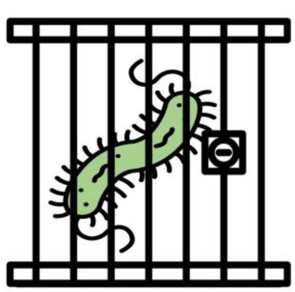
Campylobacter Outbreak at a Colorado Correctional Facility

A Foodborne Outbreak Investigation Case Study

Developed by the

Colorado Integrated Food Safety Center of Excellence

INSTRUCTOR GUIDE



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Summary

This case study is based on an outbreak caused by *Campylobacter* at several Department of Corrections facilities in Colorado. It is designed to be completed by public health students or new foodborne outbreak investigators. Participants should have a basic knowledge of epidemiologic concepts and methods.

Learning Objectives

After completing this case study, participants should be able to:

- List the steps of an outbreak investigation.
- Create and interpret an epidemic curve.
- Use epidemiologic and clinical data to develop a hypothesis about the cause of the outbreak.
- Interpret results of an epidemiologic study and tests of statistical significance.
- Identify special considerations when investigating an outbreak in a correctional facility.

Intended Use

This case study is designed to be discussed in-person or via bi-directional video with a small group (8-15 participants) led by an instructor or facilitator with experience investigating foodborne outbreaks. We recommend allowing at least 2 hours to complete the case study.

Suggested materials may include pens, paper, a whiteboard, or calculators. Some activities may benefit from having internet access. Specific instructions for the instructor are provided in the text of the case study and in the appendix.

Specific instructions for the instructor/facilitator are indicated with this symbol.

Guided answers for the instructor/facilitator are indicated with this symbol.

This case study was developed by the Colorado Integrated Food Safety Center of Excellence. For additional information, or to provide feedback, visit www.COFoodSafety.org

PART A: INTRODUCTION

On September 28, 2005, the Medical Director at the Colorado Department of Corrections (DOC) called the Colorado Department of Public health and Environment (CDPHE) to report *Campylobacter* among two inmates at different DOC facilities. Several other inmates at both facilities were also reporting gastrointestinal symptoms.

Background

Campylobacter is an organism that causes acute diarrheal illness. The incubation period is usually 2-5 days, ranging from 1 to 10 days. *Campylobacter* is the most commonly reported foodborne pathogen in Colorado and at the time of the outbreak approximately 800 cases are reported each year (a rate of 16.3 per 100,000). Reported outbreaks of campylobacteriosis are rare. *Campylobacter* is a zoonotic disease with reservoirs in poultry, cattle, puppies, kittens, and many other animals. Illness is often associated with the consumption of chicken, unpasteurized (raw) milk, and other food products that are contaminated with juice from raw meats. *Campylobacter* may also be transmitted by direct or indirect contact with animals or their environments and via ingestion of contaminated water. Person-to-person transmission is rare.

In 2005, Colorado DOC had over 13,000 inmates at 24 facilities around the state. These facilities house inmates at all levels of security. As with all correctional facilities, residents live in close quarters and there is a potential for inadequate hygiene. Meals are usually prepared by other inmates and served in the prison cafeteria. Vending items are also available. Contraband foods can bebought, sold, and prepared in creative ways including alcohol (“Hooch”). The DOC has several agricultural training programs. Inmates manage a vegetable garden, a dairy, and keep layer hens that produce eggs for public sale. The dairy has its own cattle herd and milk treatment (pasteurization) plant. Produce from the garden and milk from the diary are distributed to all 24 facilities. A dog training program is also housed at one of thel facilities and a wild horse training program at another. Inmates have a co-pay fee for medical care, which can deter them from seeking care. Inmates are frequently transferred between facilities.

Question 1: **Do you think this is an outbreak? Why or why not? What is the definition of an outbreak?**

The general definition of an outbreak is the occurrence of disease in excess of what would normally be expected in a defined community, geographical area, or season. To determine if an outbreak has occurred, we must know the baseline rate of disease. How many cases of *Campylobacter* are expected in this population? In this situation, the easiest way to determine if the two cases exceed the baseline would be to ask the DOC medical director if this is unusual.

Since *Campylobacter* is a reportable condition, you could also review surveillance data to determine the typical number of cases reported from those facilities in a given time frame.

Given that this is relatively small, confined population, even two cases of *Campylobacter* is more than would be expected in a typical week. Also, the fact that other ill inmates are reporting similar gastrointestinal symptoms raises concern.

