

(If NO) ► “When would be a convenient time to call to speak with \_\_\_\_\_ or another adult?”

“As you may know from the recent media coverage, we are investigating E. coli infections among persons who attended the Cleveland County Fair. We appreciate the information that has been provided regarding (your / your child’s) illness and realize that you may have already spoken with someone from the county or state. We are now conducting more detailed interviews to help us understand what caused this E. coli outbreak. All of your answers will be kept confidential and you should not feel obligated in any way to answer these additional questions. The questionnaire will take about 15 minutes to complete. Are you willing to answer these additional questions about (you / your child’s) illness?”

Y (1) N (0) DK (9) (circle)

(If NO) ► “Your participation would be very helpful in understanding this outbreak. Is there a better time when (you / you and your child) could participate?”

(If YES) ► **Schedule date / time** \_\_\_\_\_

(If NO) ► “Thank you.”

**Section A: Demographic**

Before I go any further I want to confirm that (you / your child) attended the Cleveland County Fair between September 26, 2012 and October 7, 2012. Is this correct?

Y (1) N (0) DK (9) (circle)

(If NO) ► “Thank you. At this time we are only interviewing persons that attended the Cleveland County Fair.

(If YES) ► “Thank you for agreeing to participate. Some of these questions may have been asked already. It is important that we ask everyone the same questions in the same way during this part of the investigation. We will be talking about dates before, during, and after the fair. Having a calendar available will help us with these dates.” (Allow time for interviewee to get calendar)

**“I need to verify some information about (your / your child’s) age, sex, and county of residence.”**

1. What is (your / your child’s) date of birth? \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ (mm/dd/yy)

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2. Sex? Male Female UNK/Refused (circle)

3. What is (your/ your child's) race?

- White
- Black/African American
- American Indian/Alaskan Native
- Native Hawaiian or Pacific Islander
- Asian
- Other, specify: \_\_\_\_\_
- Unknown

4. Do you consider yourself to be of Hispanic origin? Y (1) N (0) DK (9) (circle)

5. What is (your / your child's) county of residence? \_\_\_\_\_

5A. What is your US postal address?

\_\_\_\_\_ (street 1, Apt number)  
 \_\_\_\_\_ (street 2)  
 \_\_\_\_\_ (city, state, zip code + 4)

5B. Does your family keep cattle, sheep or goats on your home property? Y (1) N (0) DK (9) (circle)  
 (If YES) ► Circle animal(s): cattle sheep goats

	YES (1)	NO (0)	DK (9)
6. Does your child attend daycare?			
7. Do you/Does your child attend school?			
8. Do you/Does your child attend college or university?			
9. Are you/ your child a food service worker?			
10. Are you/ your child a healthcare worker?			
11. Have you/your child traveled outside of the US in the past 30 days?			

**Section B: Clinical Information**

1. On what day did (your / your child's) illness begin? \_\_\_ / \_\_\_ / \_\_\_ (mm/dd/yy, [ONSET DATE])

2. Are you / Is your child still ill? Y (1) N (0) DK (9) (circle)  
 (If NO) ► How many days did the illness last? \_\_\_ days

3. Did (you / your child) have:

Diarrhea? Y (1) N (0) DK (9) (circle)  
 (If YES) ► What was the maximum number of stools in a 24-hour period? \_\_\_\_\_  
 On what day did (your / your child's) diarrhea begin? \_\_\_\_\_ (mm/dd/yy)  
 Still having diarrhea? Y (1) N (0) DK (9) (circle)  
 (If NO) ► How many days did the diarrhea last? \_\_\_\_\_ DK (9)

Any bloody diarrhea? Y (1) N (0) DK (9) (circle)

(If YES) ► On what day did (your / your child's) bloody diarrhea begin? \_\_\_\_\_ (mm/dd/yy)  
 Still having bloody diarrhea? Y (1) N (0) DK (9) (circle)  
 (If NO) ► How many days did the bloody diarrhea last? \_\_\_\_\_ DK (99)

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4. Now I would like to ask you about other symptoms you / your child may have had.

