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**Foodborne Illness Outbreak Associated with a
Fundraiser
Northwest Iowa
Spring 2005
Campylobacter jejuni Outbreak**

Introduction:

One spring morning a local public health agency contacted the Center for Acute Disease Epidemiology (CADE) after being contacted by a mother regarding her 22-month old with onset of diarrheal illness eight days prior. The father and another child in the family were also ill with diarrhea. Stool specimens had been obtained from the 22-month old child and the father by a local doctor for testing. The family had attended a youth-group fundraiser. The mother had learned that she had unknowingly fed her child unpasteurized milk at the fundraiser and was requesting that the milk be tested. CADE suggested that the LPHA see if the mother knew of any other people who had become ill since attending the event.

Background:

The youth group sponsors at least two annual fundraisers during the year at a local church. The youth group has a specific faith-based philosophy sponsored by the local church. This organization is open to all boys within the community and surrounding area, not just church members. The food for the fundraiser held in the morning was either purchased at a local discount store or was donated by various community members. A local dairy donated the raw milk. The dairy has donated milk for events for this group for a number of years. Patrons were mainly from the reporting county.

Investigation:

Case Finding and Epidemiological Investigation:

Because there was not a list of the fundraiser attendees, a random sample of patrons could not be obtained. Therefore, patrons known to have attended the fundraiser were asked, as part of their interview, for names of additional persons that they knew had attended. To determine correlation between the fundraiser and illness, community members who did not attend the event, but that had knowledge of the event and could have attended, were also interviewed. Local community health staff, a nurse epidemiologist at Iowa Department of Public Health (IDPH), and an IDPH intern interviewed both ill and well patrons attending the event in question using a survey tool. Information was collected on signs and symptoms of illness, onset of illness, a 72-hour food history prior to the event, and what foods were eaten at the event in question.

Eighty-two patrons attending the fundraiser and 14 persons with knowledge of the event but that did not attend were contacted by telephone and interviewed. Data from the 96 interview forms were entered into EPI Info 2000 statistical software.

Environmental Investigation:

The director of the LPHA obtained information on food preparation methods from an adult counselor who was one of the cooks, but not necessarily involved with the preparation of all of the food. All of the adult counselors, along with the group of boys, were in the kitchen and involved with food preparation.

French Toast:

The eight loaves of bread for the French toast was purchased at local discount store. The bread was dipped in a mixture of eggs, milk, and cinnamon and fried on a grill. The French toast was prepared no longer than 15 minutes prior to serving and was kept warm on the grill. The egg mixture was made up just prior to the event. As this mixture got low, more was made up throughout the two-hour serving period.

Pancakes:

Water was added to the complete powdered mix and individual amounts were cooked on demand as people came through the food line. Additional mixture was made up as needed.

Regular Pancakes:

Hungry Jack pancake mix was purchased at a local discount store.

Blueberry Pancakes:

Krustes blueberry pancake mix was purchased at a local discount store.

Eggs:

Twenty-four dozen eggs were donated by a local business and picked up by a counselor.

Scrambled eggs: Scrambled eggs were prepared in advance by mixing butter, eggs, milk, and salt and baking in a 9x13 inch pan. The eggs were kept warm until served.

Fried Eggs: Individual eggs were fried on the grill and put on a plate on the grill to keep warm until served. It was reported that the fried eggs never sat more than 15 minutes.

Sausage links:

A hog was donated and processed by a local locker. The sausage had been smoked at the locker at the time of butchering. Meat from this same hog had been served at the last 2-3 events sponsored by the organization. Approximately 12 packages of link sausages were used. The meat was taken out of the freezer to thaw the night before the event. It was left on the counter at room temperature for approximately 8-10 hours. The sausage was fried in a skillet with oil the morning of the event and kept warm in a roaster until served.

Milk:

Donated by a local dairy. The milk was delivered in glass jars that had been cleaned and stored since the last group event last fall.

