



Missouri Department of Health and Senior Services

P.O. Box 570, Jefferson City, MO 65102-0570 Phone: 573-751-6400 FAX: 573-751-6010
RELAY MISSOURI for Hearing and Speech Impaired 1-800-735-2966 VOICE 1-800-735-2466

Jane Drummond
Director



Matt Blunt
Governor

November 21, 2008

Patti Waller
MarlerClark LLP, PS
701 5th Avenue, Suite 6600
Seattle, WA 98104

RE: medical records of minor, Noah Russell Ennis

Dear Ms. Waller:

Enclosed are the records that are responsive to your request dated October 20, 2008.

The records have been redacted pursuant to section 192.067.2, RSMo Supp 2006 to prevent the disclosure of the identity of the physician and the medical facility.

Sincerely,

A handwritten signature in cursive script that reads "Alisa M. Dotson".

Alisa M. Dotson
Legal Counsel

www.dhss.mo.gov

Healthy Missourians for life.

The Missouri Department of Health and Senior Services will be the leader in promoting, protecting and partnering for health.

AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER: Services provided on a nondiscriminatory basis.



MISSOURI DEPARTMENT OF HEALTH AND SENIOR SERVICES
SECTION OF COMMUNICABLE DISEASE CONTROL AND VETERINARY PUBLIC HEALTH
RECORD OF INVESTIGATION OF ENTERIC ILLNESS

MOHSIS CIDR
1242002252

Ennis, Noah

Information with shaded titles is not required if entered on the CD-1 report or entered into MOHSIS.

NAME: (LAST, FIRST, MI) Ennis Noah R DATE OF BIRTH: 3/13/107 AGE: 13M GENDER: M RACE: NH
 PARENT(S) NAME IF NOT ADULT: Brittney Bourous PHONE NO.: 417-842-1305
 HOME ADDRESS: 1011 Old Exeter Rd. CITY: Cassville STATE: MO ZIP CODE: 65625 COUNTY: Barry

EMPLOYMENT / CHILD CARE (See reverse side for High-Risk Employment information.)
 PLACE OF EMPLOYMENT: ADDRESS: PHONE NO.:
 OCCUPATION: JOB DUTIES:
 SCHOOL / CHILD CARE ATTENDED: GRADE OR ROOM:
 SCHOOL / CHILD CARE ADDRESS: CITY: STATE: ZIP CODE:

Symptoms:* (Check Yes or No and number the order in which symptoms first presented)

ORDER NO.	SYMPTOM	YES	NO	ORDER NO.	SYMPTOM	YES	NO	ORDER NO.	SYMPTOM	YES	NO
	Nausea	<input type="checkbox"/>	<input type="checkbox"/>	<u>2</u>	Bloody Diarrhea	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Malaise	<input type="checkbox"/>	<input type="checkbox"/>
	Vomiting	<input type="checkbox"/>	<input type="checkbox"/>		Cramps	<input type="checkbox"/>	<input type="checkbox"/>		Headache	<input type="checkbox"/>	<input type="checkbox"/>
<u>1</u>	Diarrhea	<input checked="" type="checkbox"/>	<input type="checkbox"/>		Chills	<input type="checkbox"/>	<input type="checkbox"/>		Dizziness	<input type="checkbox"/>	<input type="checkbox"/>
	Watery Diarrhea	<input type="checkbox"/>	<input type="checkbox"/>		Fever	<input type="checkbox"/>	<input type="checkbox"/>		Other		

Disease
 DIAGNOSIS: E. coli pos Shiga toxin ONSET DATE / TIME: 4/12/08 8 am pm DURATION OF SYMPTOMS: 5 days
 INCUBATION PERIOD: 2-7 days PHYSICIAN CONSULTED? Yes No DATE: 4/28/08 HOSPITALIZED? Yes No
 PROVIDER NAME: CITY: STATE: PHONE NO.:
 TREATMENT: (TYPE, AMOUNT) DATE: 4/28/08
Kecefin
 Recovered Died DATE OF DEATH: CAUSE OF DEATH:

Patient History (Limit patient responses to within one disease incubation period.)
 TRAVEL: (OUTSIDE OF HOME COMMUNITY) DATE(S): LOCATION(S):
 Yes No
 HOME WATER SUPPLY: Private (type) well Bottled Water (brand) Other water sources:
 Public Water District (Name) Other water sources:
 HOME SEWAGE DISPOSAL SYSTEM: Private (type) septic Community System (Name)
 RECREATIONAL WATER CONTACT: (SWIMMING POOL, LAKE, RIVER, ETC.) Location: Dates:*
 Yes No Type: Location: Dates:*
 PET / ANIMAL EXPOSURE: (DOMESTIC PETS, LIVESTOCK, OTHER) Animal Type(s):
 Yes No Pets/Animals Ill: Yes No Date(s)* of Animal Exposure:
 Describe Animal Exposure:
 Location of Animal Exposure:
 Comments:

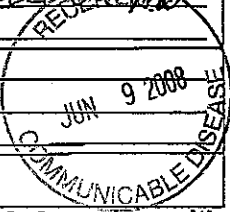
Food**

	NAME	STREET ADDRESS	CITY / STATE
Grocery stores routinely used:	<u>Pamery SuperCenter (Wal-Mart)</u>		<u>Cassville MO</u>
Restaurants routinely used:	<u>McDonalds</u>		<u>Cassville MO</u>
OTHER FOOD SOURCES: (e.g., ETHNIC, UNPASTEURIZED, HOME CANNED)	TYPE / LOCATION:		

RECEIVED

MAY 09 2008

BCDCP - SW



* Epi Calendar (reverse side) may be used to help determine time periods.
 ** Attach separate 3-day food history if multiple cases are known/suspected.