To determine whether this was an outbreak, you asked the DOC medical director if the number of *Campylobacter* cases was unusual. In this case, even two cases of *Campylobacter* are more than would be expected in a typical week. Therefore, you decided to investigate this potential outbreak.

Beginning the Investigation

On September 29, you visited the Spruce facility, the prison with the most reported illnesses. The warden stated that five additional inmates received a laboratory-confirmed diagnosis of *Campylobacter*. The seven laboratory-confirmed cases first developed symptoms of diarrhea and/or abdominal pain on September 17, 19, 21, 23, 23, 24, and 25.

Question 2: **Based on these onset dates, when do you think inmates were exposed? How might the disease be spread?**

Based on what is known about the incubation period for *Campylobacter,* the earliest period of exposure was most likely 2-5 days (there is no single estimated incubation period for *Campylobacter*; most books give a range) before September 17; that is, between September 12-15. Due to the wide range of onset dates, there is some suggestion that the contamination was over multiple days. Which leads to the question of whether it was a single point source transmission followed by person-to-person transmission at the facility (common in prisons) or a source of exposure over a few days. Looking at the data in the table at the end it can be seen that most cases are clustered around the September 23-25, leading us to assume September 14-15 as a likely period of exposure.

- Based on what we know about *Campylobacter*, it is likely to be foodborne, waterborne, or due to animal contact. Person-to-person transmission is unlikely.
- Common sources of *Campylobacter* include chicken, unpasteurized (raw) milk, and other cross-contaminated food products. It could be due to foods prepared by inmates in the prison cafeteria. It could be due to milk at the dairy. Other contraband foods or drinks should also be considered.
- Water seems like an unlikely source, because illness being reported at more than one facility but always good to keep in mind.
- Cows in the dairy or the dogs could also be a transmission route, but it is unlikely that many inmates would have had direct contact with these animals, since illnesses are being reported from more than one facility.

You suspected the exposure began on or around September 12-15 based on the incubation period for the earliest cases and that food was the most likely source of the outbreak.

The following steps were taken:

- Menus were obtained from the kitchen, and your environmental health colleagues interviewed kitchen staff about food preparation and handling practices.
- Environmental health specialists inspected the prison kitchen and the milk plant, including an inspection of the pasteurization process and packaging, storage and distribution practices.

Question 3: What measures would you implement to prevent further spread of *Campylobacter?*

The following control measures should be considered:

- Cohort or send ill inmates to the infirmary until symptoms resolved.
- Educate inmates and staff about increased cleaning and hand-washing.
- Exclude ill food handlers from work until their symptoms resolved and a negative stool culture was obtained.
- Distribute fact sheets to inmates and staff.
- Halt all unnecessary movement of inmates.
- Actively ask food handlers about symptoms and exclude them from further food handling if ill.
- Drop the copay requirement for infirmary care to encourage health seeking by ill inmates.

To prevent further spread of *Campylobacter* among inmates, you implemented the following control measures:

- Ill inmates were sent to the infirmary until symptoms resolved.
- Increased cleaning and hand-washing was encouraged.
- Ill food handlers were excluded from work until their symptoms resolved and a negative stool culture was obtained.
- Fact sheets were distributed to inmates and staff.
- All unnecessary movement of inmates was halted.

Question 4: What case definition would you use to identify an "outbreak case"? What elements should a case definition include?

Case definitions establish specific criteria for classifying cases, while also ruling out illnesses not associated with the outbreak. Student case definitions may vary, but all should include information about person, place, time, and clinical information.

There is no one 'correct' case definition, and the case definition can evolve as you learn more.

A laboratory diagnosis often defines "confirmed" status while persons without a laboratory confirmation but presenting with similar symptoms may be defined as "suspect" cases.

Because this outbreak occurred in a prison where inmates might have an incentive to underreport or exaggerate illness the investigators chose to include only laboratory-confirmed illness in the case definition.

Case definition going forward in the exercise:

"An inmate in a Colorado DOC facility with laboratory-confirmed *Campylobacter* infection with onset September 1-October 1."

PART B: EPIDEMIOLOGIC STUDY

A case was defined as illness in an inmate in a Colorado DOC facility with laboratory-confirmed *Campylobacter* infection with onset September 1-October 1.

The investigation team decided to search for additional cases.