A sample of the milk was transferred from the original container into a clean, plastic container eight days after the event. The milk had been kept refrigerated since the event. This sample was shipped to the University Hygienic Laboratory (UHL) via UPS overnight delivery with ice packs inside the parcel.

Coffee:

Folgers brand coffee was made from a stock at the church.

Syrup:

Log Cabin brand was purchased from a local discount store.

Butter:

Land-O-Lakes brand butter was donated by a local dairy.

Environmental investigation done by the Iowa Department of Agriculture and Land Stewardship:

It was reported that the raw milk served at the fundraiser came from a local dairy. This dairy does not do any on-farm pasteurizing. The raw milk is sold to companies and at the time of the fundraiser, the milk was being shipped to a company for processing and distribution. The dairy holds a Grade A dairy permit from the Iowa Department of Agriculture and Land Stewardship (IDALS).

Twenty-four days after the fundraiser an IDALS dairy inspector went to the dairy and spoke to owner. The owner advised the inspector that on 25 days ago, a community member arrived at the dairy to obtain some raw milk to use in pancake mix and to serve for drinking at the local youth group fundraiser in northwest Iowa. The owners had made a standing donation of similar milk for approximately twenty years.

The dairy owner reported that the community member arrived in the afternoon/evening with several glass gallon containers. He assisted the community member in filling the jars from the tank valve to the bulk tank. Eleven gallons of milk were donated, and all milk was taken from the same bulk tank—tank #1—at the same time. The dairy owner reported that the community member placed the milk into his vehicle and left and does not recall seeing any coolers in the vehicle. It was the dairy owner's understanding that the milk was being transported directly to the church for storage for the fundraiser. The dairy owner stated that he had no knowledge of how the jars had been washed prior to being filled with milk or any knowledge of what exactly happened to the milk once it left the farm.

The inspector advised the dairy owner of the dangers to the public of consumption of raw milk, especially to individuals with little or no previous exposure to raw milk. The inspector provided the dairy owner with some literature obtained from the Internet regarding *Campylobacter jejuni*. The dairy owner indicated that in the future if there is a request for milk, it is likely that he would go to the store and purchase processed milk to donate.

Laboratory Investigation:

Stool cultures were performed on some of the fundraising attendees. *Campylobacter jejuni* was isolated from the seven stool cultures. Six of the *Campylobacter* isolates were submitted to the UHL from a local hospital and were received 11 days after the event. The seventh isolate was submitted to UHL from a neighboring state health department and was received 17 days after the fundraiser. Milk samples were submitted to UHL 17 days after the fundraiser.

Results:

Case Finding and Epidemiological Investigation:

Table 1 compares the 82 participants who attended the fundraiser with 14 other individuals who did not attend the event but had the opportunity to attend. A significant p value of < 0.03 suggested a strong correlation between attending the fundraiser and becoming ill.

Odds Ratio=7.90
95% CI [0.99-169.60]
p-value=0.03 (Fisher Exact)