Please submit this form along with completed CD-1 Report on all enteric cases.



1242002852

Laboratory Tests*: Record Diagnostic Information in Section 41 of CD-1 Report and/or attach copy of lab slip(s)

Are there other associated cases? Yes No If yes, how many? How Associated:

List ill contacts:

NAME & ADDRESS	DOB / AGE	SEX	RELATION TO PATIENT	SIMILAR ILLNESS		ONSET DATE	LAB CONFIRMED		CD-1 AND ENTERIC FORM COMPLETED	
				YES	NO		YES	NO	YES	NO
				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

High Risk Employment Information (e.g., Food Handler, Child Care or Health Care Worker)

SPECIFIC JOB DUTIES:

DATE(S) WORKED PRIOR TO ONSET OF ILLNESS: EXCLUDED FROM WORK? Yes No DATE: / /

IF YES, BY WHOM: TITLE:

FOLLOW-UP SPECIMEN(S) REQUIRED? Yes No DATE COLLECTED: / / RESULTS: 1. 2. 3.

LAB: WERE CONTROL MEASURES DISCUSSED WITH PATIENT? Yes No BY:

RETURNED TO WORK? Yes No DATE: / / EXPECTED DATE: / / EXCLUDED FROM HIGH-RISK DUTIES? Yes No

SEXUAL PREFERENCE: Heterosexual Homosexual Bisexual Unknown N/A MULTIPLE PARTNERS? Yes No

RECREATIONAL DRUG USE: Yes No DRUGS OF CHOICE:

***Epi Calendar:**

MONTH(S) / DATES:		YEAR:	DISEASE:			WORK:
Sunday	Monday 4/21 drank goats milk		Tuesday	Wednesday	Thursday	Friday 4/25 diarrhea →
Sunday bloody diarrhea	Monday 4/28 (to ER)		Tuesday	Wednesday 4/30 test results here →	Thursday	Friday 5/2 back to Dr for checkup
Sunday	Monday		Tuesday	Wednesday	Thursday	Friday 5/2 RECEIVED MAY 09 2008

OTHER PERTINENT EPIDEMIOLOGICAL DATA (TO INCLUDE PROBABLE SOURCE):
unpasteurized goats milk

BCDCP - SW COMMUNICABLE DISEASES

INVESTIGATOR: *Melinda Go...* DATE COMPLETED: 5-7-08

COPY

Onset Date: 04/25/2008 Duration:
Onset Time: Symptom Site:
Symptom: diarrhea with occasional bloody mucus for 5 days

Treatment Information:

<u>Drug:</u>	ROCEPHIN	<u>Treatment Date:</u>	04/28/2008
<u>Dosage:</u>	/ ONCE	<u>Duration:</u>	
<u>Procedure:</u>	IM	<u>Treatment Site:</u>	GLUTEUS MAXIMUS/L

Comments/Notes:

<u>Narrative:</u>	phone call attempt unsuccessful, letter sent on 5-7-08	05/07/2008
	child had drank goat's milk from herb depot in monett, mo on 4-21 got sick on 4-25 with diarrhea, saw dr on 4-28 and then had recheck on 5-2	05/07/2008
	raw dairy was consumed	06/04/2008

C

C

E COLI O157:H7 PFGE PATTERN DESIGNATIONS

PFGE type	Organism	Spec. Date	Test Date	State lab #	Region	County	Last Name	First Name	Address	City	Zip	Age	Sex	2nd Enzyme
MOE014	E. coli O157:H7	4/28/2008	5/14/2008	08-0495	SW	Barry	Emis	Noah	1011 Old Exeter Rd	Cassville	65825	13m	M	MBE104

* Specimen Date/Rec'd at Lab
 Rec =PFGE # was adjusted

Rudroff, Joann

From: scdp-bounces@lphamo.org on behalf of Marx, Harvey [Harvey.Marx@dhss.mo.gov]
Sent: Wednesday, May 14, 2008 5:08 PM
To: CD ListServ (E-mail)
Subject: [SCDP] Advisory

Department of Health and Senior Services (DHSS)
Section for Disease Control and Environmental Epidemiology
Bureau of Communicable Disease Control and Prevention
Advisory

The Missouri Department of Health and Senior Services is currently working with a local public health agency in Southwest Missouri on a Hemolytic Uremic Syndrome (HUS) case in an infant.

HUS is a severe, life-threatening complication that occurs in about 10% of those infected with *E. coli* O157:H7 or other Shiga toxin-producing *E. coli*. HUS is characterized by the acute onset of microangiopathic hemolytic anemia, renal injury, and low platelet count.

The investigation is ongoing and the source of infection has not been confirmed. Several venues are being considered, however it is known that the infant consumed raw goats milk before onset of illness. The infant's illness is severe and the outcome of the patient is in question .

196.935 Revised Statutes Missouri 2000 specifically allows a farmer to sell raw milk or cream in Missouri, at the farm where it originated, or deliver it to the customer for the customer's own use. If a producer wishes to sell retail raw milk or cream at a farmers' market or any other retail venue, the producer must first obtain a permit with the Missouri State Milk Board. If the producer obtains a permit, he/she also must comply with the regulations pertaining to the proper bottling and capping of raw milk products found in 2 CSR 80-3.070 and the proper labeling of raw milk products found in 2 CSR 80-3.04

The Bureau of Environmental Regulations and Licensure (BERL) is currently not aware of any producer with a retail permit to sell raw milk or cream in Missouri.

Raw milk is an important vehicle of transmission of *E. coli* O157:H7 and other pathogens, including but not limited to *Mycobacterium bovis*, *Listeria monocytogenes*, *Campylobacter*, *Brucella*, and *Salmonella* species.