Question 5: How would you find additional cases?

Methods for identifying additional cases may include:

- Searching clinical records.
- Searching hospital records.
- Informing the guards/clinic health staff and ask them to report additional cases.
- Encourage healthcare staff to culture stools of all patients with diarrhea.
- Asking prison staff to go cell by cell to ask inmates if they had diarrhea and encourage inmates with diarrhea to seek medical care.
- Monitoring routine communicable disease reporting.

To identify additional cases, you:

- Sent out a bulletin to the entire DOC asking prison staff to report and culture suspected cases immediately.
- Reviewed medical records at the Spruce facility. Three additional cases were treated on September 25th and 26th.
- The guards conducted cell-to-cell checks for illness at the Spruce facility and requested stool specimens from all from symptomatic inmates.

After actively searching for cases, you identified a total of 40 laboratory-confirmed cases.

Question 6: Construct an epidemic curve of cases by onset of symptoms listed in Appendix A. What can you infer from the shape of the epidemic curve?

Students should work individually or in small groups to construct epidemic curves. Have students compare their epidemic curves as a group.

Instructor notes for creating epidemic curves:

- The epidemic curve is a histogram showing the number of outbreak-associated cases by their time of onset.
- It should include a brief, but descriptive, title (including place, time).
- The x/y axes should be clearly labeled.
- The x-axis represents the date or time of illness onset among cases.
  - The unit of time is usually 1/4 to 1/3 of the median incubation period.
- The y-axis shows the number of ill cases.
- There should be no gaps between the bars of the histogram.

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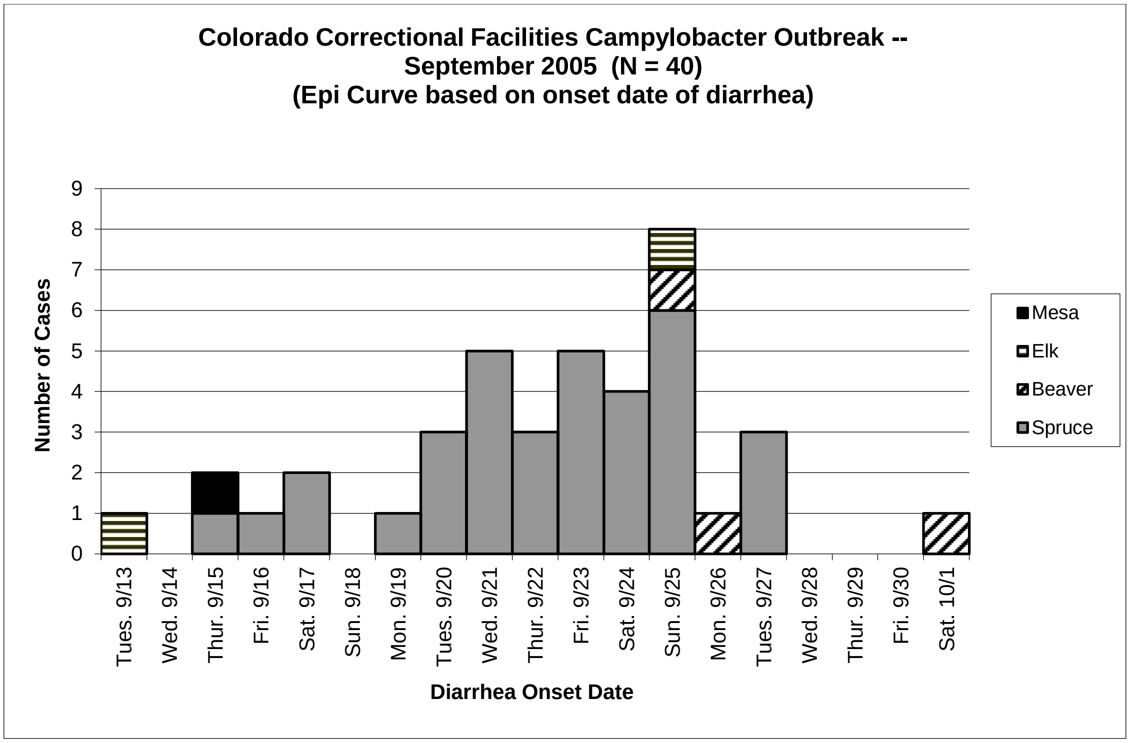


From the epi curve, onset dates span multiple incubation periods, which indicates cases were exposed over several days.