Symptoms	YES (1)	NO (0)	DK (9)
Nausea?			
Vomiting?			
Abdominal cramps?			
Fever ( <i>subjective</i> )?	Max Fever: _____		
Chills?			
Headache?			
Body aches?			
Fatigue?			
Constipation?			
Other? (specify): _____			

**The following questions are about medications and medical care that (you / your child) received during the 7 days after this illness started on \_\_\_ / \_\_\_ / \_\_\_\_\_. (ONSET DATE)**

1. During the first 7 days of this illness, did (you/your child) take any antibiotics; this could be antibiotics taken at home or antibiotics from a medical provider? Y (1) N (0) DK (9) (*circle*)

A. Antibiotic Name	B. Start date? (mm/dd/yy) DK(9)	C. Stop date? (mm/dd/yy) DK(9) still taking (7)	D. Miss any doses?
Ab1:			Y / N / DK
Ab2:			Y / N / DK
Don't Remember			

2. Did (you/your child) take any anti-diarrhea medications during the 7 days after this illness began, this could be anti-diarrhea medications taken at home or given by a medical provider?  
Y (1) N (0) DK (9) (*circle*)

(If YES) ► What medication did you take? \_\_\_\_\_  
What date did (you / your child) start taking this medication? \_\_\_ / \_\_\_ / \_\_\_\_  
And for how long? \_\_\_\_\_

3. How many times did (you / your child) visit a doctor or other health professional for this illness?  
Please include emergency room, urgent care, and clinic visits, including follow-up visits.  
\_\_\_\_\_ visits DK (9)

*“Let’s talk about the dates that (you / your child) attended the Cleveland County Fair. We can use the calendar to help us remember specific dates. The fair ran from Wednesday, September 26 through Sunday, October 7, 2012”*

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**On what days did you/ your child attend the Cleveland County Fair? (Circle the date(s) attended)**

<u>Wednesday</u>	<u>Thursday</u>	<u>Friday</u>	<u>Saturday</u>	<u>Sunday</u>	<u>Monday</u>	<u>Tuesday</u>
<u>9/26</u>	<u>9/27</u>	<u>9/28</u>	<u>9/29</u>	<u>9/30</u>	<u>10/1</u>	<u>10/2</u>
<u>10/3</u>	<u>10/4</u>	<u>10/5</u>	<u>10/6</u>	<u>10/7</u>		

(Were you / Was your child) or another household member at the fair to exhibit animals?

Y (1) N (0) DK (9) (circle)

(If YES) ► Which of the animals did (you / your child) exhibit or show at the Cleveland County Fair?

---

**Section B: Animal Contact**

***“Now I am going to ask about various animal activities that (you / your child) did at the Cleveland County Fair.”***

Animal Exhibits	Y(1)	If yes, time spent:	N(0)	DK(9)
1. Wild World of Animals?				
2. Pony Ride?				
3. Camel Ride?				
4. Brahman (bull) pictures?				
5. Children's barnyard?				
6. Poultry Barn?				
7. Horse Barn?				
8. Livestock competition barn?				
9. Doggies of the Wild West?				
10. Amazing Animals?				
11. Racing pigs?				

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12. Did (you / your child) visit the *Petting Zoo*? (Petting zoo housed sheep, goats, llamas, camels, pony, ostrich, etc.) Y (1) N (0) DK (9) (*circle*)

(If YES) ► How long (were you / was your child) in the Petting Zoo? \_\_\_\_\_ minutes

12A. Did you pet any of the animals? Y (1) N (0) DK (9) (*circle*)

(If YES) ► Which animals did you pet? \_\_\_\_\_

12B. Did you feed any of the animals? Y (1) N (0) DK (9) (*circle*)

(If YES) ► Which animals did you feed? \_\_\_\_\_

12C. Did (you / your child) eat or drink anything while at the Petting Zoo?

Y (1) N (0) DK (9) (*circle*)

(If YES) ► What? Specify: \_\_\_\_\_

12D. Did (you/your child) use a hand sanitizing gel, wash (your / his or her) hands with soap and water or use hand wipes upon exiting the Petting Zoo? Y (1) N (0) DK (9) (*circle*)

(If YES) ► Which one?

Hand sanitizing gel (1) Soap/Water (2) Hand wipes (3) (*circle*)

12E. If CASE is a CHILD <6 years old: Did your child ride in a stroller through the Petting Zoo?