Although many consumers are aware that raw milk can contain pathogens, some *believe* that it has potential benefits (e.g., vitamins that are present naturally rather than added, enhanced fertility, and protection against tooth decay).

It is well documented that raw milk can cause enteric infections. Pathogens that can infect humans, including *E. coli* O157:H7, are shed in the feces of cows and goats and can contaminate milk during the milking process. Using standard hygiene practices during milking (e. g., washing hands, keeping equipment clean, and keeping the milking area separated from other areas) can reduce but not eliminate the risk for milk contamination.

Consumers should not assume that permitted raw milk is free of pathogens. To prevent *E. coli* O157:H7 and other infections, consumers should not drink raw milk.

When investigating an enteric disease please check to see if the case has consumed raw milk, cream, or other

homemade dairy products such as soft cheeses. This can be documented on the Enteric Form (Mo 580-0802) under "Other Food Sources" which addresses unpasteurized foods. Should raw milk be identified, please contact your District Communicable Disease Coordinator. They will alert BERL if need be.

The DHSS is considering a joint press release with the Milk Board regarding the potential adverse health affects associated with the consumption of raw milk.

Harvey L. Marx, Jr.
Chief
Bureau of Communicable Disease Control and Prevention
Missouri Department of Health and Senior Services
930 Wildwood
Jefferson City, MO 65109
Phone: 573-751-6113
Fax: 573-526-0235

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ENTERIC BACTERIOLOGY EXAMINATION REQUEST

PATIENT NAME (LAST, FIRST)
Ennis Noah

ADDRESS (STREET, CITY, STATE, ZIP CODE)
103 A ~~Glenda~~ Exeter, MO

BIRTH DATE: **3/13/07** SEX: F M RACE: W B BLK HISP IND ASIA OTHER

DATE SPECIMEN COLLECTED: **4/28/08** SOURCE OF SPECIMEN: **feces in MAC broth**

SPECIAL AGENT/DISEASE SUSPECTED:

ST-BROTH

CULTURE STATE LAB SERIAL NO. **000495 MAY-28**

RAW

FOR STATE HEALTH LAB USE ONLY

DATE REPORTED: **5-7-08**

Organism	Not Found	Found
Salmonella		
Shigella sonnei		
Campylobacter		
E. coli O157:H7		<input checked="" type="checkbox"/>
Other Shiga toxin-producing E. coli		
Other		

SPECIMEN SUBMITTED FOR

CULTURE ID DIAGNOSIS CONTACT TREATMENT FOLLOW-UP

OUTBREAK SCREEN, LOCATION

RECENT FOREIGN TRAVEL - LOCATION

MEDICAID NUMBER

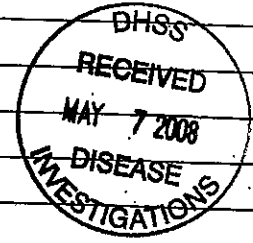
PREVIOUS LABORATORY RESULTS

Ⓟ E. coli Shiga toxin aq EIA

SUBMITTER PHONE

NAME AND ADDRESS OF FACILITY

THIS IS YOUR RETURN ADDRESS LABEL



MISSOURI DEPARTMENT OF HEALTH AND SENIOR SERVICES
STATE PUBLIC HEALTH LABORATORY
101 N. CHESTNUT, PO BOX 570
JEFFERSON CITY, MO 65101

MC 0743 (6-07)

PLEASE FILL OUT COMPLETELY AND SEND ALL COPIES WITH SPECIMEN TO LAB

LAB 11

SW Barry

1242002252

FAXED 5-7-08 **COPY**
+ SW

Name of Outbreak: Multi-County Outbreak of *Escherichia coli* O157:H7 – Subtype MOE014, MBE104, Among Persons who Consumed Unpasteurized Goat's Milk – Spring 2008

Date: September 9, 2008

Status of Report: Final

Prepared by: John Bos, M.P.H., Senior Epidemiology Specialist
Missouri Department of Health and Senior Services

Investigators: Melissa Barrientos, R.N., Public Health Nurse
Barry County Health Department

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Lawrence County Health Department

Jodi Daniel, Coordinator of Epidemiological Services
Springfield-Greene County Health Department

Shelby Sears, R.N., Public Health Nurse
Christian County Health Department

Kendra Williams, M.S., Administrator of Community Health and Epidemiology
Springfield-Greene County Health Department

Introduction

On May 12, 2008, the Lawrence County Health Department (LCHD) was notified of a case of hemolytic uremic syndrome (HUS) in a child with a history of bloody diarrhea. The health care provider reported the child had consumed unpasteurized goat's milk obtained from a local store (Store A) in Barry County, Missouri, on April 29, 2008. The LCHD contacted the Missouri Department of Health and Senior Services (DHSS) per established protocols and initiated an investigation into the reported illness. As part of the initial investigation, an evaluation of surveillance data revealed a young child from Barry County was confirmed to have a recent *Escherichia coli* (*E. coli*) O157:H7 associated illness. The child had consumed unpasteurized goat's milk on April 21, 2008, which had also been obtained from Store A. An outbreak investigation was initiated by DHSS on May 12, 2008, to confirm the infectious agent, determine the source of the infections, and institute control measures to prevent additional cases. This report summarizes the findings from the investigation.