Based on the epidemic curve, you suspected cases were exposed over several days.

All case-patients were male. The median age was 35 years (range: 20–65). Symptoms are described below. All patient isolates were sent to CDPHE laboratory for confirmation, speciation, and PFGE.

Table 1. Characteristics of Illness among Case-Patients (n=39)*

Characteristic	N	%
Diarrhea	39	100
Abdominal pain	37	95
Headache	30	77
Fever	24	62
Bloody diarrhea	13	33
Vomiting	13	33
Hospitalized	1	3

*Information was not available for one case

As most cases were found from the Spruce facility, investigators decide to focus their epidemiological investigations on that facility.

Question 7: What are the two most common types of epidemiological studies used to investigate the source of an outbreak? Which would you use to investigate the source of this outbreak? Why?

In outbreak investigations, two types of analytic studies are commonly used:

- Cohort study:
    - In a cohort study, subjects are enrolled based on exposure to a factor of interest or if they were a member of a group (e.g., guests at a wedding banquet, patients on a particular hospital ward).
    - The occurrence of disease is then ascertained and compared between people with exposure and those without the exposure to see if there is a relationship between exposure and disease.
    - A cohort study is typically used when illness occurs among a well-defined group.
- Case-control study:
    - Subjects are enrolled based on whether they have the disease of interest or not.
    - Characteristics are then compared between cases and controls to see if there is a relationship between the disease and the exposure.
    - A case-control study is typically used when:
        - The population at risk is not known.
        - The disease under investigation is rare.
        - The exposure is common.
        - The time between exposure and onset of the disease is long.

For this outbreak, investigators could conduct a cohort study (with prison inmates as the cohort) or they could use a case-control study design. Reasons for choosing a case-control study design over a cohort study include:

- Only laboratory-confirmed cases were included in the case definition.
- In a correctional facility setting, it may not be feasible to interview everyone or even to randomly select people, due to security issues.
- The prison population is very large.

If conducting a cohort study, power calculations should be done as only a subset or sample of the cohort may need to be interviewed.

You decided a case-control study would be more efficient in this setting. Although a sizeable outbreak, the disease was still relatively rare in the total population (there are over 2,000 inmates at the Spruce facility yet there were only 34 laboratory-confirmed cases). It was less resource intensive to start with 34 laboratory-confirmed cases than to try and interview a cohort of over 2,000 inmates.

Question 8: Who would you select as controls? What inclusion/exclusion criteria would you use for controls?

Controls should be other inmates that had the same opportunity of exposure as the cases. You may want to match controls to cases by facility or other factors.

Controls should be excluded if they reported diarrhea as they could be a case and including them could result in misclassification. Newly arrived inmates should also be excluded if they were not at the prison during the suspected exposure period.

Ideally investigators would use a random process to select controls. This is rarely feasible in correctional settings where guards often select controls for public health based on security considerations.

You interviewed 31 cases at the Spruce facility. One control was selected per case, and controls were matched to cases by prison unit using a random selection from rosters by prison staff. Controls were excluded if they reported a gastrointestinal illness from September 1-October 1 or chose not to participate.

Question 9: What does it mean to "match" cases and controls? What is the difference between a matched and an un-matched analysis? What are the advantages and disadvantages of matching?

Matching generally refers to a case-control study design in which controls are intentionally selected to be like cases on one or more characteristics. The characteristics most appropriately specified for matching are those which are potential confounders of the exposure-disease association of interest (e.g. age, gender, geographic area). By matching, the distribution of the selected characteristics are identical between cases and controls and, therefore, will be eliminated as potential confounders in the analysis.

Advantages:

- Matching may control for confounding by numerous social factors that would otherwise be difficult to measure and control.
- Matching may be cost- and time-efficient, facilitating enrollment of controls, when the control knows the case and, therefore, is more likely to participate.
- Appropriate matching increases statistical efficiency of an analysis and, thus, provides narrower confidence intervals.

Disadvantages:

- Matching on a factor prevents one from examining its association with disease.
- Matching may be cost- and time-inefficient, if considerable work must be performed to identify appropriately matched controls.
- Matching on a factor that is not a confounder or having to discard cases because suitable controls could not be found decreases statistical efficiency and results in wider confidence intervals (i.e., decreases precision).
- Matching complicates analyses, particularly if confounders are present.