Y (1) N (0) DK (9) (*circle*)

13. Did (you / your child) visit the *Milking Booth*?

(If YES) ► How long (were you / was your child) in the Milking Booth? \_\_\_\_\_ minutes

13A. Did you pet/milk any of the cows? Y (1) N (0) DK (9) (*circle*)

13B. Did (you / your child) eat or drink anything while at the Milking Booth?

Y (1) N (0) DK (9) (*circle*)

(If YES) ► What?, Specify: \_\_\_\_\_

13C. Did (you/your child) use a hand sanitizing gel, wash (your / his or her) hands with soap and water or use hand wipes upon exiting the Milking Booth? Y (1) N (0) DK (9) (*circle*)

(If YES) ► Which one?

Hand sanitizing gel (1) Soap/Water (2) Hand wipes (3) (*circle*)

14. Did (you/your child) visit any animal exhibits that we have not mentioned? Y (1) N (0) DK (9) (*circle*)

(If YES) ► Which one(s)?

Exhibit 1		Animal Species		Location 1	
Exhibit 2		Animal Species		Location 2	
Exhibit 3		Animal Species		Location 3	

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15. Were hand-washing facilities with running water and soap available to the public at the fair? Y (1) N (0) DK (9) (circle)  
 (If YES) ► Where were these facilities located?  
     In the same area as the animals? Y (1) N (0) DK (9) (circle)  
     At the exit of the exhibit? Y (1) N (0) DK (9) (circle)  
     Near eating facilities or picnic areas? Y (1) N (0) DK (9) (circle)
16. Were hand-sanitizing dispensers available to the public at the fair? Y(1) N(0) DK(9) (circle)  
 (If YES) ► Where were these facilities located?  
     In the same area as the animals? Y (1) N (0) DK (9) (circle)  
     At the exit of the exhibit? Y (1) N (0) DK (9) (circle)  
     Near eating facilities or picnic areas? Y (1) N (0) DK (9) (circle)
17. Were hand-washing or hand-sanitizing facilities low to the ground, at child level? Y(1) N(0) DK(9) (circle)
18. Were there verbal instructions to wash (your / your child's) hands after coming into contact with farm animals? Y (1) N (0) DK (9) (circle)
19. Were there posters/signs instructing (you/your child) to wash your hands after coming into contact with farm animals? Y(1) N(0) DK(9) (circle)  
 (If YES) ► Were the signs/posters located...  
     At the entrance to the exhibit or pen? Y (1) N (0) DK (9) (circle)  
     Inside the exhibit or pen? Y (1) N (0) DK (9) (circle)  
     At the exit of the exhibit or pen? Y (1) N (0) DK (9) (circle)
20. Were there posters/signs instructing (you/your child) not to eat/drink in the animal areas? Y (1) N (0) DK (9) (circle)  
 (If YES) ► Were the signs/posters located...  
     At the entrance to the exhibit or pen? Y (1) N (0) DK (9) (circle)  
     Inside the exhibit or pen? Y (1) N (0) DK (9) (circle)  
     At the exit of the exhibit or pen? Y (1) N (0) DK (9) (circle)

#### Section D: Fair Food and Drinks

***"Now I would like to ask you about food and drinks that (you / your child) ate and drank while at the Cleveland County Fair."***

1. Did (you / your child) eat or drink at the fair? Y (1) N (0) DK (9) (circle)  
 (If NO) ► **GO TO SECTION E**
2. While (you were/ your child was) at the Cleveland County Fair, did (you /your child) **always(1), almost always(2), sometimes(3), or never(4)** wash (your / his or her) hands before eating? (circle answer)  
 (If 1, 2 or 3 yes) ► How did (you / your child) wash (your/ his or her) hands? (Read choices, circle all that apply)
- Hand sanitizing gel (1)  
 Running water & soap (2)  
 Hand wipes (3)  
 Other (4) ► Specify: \_\_\_\_\_

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3. Did (you / your child) eat any of the following items? Specify location. (*Read choices*)

<b>Meats (specify location):</b>	Y(1)	N(0)	DK(9)
Hamburger or cheeseburger?			
Sloppy Joes?			
Hot Dog?			
Corn Dog?			
Sausage (Italian, Polish, Kielbasa, etc.)?			
Ribs on a stick?			
Baby Back ribs?			
Ribeye steak sandwich?			
Chicken (nuggets, sandwich, wings, etc.)?			
Philly steak?			
Turkey Leg?			
Barbeque/brisket?			
Livermush sandwich?			
Bologna sandwich?			
Pork loin?			
Ham?			
Burritos/Tacos?			
Gyro?			
Kebobs?			
Ostrich (burger, on a stick)?			
Lamb?			
Frog legs?			
Fish?			
Shrimp?			