Background

Enterohemorrhagic *E. coli* (EHEC) are a group of bacteria that cause diarrheal illnesses ranging from mild and nonbloody diarrhea to stools that are virtually all blood.¹ The primary reservoirs for the bacteria are cattle, though a variety of other animals may also carry EHEC bacteria.¹⁻³ *E. coli* O157:H7, the predominant type of EHEC in North America, produce cell-destroying toxins called Shiga toxins.^{1,2} Approximately 8% of persons with diarrhea due to Shiga toxin producing EHEC will develop a severe condition called HUS.^{1,2} HUS typically develops within two weeks after onset of diarrhea. Fifty percent of persons with diarrhea-associated HUS will require dialysis, and 3% to 5% of these cases will be fatal.² EHEC infection is the primary cause of HUS and the leading cause of renal insufficiency in children.² Young children and the elderly are at greater risk of developing HUS.³ Serious outbreaks of *E. coli* O157:H7 have been associated with the consumption of beef, produce (alfalfa sprouts, lettuce, etc.), and unpasteurized dairy milk.¹

Testing for EHEC typically includes a Shiga toxin test and culture for the pathogenic bacteria from stool specimens.^{1,2} Illnesses caused by Shiga toxin-producing *E. coli* and persons diagnosed with HUS, are reportable diseases and conditions in Missouri (19 CSR 20-20.020). In addition, all *E. coli* O157:H7 isolates identified by laboratories in the state should be submitted to the State Public Health Laboratory (SPHL). The testing of these bacterial isolates at the SPHL includes identification of the bacteria and testing for the presence of Shiga toxin. In addition, the *E. coli* O157:H7 isolates submitted to the SPHL, are subtyped by a process called Pulsed Field Gel Electrophoresis (PFGE).

PFGE developed in 1984, utilizes deoxyribonucleic acid (DNA) cut up by enzymes that result in a small number of large DNA fragments. The PFGE process facilitates migration of the DNA fragments through agarose gels by constantly changing the direction of the electrical field during electrophoresis. The DNA fragments separate on the gels forming patterns, which can be compared with the patterns produced from other similar bacteria. The bacteria can then be classified into subtypes based on their specific DNA patterns. PFGE subtyping has been successfully applied to the subtyping of many pathogenic bacteria including *E. coli* O157:H7. PFGE has been repeatedly shown to be more discriminating than other methods and the PFGE patterns generated are stable and reproducible. PFGE is the method of choice for epidemiologic subtyping of pathogenic bacteria including *E. coli* O157:H7.⁴

Methods

Following the initial report on May 12, 2008, the DHSS analyzed surveillance data to identify additional cases. Cases of *E. coli* O157:H7 and HUS were investigated per DHSS guidelines. Information regarding the cases was collected through phone interviews conducted by public health nurses and epidemiologist from their respective local public health agencies. The questionnaire used to collect the data on confirmed cases was the Record of Investigation of Enteric Illness, DHSS Form MO 580-0802 (6-02). Information collected included demographics, onset dates and symptoms, possible risk factors, and the presence of ill contacts. In addition, health care providers and laboratories were contacted to obtain information

regarding clinical and laboratory findings. The SPHL conducted routine testing on each *E. coli* O157:H7 isolates to confirm the production of Shiga toxin, the identification of the bacteria, and determine the PFGE subtype. The SPHL findings are reported to the DHSS and forwarded to the appropriate local public health agency.

For the purpose of this investigation, a confirmed case is defined as any person residing in Southwest Missouri, with an acute onset of symptoms that include diarrhea, an illness onset of April 5, 2008 through May 25, 2008, and whose specimens tested positive for *E. coli* O157:H7, PFGE type MOE014, MBE104. A probable case is defined as any person residing in Southwest Missouri, with an acute onset of symptoms that include diarrhea and a diagnosis of diarrhea-associated HUS, in the absence of laboratory confirmation of the causative agent, and an illness onset of April 5, 2008 through May 25, 2008.

On May 13, 2008, a DHSS representative made an unannounced onsite visit to Store A to determine the availability of unpasteurized dairy in the store. On May 14, 2008, a DHSS epidemiologist and representative from the Barry County Health Department made an onsite visit and met with the owner/operator of Store A. The purpose of the meeting was to identify additional cases, identify the source of the milk, and provide educational information regarding the risks associated with the consumption of unpasteurized dairy products. A list of others who had obtained the unpasteurized goat's milk from Store A was requested. Upon determining the source of the unpasteurized goat's milk, the Springfield-Greene County Health Department (SGCHD) was contacted and informed the milk originated from a rural Greene County Farm (Farm A).

On May 15, 2008, SGCHD and DHSS representatives made an unannounced onsite visit to Farm A, to meet with the owner. No one was present at that time; therefore, the SGCHD contacted the owner by phone. The purpose of the call was to inform the owner of the illnesses, the concerns regarding the unpasteurized goat's milk produced on the farm, and to identify others who had consumed the product. A list of customers who regularly purchase the unpasteurized goat's milk was provided to the SGCHD. SGCHD staff called persons on the list to express concerns associated with the consumption of the unpasteurized goat's milk and to identify additional cases. Multiple attempts were made to contact persons when there was no answer and messages requesting a return call were left when answering machines were available. In addition, the SGCHD requested information from the owner of Farm A, regarding the production of the goat's milk and requested samples of the goat's milk for the purpose of laboratory testing. The requested milk specimens were to be tested at the SPHL for the presence of bacteria including *E. coli* O157:H7.

Results

A total of 4 cases (3 confirmed, 1 probable) of *E. coli* O157:H7 and/or HUS were identified. The median age of cases was 4.5 years with a range of 1- 57 years. Fifty percent of the cases were female. Each of the cases resided in different counties in Southwest Missouri, and were not known to be related or have other direct contact to the other known cases. The symptoms reported included diarrhea 100% (n = 4), bloody diarrhea 100% (n = 4), nausea 75% (n = 3), vomiting 75% (n = 3), abdominal cramps 75% (n = 3), and fever 50% (n = 2). The reported

onset dates of illnesses ranged from April 25 through May 4, 2008 (Figure 1). Each of the cases sought medical care from a health care provider and two of the cases were hospitalized. No deaths associated with this outbreak were reported.