You decided to match the *Campylobacter* cases with controls from the prison based on age and prison unit. Matching cases with controls on prison unit was a way of controlling for other potential confounders, such as illicit foods and other social/behavioral factors specific to different units that were difficult to measure. You decided to ask the cases and controls about exposures in the five days prior to illness onset.

Question 10: What questions would you include on your questionnaire?

The following questions were included:

- Consumption of items on prison menu
- Canteen and vending items
- “Hooch” and illicit foods
- Contact with animals
- Contact with others who were ill
- Demographic information
- Symptom information
- Jobs performed at the facility

Based on what you know about *Campylobacter*, you determined that it was important to ask the cases and controls about consumption of items on the prison menu, vending items, "hooch" and illicit foods, contact with animals, and contact with others who are ill.

Question 11: What "measure of association" is used in a case-control study? That is, how is the association between exposure and disease quantified? How is it interpreted?

The odds ratio is the measure of association for a case-control study (matched or unmatched). It is the ratio of two odds: the odds of exposure to a factor among cases and the odds of exposure to the factor among controls. An odds ratio tells us how many times higher the odds of exposure is among cases compared to controls.

Odds ratios are always between 0 and infinity.

An odds ratio of:

- < 1.0 means that the odds of exposure among cases is lower than the odds of exposure among controls. The exposure may be protective against the health problem.
- 1.0 (or close to 1.0) means that the odds of exposure among cases is the same as the odds of exposure among controls. The exposure is not associated with the health problem.
- 1.0 means that the odds of exposure among cases is greater than the odds of exposure among controls. The exposure may be a risk factor for the health problem.

Tests of statistical significance (e.g., chi-square, Fisher exact test) are used to determine the probability that an observed odds ratio could have occurred due to chance alone. This probability is called the p-value. P-value results range from 0.0 to 1.0. A very small p-value indicates it would be unlikely to observe an outcome due to chance alone, if there were no association between the exposure and the disease. If the p-value is less than some predetermined cut-off (usually 0.05 or a 5 in 100 chance), the association is then said to be statistically significant.

Here are the results of the case-control study:

Table 2. Cases and controls reporting consumption of food items in the past 5 days

FOOD ITEM	CASES (N=31)	CONTROL (N=31)	MATCHED OR	95% CI	P-VALUE
Milk	29 (94%)	14 (45%)	16.0	(2.1, 120.6)	0.0071
Foods made w/milk	28 (90%)	21 (68%)	8.0	(1.0, 64.0)	0.0499
Any turkey	24 (77%)	20 (65%)	1.8	(0.6, 5.4)	0.2920
Fresh fruit	30 (97%)	27 (87%)	4.0	(0.5, 35.8)	0.2150

Question 12: Interpret the odds ratios for the above exposures in the matched analysis. What exposures appear to be risk factors for *Campylobacter* in this outbreak?

The following interpretations can be gleaned from the table:

- The odds of drinking milk were 16 times higher among cases than controls. The p-value is less than 0.05, therefore the odds ratio is statistically significant.
- The odds of eating foods that were made with milk was 8 times higher among cases than controls. The p-value is less than 0.05, therefore the odds ratio is statistically significant.

Milk and foods made with milk appear to be risk factors for *Campylobacter* infection in this outbreak.

The findings of the case-control study suggest that consumption of milk or foods containing milk were a significant risk factor for *Campylobacter*. You decided to examine the amount of milk consumed to determine if there was a dose-response.

Table 3. Results of dose response variables

MILK SERVING	CASES (N=31)	CONTROL (N=31)	MATCHED OR
None	2	21	Ref
1	2	3	7.0
2	4	6	7.0
3	6	3	21.0
4	19	9	22.2

Chi square test for linear trend p = 0.00001

Question 13: What is meant by "dose-response"? Interpret the results in Table 3.

A dose repose indicates the higher the dose, the higher the rate of disease.

In this study, there was a dose response relationship between the amount and milk consumed the odds of being ill.

Cases were 7 times more likely than controls to have consumed one glass of milk. However, cases were 22 times more likely to have consumed four milk servings.

PART C: ENVIRONMENTAL ASSESSMENT

During the environmental investigation, the epidemiologist and the milk program specialist inspected the dairy. They observed pasteurization, packaging processes, pasteurization records, and they collected environmental swabs and samples of raw and pasteurized milk. You also collected shipping logs to determine distribution of milk to each DOC facility.