<b>Finger/Handheld Foods (specify location):</b>	Y(1)	N(0)	DK(9)
Pizza?			
Popcorn?			
Cotton candy?			
Grilled/Roasted corn?			
Nachos?			
French fries?			
Fried pickles/onions?			
Peanuts?			

<b>Drinks (specify location):</b>	Y(1)	N(0)	DK(9)
Fresh squeezed lemonade?			

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Iced tea?			
Soda?			
Coffee?			
Other: _____			
<b>Other Food Items (specify location):</b>	Y(1)	N(0)	DK(9)
Slaw?			
Funnel (chocolate) cakes?			
Fried desserts (Oreos, cheesecake)?			
Ice cream?			
Candied apples?			

4. Did (you / your child) consume any other foods/beverages that were purchased at the fair?  
 Y(1) N(0) DK(9)  
**(If NO) ► GO ON**  
**(If YES) ► What else did (you/your child) consume while attending the fair?**  
*(Ask them to specify the food and which vendor)*

Item 1			Location 1		
Item 2			Location 2		
Item 3			Location 3		
Item 4			Location 4		

**SECTION E: Pre-existing medical conditions**

*“Now I would like to ask you a few questions about (your / your child’s) health in the month before this illness began. We would like to know about long-standing medical conditions or other specific medical conditions in the three weeks before this illness, which is from \_\_\_ / \_\_\_ / \_\_\_ (4 weeks prior) to \_\_\_ / \_\_\_ / \_\_\_ (ONSET DATE). You do not need to answer the questions if you don’t want to.”*

1. Prior to this illness did (you / your child) have any of the following medical conditions?

**PLEASE READ EACH CONDITION AND RECORD YES / NO / DK**

		Yes	No	DK
<b>A</b>	Diabetes			
<b>B</b>	Kidney Disease			
	→→ <b>IF YES</b> , Are you/your child on dialysis or awaiting dialysis?			
<b>C</b>	Organ or Bone Marrow Transplant			
<b>D</b>	Leukemia or Cancer			
	If Yes► Treatment with radiation or chemotherapy in previous month?			

*“I would now like to ask some questions about medications that (you / your child) may have been taking in the month before (your / your child’s) illness began, which is from \_\_\_ / \_\_\_ / \_\_\_ (4 weeks prior) to \_\_\_ / \_\_\_ / \_\_\_ (ONSET DATE)”*

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2. In the **month** before (your/your child's) illness began, did (you/your child) receive any of the following types of treatments or take any of the following types of medications?

PLEASE READ EACH MEDICATION/TREATMENT		Yes	No	DK
<b>A</b>	Any oral steroid, such as Prednisone?			
<b>B</b>	Any immune-suppressing medication, such as to treat juvenile arthritis?			
	(If YES) ► Specify:			

3. In the month before (your / your child's) illness onset, which was \_\_\_ / \_\_\_ / \_\_\_ (ONSET DATE), did (you/your child) take any antibiotics? Y (1) N (0) DK (9) (circle)

(If YES) ► It may be helpful to get the pill bottle, do you want to do that now?

- A. What is the name of the antibiotic(s) (you / your child) took? \_\_\_\_\_
- B. What date did (you / your child) start taking the antibiotic? \_\_\_\_\_
- C. When did (you / your child) stop taking the antibiotic? \_\_\_\_\_
- D. Did (you / your child) miss any doses of antibiotics? \_\_\_\_\_

**SECTION F: Closing**

Do you know anyone else (household member, friend, etc.) that attended the Cleveland County Fair and had/has a similar illness?

(If YES) ► Please list Name and phone number

\_\_\_\_\_

Do you know anyone else (household member, friend, etc.) that attended the Cleveland County Fair that did not get sick?

We may need to interview people that attended the fair and were not ill, as part of our investigation.

(If YES) ► Please list Name and phone number

\_\_\_\_\_

Thank you for your time.