The hospitalized cases were diagnosed with HUS. In addition to the symptoms noted, these two cases presented with thrombocytopenia, elevated creatinine levels, and acute renal failure. These findings were noted less than one week following the onset of bloody diarrhea in each of the two cases. Both were placed on dialysis with a duration of 15 days and 20 days respectively and the average length of their hospital stay was 23 days.

Laboratory testing was performed on stool specimens from each of the cases. The three confirmed cases tested positive for *E. coli* Shiga toxin at a hospital laboratory (Hospital A). The Shiga toxin positive specimens submitted to the SPHL were culture positive for *E. coli* O157:H7. PFGE subtyping of the *E. coli* O157:H7 isolates from each of the confirmed cases were identified as indistinguishable subtypes, MOE014, MBE104. Specimens collected from the probable case on May 8, 2008 and May 12, 2008 were negative for several enteric bacterial pathogens including *E. coli* O157:H7, at hospital laboratories (Hospital B and Hospital C) respectively. Shiga toxin testing on specimens from the probable case, were not performed and specimens from this case were not submitted or tested at the SPHL.

No unpasteurized goat's milk was observed to be available for sale from Store A during the onsite visits conducted on May 13, 2008 and May 14, 2008. The owner of Store A was informed of the ongoing investigation and provided information regarding the risks associated with the consumption of unpasteurized milk. The owner acknowledged providing the unpasteurized goat's milk she obtained from Farm A, to an undefined number of persons. In addition, the owner reported having received a call from a relative of a child who had reportedly become ill after consuming the unpasteurized goat's milk. The owner of Store A declined to provide the names of persons for whom she provided the milk or the relative that had called regarding the ill child.

Farm A is located in Greene County. The owner raises and sells a variety of animal products including beef, chicken, eggs, pork, turkey, and unpasteurized goat's milk. In 2008, Farm A's seasonal production and sale of goat's milk was reported to have begun in late March to early April 2008. The milk is sold in 1 gallon and ½ gallon amounts in glass jugs, which narrow at the neck to the opening at the top. The jugs are provided by Farm A and once emptied are returned to Farm A, washed, and reused. The owner declined to provide further details regarding milk production and also declined to provide samples of the goat's milk to the SGCHD for testing at the SPHL. The owner of Farm A stated unpasteurized goat's milk samples from the farm were submitted to a private laboratory and tested negative for *E. coli*. The owner declined a verbal request for the identity of the laboratory that conducted the tests.

The owner of Farm A provided a list of 13 persons who purchased the unpasteurized goat's milk on a regular basis to the SGCHD. A total of 11 (85%) of persons from the list were contacted and informed of the risks associated with the consumption of unpasteurized milk and the concerns regarding the unpasteurized goat's milk product. The remaining two persons on the list were unable to be contacted or did not respond to the messages left on answering machines. A

complete list of Farm A customers who purchase the milk was not maintained by the owner of Farm A.

Discussion

E. coli O157:H7 associated illnesses are endemic in Missouri, with a total of 80 cases reported statewide in 2007. During the past five years, a median of 5 cases of *E. coli* O157:H7 associated illnesses were reported in Southwest Missouri residents through July 1. The outbreak-associated cases all reported an illness onset within a 10-day period from April 25 through May 4. Four reported cases of *E. coli* O157:H7 during this short period of time exceed the expected incidence of the disease among residents of Southwest Missouri.

The *E. coli* O157:H7 isolates associated with the outbreak are considered to be genetically indistinguishable and identified as PFGE subtype MOE014, MBE104. Since mid-year 2004, a total of 261 *E. coli* isolates have been PFGE subtyped using similar methods, of which only three (1.1%) were subtype MOE014, MBE104. The only three *E. coli* O157:H7, subtype MOE014, MBE104 on record in Missouri, were isolated from cases associated with this outbreak. *E. coli* O157:H7, subtype MOE014, MBE104 is a unique subtype, which had not been previously identified in Missouri. In addition, no illnesses or outbreaks associated with *E. coli* O157:H7, subtype MOE014, MBE104 were reported nationally (unpublished PulseNet data - CDC).

The temporal and geographic clustering of these illnesses caused by a bacterium, with matching and unique PFGE subtypes, is strongly suggestive of a common source of exposure. The only common risk factor identified for all of the cases was the consumption of unpasteurized goat's milk originating from Farm A. Each of the four cases had consumed the milk within 3-4 days prior to becoming ill. One of the cases reported direct contact with the goats at Farm A in addition to consuming the milk. Information regarding other potential risk factors was reviewed, however, no other plausible sources of exposure common to all four cases were identified. The median incubation period for *E. coli* O157:H7 infections is 3-4 days following exposure to the bacteria.¹

Several limitations were identified during this investigation. A limited sample size of 4 cases restricted our ability to use a more powerful epidemiologic study design to identify statistical associations between risk factors and disease. No unpasteurized goat's milk consumed prior to the onset of illness or after identification of the outbreak was available for testing for the presence of *E. coli* O157:H7. In addition, no environmental sampling and testing of feces from the goat's or from the milk production area was performed. Finally, details regarding the specific procedures used by Farm A to milk the goats were not provided.