The dairy was relatively small and produced 3,000 gallons of milk 3 days per week. All milk provided to inmates was 1% milk fat. The cream was sold to another diary. Most work was performed by inmates, who were supervised by the plant manager. The state health department conducted a routine milk plant inspection on August 30, and all samples had been within normal limits.

Milk was packaged in two container types: ½ pint cartons and 5-gallon plastic bladders, or 'mags.' An automated package system was used for the ½ pint cartons. 'Mags' were filled by hand.

No problems with pasteurization records or processes were noted, such as equipment failures. Heat and time records were within normal limits. No cows had recently had mastitis. There were no ill workers whose illness had preceded the outbreak. You noted some potential sources for contamination post-pasteurization. In particular:

- Workers filled milk bladders by hand, and bare-hand contact with the bag's opening could have occurred. Also, investigators noted a pipe dripping with condensation directly above the mag dispenser.
- There was some mixing of milk plant and dairy workers in a shared break room, which could facilitate spread of pathogens from shoes or cloths of dairy workers to that of the milk plant workers.
- Milk bladders had the potential to be splashed by dirt on the floor when placed in crates near the floor, which was usually wet.

In the cafeteria, milk was served from dispensers that were stocked with 5-gallon plastic bladders, or ‘mags.’ Inmates in ‘segregation units’ were served milk in half-pint cartons (n=288). Both types were packaged on site at the prison dairy.

You examined the attack rate by type of milk container. There were no cases reported among the 288 inmates in segregation units. The 34 cases at the Spruce facility occurred among the 2,157 non-segregated inmates.

QUESTION 14: Calculate the attack rate among inmates who were able to drink from a bladder milk container and a carton milk container.

The attack rate among non-segregated inmates was 34/2,157 or 1.6%. The attack rate among the segregated inmates was zero, since there were zero cases among this group.

Table 5. Attack rate among prisoners who drank from a bladder milk container and a carton milk container.

	ILL	NOT ILL	ATTACK RATE
Bladder milk	34	2,123	1.6%
Carton milk	0	288	0

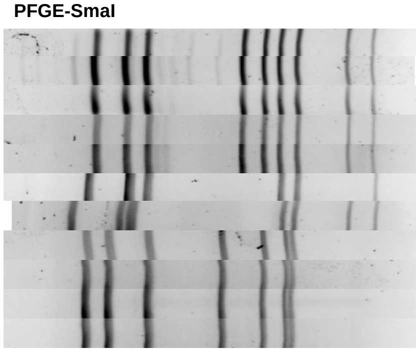
PART D: CONCLUDING THE INVESTIGATION

Campylobacter jejuni was found in both milk samples from the balance tank, which is a holding tank for milk that has had the cream removed but has not yet been pasteurized. Samples from all equipment swabs, finished and raw milk tank samples, and all cultures from prison staff were negative.

From the epidemiologic and environmental findings (milk samples), you concluded the outbreak was due to contaminated milk. Since cases were identified in several facilities the milk was likely contaminated at the milk plant. The exact source of the contamination remained unknown. No correlation between specific production dates and delivery dates to particular facilities could be established. *Campylobacter* could have been present in the milk because of a failure of pasteurization, or contamination of finished milk with raw milk or splatter from the environmental or a worker. Further, it remains possible that this outbreak was a result of intentional contamination by a worker (inmate) in the plant.

PFGE was performed on isolates from 8 of the cases and on isolates recovered from milk obtained at the dairy. Four different PFGE patterns were identified, named patterns A, B, C and H. Pattern "A" was identified from two patients at the Mesa and Spruce facilities and from the milk at the dairy. Pattern "C" from one patient at the Elk facility, Pattern "H" from one patient at the Beaver facility, and Pattern "B" from 4 patients at Spruce and Beaver facilitates. It is not uncommon to have different PFGE patterns for a Campylobacter outbreak associated with milk, especially if that milk was not pasteurized, since cows can carry multiple strains and multiple cows can contaminate a batch of milk or the environment. In this case because no deficiencies with the pasteurization process were identified, we suspected that the contamination happened post-pasteurization from something (or someone) in the dairy environment so having multiple patterns does not refute that. Therefore, finding the same pattern in milk and at least one patient supported our hypothesis about milk.

PFGE-SmaI



ENF-2005000570	05-A	Elk
ENF-2005000571	05-A	Elk
ENF-2005000571-1	05-A	Elk
PHM-2005009491	05-A	Mesa
PHM-2005009536	05-A	Spruce
PHM-2005009675	05-C	Elk
PHM-2005009913	05-H	Beaver
PHM-2005009490	05-B	Spruce
PHM-2005009539	05-B	Spruce
PHM-2005009686	05-B	Beaver
PHM-2005009797	05-B	Beaver

PUBLIC HEALTH RECOMMENDATIONS

The state health department instructed the facility to correct the minor deficiencies noted that could lead to contamination of finished milk.

While results of all routine milk testing had been within acceptable limits, the state health department realized that only milk from half pint containers was routinely tested, due to logistical issues related to testing the 5 gallon containers. Milk testing is now performed on both packaging types at the state health department.

AUTHORS

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References:

This case study was developed by the Colorado Integrated Food Safety Center of Excellence in collaboration with the original investigators. Some aspects of the outbreak investigation have been altered for the purposes of this case study. Additionally, the methods utilized in this case study reflect the approach used for this particular outbreak. Outbreak response procedures, policies, and methods may vary by country, state, or local jurisdiction.

The Colorado Integrated Food Safety Center of Excellence (CoE) is a collaborative partnership between the Colorado Department of Public Health and Environment (CDPHE) and the Colorado School of Public Health (CSPH), one of six Integrated Food Safety Centers of Excellence designated by the Centers for Disease Control and Prevention (CDC). We are dedicated to identifying and developing model practices in foodborne disease surveillance and outbreak response. We provide trainings, continuing education opportunities, and serve as a resource for local, state, and federal public health professionals who respond to foodborne illness outbreaks. Learn more at www.COFoodSafety.org

Appendix A: Line list of onset date and symptoms for inmates with laboratory-confirmed *Campylobacter* infection.

Case ID	Onset Date	Facility	Age	Diarrhea	Bloody diarrhea	Abdominal pain	Fever	Headache	Vomiting
1	09/15/05	Spruce	25	+	+	+	+	+	
2	09/17/05	Spruce	63	+		+	+	+	+
3	09/19/05	Spruce	21	+		+	+	+	
4	09/20/05	Spruce	20	+		+			
5	09/20/05	Spruce	37	+	+	+	+	+	
6	09/20/05	Spruce*							
7	09/20/05	Spruce	27	+		+		+	+
8	09/21/05	Spruce	29	+		+	+		+
9	09/21/05	Spruce	33	+		+	+		+
10	09/21/05	Spruce	31	+		+	+	+	
11	09/21/05	Spruce	30	+		+	+	+	
12	09/21/05	Spruce	34	+	+	+			+
13	09/22/05	Spruce	22	+		+	+	+	
14	09/22/05	Spruce	25	+		+	+	+	
15	09/23/05	Spruce	25	+			+	+	+
16	09/23/05	Spruce	59	+	+	+		+	
17	09/23/05	Spruce	62	+		+	+	+	+
18	09/23/05	Spruce	29	+		+	+		+
19	09/23/05	Spruce	51	+	+	+	+		
20	09/23/05	Spruce	25	+		+	+	+	
21	09/24/05	Spruce	50	+		+	+	+	+
22	09/24/05	Spruce	27	+	+	+	+	+	
23	09/24/05	Spruce	44	+	+	+	+	+	
24	09/24/05	Spruce	23	+	+	+	+	+	
25	09/24/05	Spruce	31	+		+		+	+
26	09/25/05	Spruce	52	+		+		+	+
27	09/25/05	Spruce	39	+	+		+	+	
28	09/25/05	Spruce	33	+		+	+	+	
29	09/25/05	Spruce	20	+		+	+	+	
30	09/25/05	Spruce	25	+	+	+		+	
31	09/25/05	Spruce	47	+		+		+	
32	09/27/05	Spruce	34	+	+	+	+	+	
33	09/27/05	Spruce	65	+	+	+			
34	09/28/05	Spruce	22	+		+		+	
35	09/25/05	Beaver	45	+		+	+		
36	09/26/05	Beaver	23	+		+		+	
37	10/01/05	Beaver	51	+		+		+	+
38	09/13/05	Elk	29	+	+	+		+	
39	09/25/05	Elk	34	+		+		+	+
40	09/15/05	Mesa	33	+		+			

*Information was unavailable for one case.