Consuming unpasteurized dairy products is a known risk factor for developing gastrointestinal illnesses caused by a variety of pathogens including *E. coli* O157:H7.¹⁻³ Outbreaks of *E. coli* O157:H7 associated with the consumption of unpasteurized dairy products and contact with farm animals have been well documented in the literature.⁵⁻¹² From 1998 to May 2005, unpasteurized milk or unpasteurized milk products were implicated in 45 foodborne illness outbreaks in the United States, accounting for more than 1,000 cases of illness.⁵ The majority of these illnesses were associated with the consumption of unpasteurized cows milk. However, goats can also

shed *E. coli* O157:H7 and outbreaks of illness have been associated with direct contact with goats or consumption of unpasteurized goat's milk.⁹⁻¹² Despite the numerous claims regarding the health benefits of unpasteurized dairy products, the product, no matter how carefully produced, may be unsafe.¹³

Conclusions

The findings from this investigation confirm three of the illnesses described in this report were the result of *E. coli* O157:H7 subtype MOE014, MBE104. The one probable case was not laboratory confirmed. However, it is plausible the same etiologic agent was present, given the cases clinical syndrome and exposure history. The temporal and geographic clustering of these illnesses caused by a previously unidentified subtype of *E. coli* O157:H7 strongly suggests a common source of exposure. The only common risk factor identified for all of the cases, whom reside in four diverse areas of Southwest Missouri, was the consumption of unpasteurized goat's milk originating from Farm A. Each of the four cases had consumed the milk within 3-4 days prior to becoming ill, which is consistent with the known incubation period for *E. coli* O157:H7. Due to the limitations of this investigation, the source of the infections could not be confirmed. However, the epidemiological findings strongly suggest the unpasteurized goat's milk from Farm A was the likely source of infection for each of the cases associated with this outbreak.

Public Health Intervention

During the course of this investigation several measures were implemented to prevent additional cases of *E. coli* O157:H7. The many public health agencies, laboratories, and the broader medical community collaborated to recognize the outbreak and rapidly identified the potential risk factors. The SGCHD attempted to quickly contact and alert each of the persons identified as consumers of the unpasteurized goat's milk from Farm A of the potential risks associated with the product. In addition, DHSS collaborated with the Missouri State Milk Board in issuing a statewide news release on May 16, 2008, to warn Missourians of the risks associated with consuming unpasteurized milk and milk products.¹⁴ The DHSS also collaborated with the Missouri State Milk Board and other regulatory agencies during inquiries pertaining to the sale and distribution of the unpasteurized goat's milk. The local public health agencies and the DHSS will continue to rapidly investigate reported *E. coli* O157:H7 associated illness and work to promote food safety.

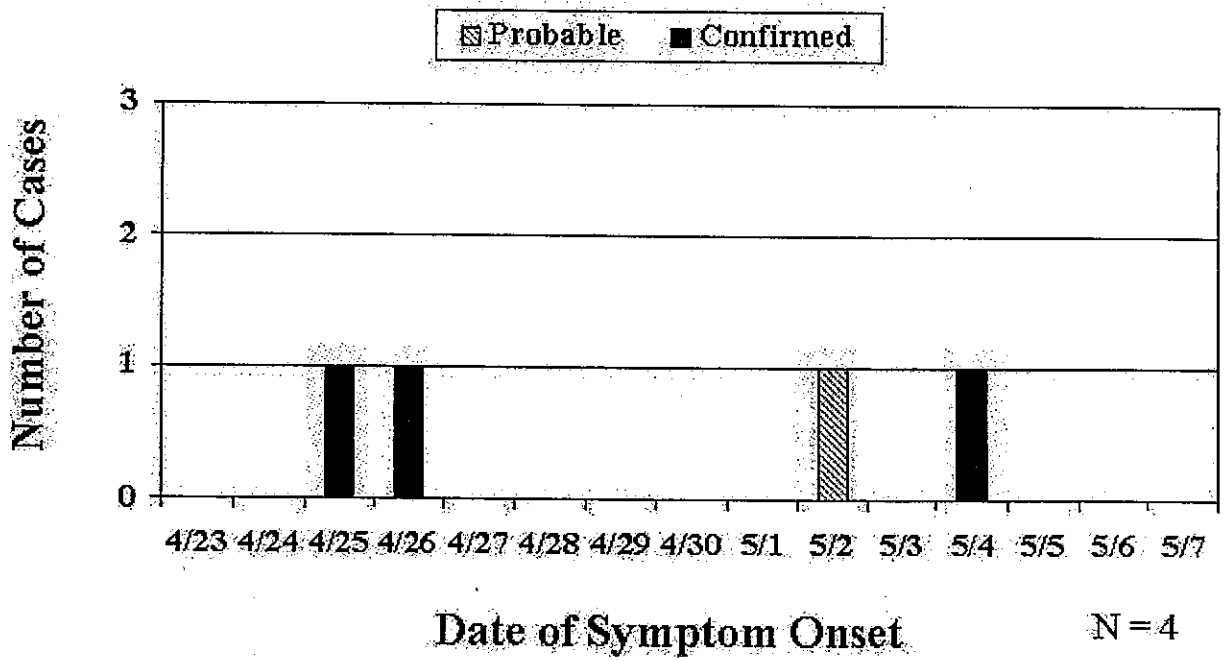
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Figure 1.

Number of *E. coli* O157:H7-MOE014, MBE104, by Date of Onset, Multi-County Outbreak Among Persons who Consumed Unpasteurized Goat's Milk - Spring 2008



From: Williams, Kendra [kdwilliams@springfieldmo.gov]
Sent: Tuesday, June 03, 2008 11:41 AM
To: Bos, John
Subject: Farm Notes

Sorry that I haven't sent these to you yet. I'm on my way out the door today to St. Louis for the rest of the week. Here are the highlights:

The list Kip sent us initially that we claimed was incomplete Kip said was a list of just his regular customers who drink the milk weekly. He does not have a list of customers who buy the milk on an irregular basis.

Kip believes that because the Greene County water district #6 is poorly pressurized that this could have been the cause of the E. coli. He states that DNR has labeled this water system as "inadequate" based on the pressure and they are frequently under boil order.

Kip claims that they use glass bottles to package the milk. They clean the bottles with Shackley Basic G because it claims to kill the HIV virus. He says this is better than any disinfectant on the market.

Kip claims that USDA expert told him that goats have internal temperature too high to support E. coli. Maybe one of his workers had just worked with raw meat prior to milking the goats when the milk became contaminated.

Kip claims that the Farm to Consumer Legal Defense Fund told him that goats didn't carry E. coli unless they had been treated with antibiotics - which his goats are not treated with antibiotics.

Kip called on 5/23 to tell me that he had taken a sample of his milk and his water to an independent lab to have them tested for E. coli. Both came back negative. I asked what lab and he stated that he would not tell me. I urged him to be diligent about having his customers sign the consent when buying milk that understood the risks associated with unpasteurized milk. He said that they were going to make sure everyone signed them. He then stated that he was upset that the woman who was selling milk from the health food store in Monnett was not having customers sign the consent.

The information I gave to Kip was:

Onset dates:

4/25

4/26

5/2

5/5

Two of the three cases had been linked by PFGE technology, meaning that the individuals were exposed by the same source.

Sorry I didn't call with this information but I thought it would be better in writing and I needed to get out of the office and on the road. Hope this helps.

Kendra

From: Williams, Kendra [kdwilliams@springfieldmo.gov]
Sent: Friday, May 23, 2008 3:25 PM
To: Bos, John; Daniel, Jodi
Cc: Goddard, Clay

I received a call from Kip Glass today. He stated that he took a sample of milk and water yesterday to an independent lab in this area and had it tested for E. coli. He called today (because he said it needed a 24 hour incubation) and they said both were negative. I asked what lab and he said that he would not tell me that. He said that we may need to look elsewhere as to the source of this outbreak. I do not believe he will be bringing any samples to send to the SPHL.

Kendra

From: Bos, John
Sent: Tuesday, May 20, 2008 3:43 PM
To: Brock, Daryel
Cc: Marx, Harvey
Subject: Unpasteurized Goats Milk

Hello Daryel,

As I recall, the owner of the Herb Depot in Monett stated she did not sell raw goats milk from her store. However, when she picked the goats milk up from the Autumn Olive Farms for her personal use, she would also pick it up for other people to save them a trip. The public health nurse from Barry County that went with me to the store concurred that is what she recalled hearing the owner say as well.

John

John Bos, M.P.H.
Senior Epidemiology Specialist
Missouri Department of Health and Senior Services
Southwestern District Office
149 Park Central Square Suite 116

Springfield, MO 65801-0777
Phone: (417) 895-6945
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From: Rudroff, Joann
Sent: Friday, July 25, 2008 10:32 AM
To: Bos, John
Subject: FW: PulseNet - Again

Here is your answer - I think!

Jo Ann Rudroff
Epidemiology Specialist
Bureau of Communicable Disease Control and Prevention
Missouri Department of Health and Senior Services
PO Box 570
Jefferson City, Missouri 65102-0570
Phone: (573) 751-6309 Fax: (573) 526-0235
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-----Original Message-----

From: Herstein, Jason
Sent: Friday, July 25, 2008 10:29 AM
To: Rudroff, Joann
Subject: RE: PulseNet - Again

I checked the Bln pattern 104 this morning and only found our MO patterns coming up- we could post if you want to???

-----Original Message-----

From: Rudroff, Joann
Sent: Friday, July 25, 2008 10:23 AM
To: Herstein, Jason

Subject: PulseNet - Again

Hello Jason,

I know that you checked PulseNet earlier on MOE014-MBE104, but can you check to see if there have been any matches to the combination since your last query?

Thanks! Jo Ann
Jo Ann Rudroff
Epidemiology Specialist
Bureau of Communicable Disease Control and Prevention
Missouri Department of Health and Senior Services
PO Box 570
Jefferson City, Missouri 65102-0570
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E coli Outbreak Report From: Kathleen King [kingk@lpha.dhss.mo.gov]
Sent: Thursday, September 04, 2008 9:01 AM
To: Bos, John
Subject: Re: E coli Outbreak Report

John, there are just a few items I thought needed adjusting. I put them in blue font. Kathy

----- Original Message -----

From: Bos, John
To: Potter, Karen ; King, Kathleen ; Barrientos, Melissa ; Goodman, Alethea
Sent: Wednesday, September 03, 2008 4:37 PM
Subject: E coli Outbreak Report

Good afternoon,

Attached is a draft of the final report regarding the E. coli outbreak for your review. Feel free and let me know if you have any comments or suggested changes. It would be great if you could have your comments to me no later than Friday 9/19... but certainly don't hesitate to send it back to me earlier, especially if you have a significant number of suggested changes. Once each of the participating counties has had an opportunity to review and provide comment, a final version will be submitted to Jeff City...approved, entered into the permanent record, and only then will be made available upon request. Also, this report is only a draft and should not be made available to others. If you

approve of the report as is without changes or comments, please send me an email stating you have reviewed and approve of the report. Let me know if you have any questions. Thanks again for your assistance with the report and all the work you and your staff put in on the investigation!

John

<<E.coli Outbreak Final Reportd3.doc>>

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From: Daniel, Jodi [JDaniel@springfieldmo.gov]
Sent: Thursday, September 04, 2008 9:39 AM
To: Bos, John
Subject: Report

John,

Other than misspelling my name for the hundredth time, the report looks just fine.

Jodi (no e) Daniel (no s either) :-0)

Epidemiologist

Springfield-Greene Co Health Department

864-1582

E coli Outbreak Report
From: Williams, Kendra [kdwilliams@springfieldmo.gov]
Sent: Wednesday, September 03, 2008 3:06 PM
To: Bos, John
Subject: RE: E coli Outbreak Report

I am fine with content. I found one typo on page 4 under Results. The typo is found in the fourth full paragraph down which starts with "Farm A.....". The typo

is half way through the paragraph under "The jugs are provide by Farm A". It should be provided. That is all I found. Good report.

E coli Outbreak Report
From: Melissa Barrientos, RN [barrim@lpha.dhss.mo.gov]
Sent: Thursday, September 04, 2008 12:13 PM
To: Bos, John
Subject: Re: E coli Outbreak Report

Jon, your report looks good and accurate. Kathleen was making some changes and should send that back to you shortly if not already. Thanks for all your hard work.

Melissa Barrientos, RN
Barry County Health Dept.

From: Janella Spencer [spencj@lpha.dhss.mo.gov]
Sent: Monday, September 08, 2008 1:20 PM
To: Bos, John
Subject: e coli

John,
Alethea said to email you and let you know that we read your paper on e coli and everything looks good to us.

Thanks,
Janella Spencer, BSN, RN
Lawrence County Health Dept.

From: Karen Potter [pottek@lpha.dhss.mo.gov]
Sent: Monday, September 08, 2008 3:04 PM
To: Bos, John
Subject: E. coli report

John,
I think the outbreak report looks good.
Thanks,
Karen Potter

NEWS RELEASE



P.O. Box 570, Jefferson City, MO 65102

For Immediate Release:

May 16, 2008

Contact:

Nanci Gonder
Office Of Public Information
(573) 751-6062

Gene Wiseman
Missouri State Milk Board
573-526-9754

**State Health Department and Milk Board Join to Warn Missourians
Against Consuming Raw Milk Products**

The Missouri Department of Health and Senior Services (DHSS) and the Missouri State Milk Board together are warning Missourians that drinking raw goat or cow milk, or eating products made from raw milk, can lead to very serious illness and even death. Among several types of bacteria that can cause illness, raw milk can be contaminated with *E. coli* O157:H7, a strain that can produce toxins that cause a condition called hemolytic uremic syndrome (HUS).

HUS is a serious, life-threatening complication that can cause severe, bloody diarrhea, injury to the kidneys and kidney failure. Half of all people with HUS-related diarrhea require dialysis, and three to five percent of these people die. Overall, HUS occurs in about 10 percent of those infected with *E. coli* O157:H7 or other toxin-producing *E. coli*. This condition can be especially serious in young children, senior adults and people with weakened immune systems.

The bacteria that cause illness are found in the feces of cows and goats and can contaminate milk during the milking process. Using standard hygiene practices during milking, such as washing hands, keeping equipment clean, and keeping the milking area separated from other areas, are important, but will not completely eliminate the risk for milk contamination. Therefore, consumers should not assume that raw milk purchased at a farmers' market or grocery store is free of bacteria and safe to drink.

Raw milk and products made with it are those that have not gone through the pasteurization process, which kills harmful organisms by heating the milk to a specific temperature for a set length of time.

Although many people are aware that raw milk can contain bacteria that cause disease, some believe that it has potential benefits over pasteurized milk, such as greater nutritional value, vitamins that are present naturally rather than added, and even protection against tooth decay. However, research has not shown any benefit of raw milk over pasteurized milk. To assure that the milk product being purchased is safe to consume, look for a label that says the product is made from pasteurized milk.

Raw milk products that should be considered unsafe include soft cheeses such as Brie and Camembert, and Mexican-style soft cheeses such as Queso Fresco, Panela, Asadero and Queso Blanco, unless they are made from pasteurized milk. Other products that could be considered unsafe if made from unpasteurized milk include cream, yogurt, pudding, ice cream and frozen yogurt.

It is legal for farmers to sell raw milk products directly to the people who will consume it. Missouri statutes

specifically allow a farmer to sell raw milk or cream, at the farm where it originated, or deliver it to the customer for the customer's own use. However, if a producer wishes to sell retail raw milk or cream at a farmers' market or any other retail venue, the producer must first obtain a permit with the Missouri State Milk Board. If the producer obtains a permit, he or she also must comply with the regulations pertaining to the proper bottling, capping and labeling of raw milk products as specified in the state statutes. Compliance with these regulations does not ensure raw milk is free of harmful bacteria. No producers currently have a retail permit to sell raw milk or cream in Missouri.

Raw milk products can also carry *Listeria* bacteria that put pregnant women and their unborn or newborn children at risk. *Listeria* can cause miscarriage, fetal death or illness or death of a newborn. These bacteria can also put the unborn baby at risk even if the mother does not feel ill.

In addition to *E. coli* O157:H7, raw milk can also carry bacteria that cause diseases such as typhoid fever, tuberculosis, diphtheria and brucellosis.

####

Patti Waller

From: Patti Waller
Sent: Thursday, October 30, 2008 11:08 AM
To: 'jbowman@aleshirerobb.com'
Cc: David Babcock; Erin Reynolds
Subject: Ennis documentation

Hi Jodi,

I'm the Marler Clark epidemiologist trying to get health department records Noah Ennis' *E. coli* infection. The state health department (Missouri Department of Health and Senior Services) would like a notarized statement from his mom, Britney Bounous, saying that she is the custodial parent. I've sent them the "next friend" documents but they have come back asking for a statement.

Could you arrange to get this? All that it has to say is something like this:

TO: Missouri Department of Health and Senior Services

"This is to certify that I, Britney Bounous, is the custodial parent of my son, Noah Ennis."

Have it notarized and then returned to me. The HD folks are really quite nice so I'm happy to get them what they need.

Let me know if you have any questions. Thanks for your help.

Patti