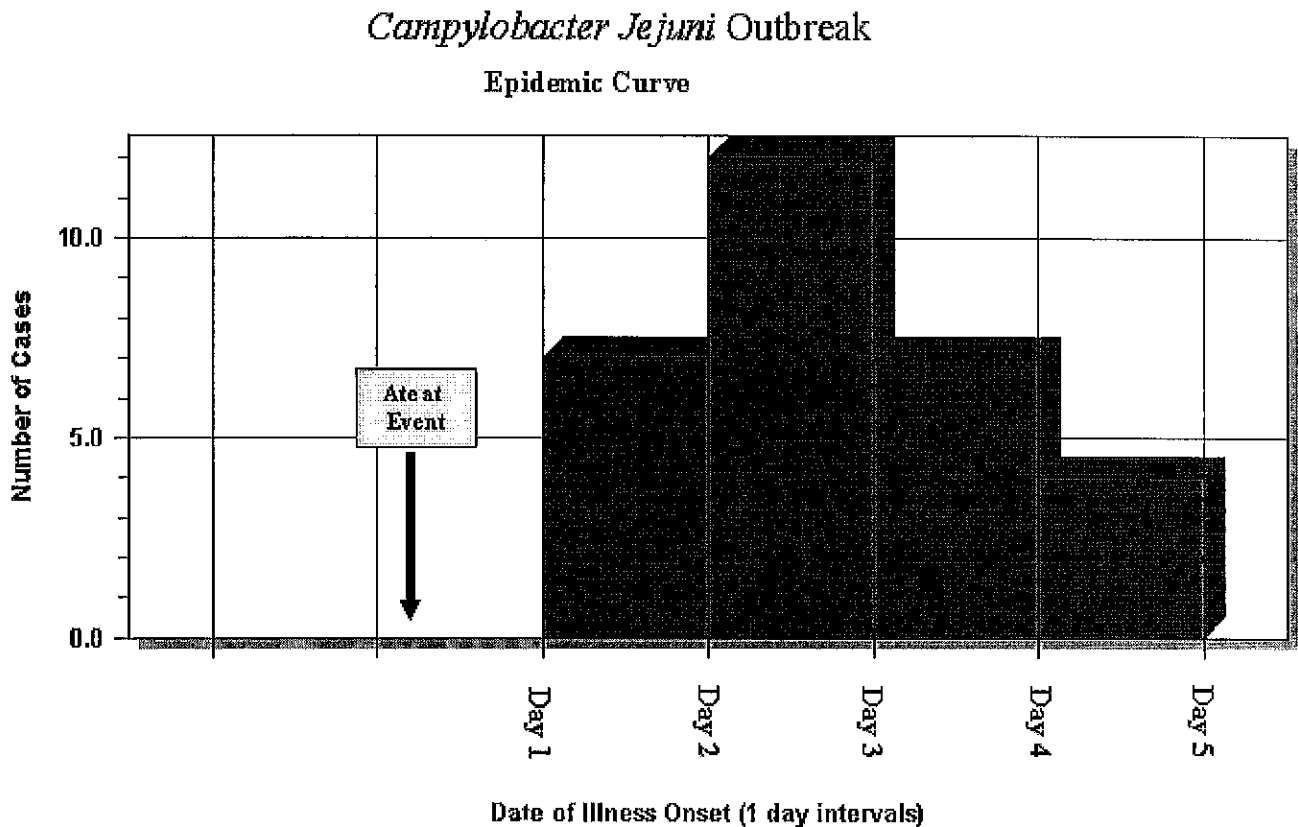
Table 1. Comparison of Illness vs. Attendance			
	Ill	Well	
Attended Fundraiser	31	51	82
Did not attend	1	13	14
	32	64	96

The case definition for illness included individuals with onset of diarrhea or vomiting between day one and day four after the fundraiser and who ate at the fundraiser. Using this case definition, 31 ill persons (cases) and 51 well persons were identified. All 31 reporting illness had diarrhea, 25 reported abdominal cramps, and 19 had a headache. Table 2 lists the frequencies of all symptoms reported by the cases.

Table 2. Symptoms / Clinical Features of Cases		
Symptom	Frequency	%
Diarrhea	31	100.0%
-Watery	21	72.4%
-Bloody	3	12.0%
Chills	14	48.3%
Fever	15	50.0%
Abdominal Cramps	25	83.3%
Nausea	9	37.5%
Vomiting	8	28.6%
Headache	19	65.5%
Muscle aches	9	31.0%

The incubation period was one to four days, with a median incubation period of two days. Specific times of illness onset were not collected from all interviewees and therefore, are not displayed. Figure A depicts the epidemic curve.

Figure A



Odds ratios, to assess the association between exposure (all food items ate at the event) and disease were calculated. To assess statistical significance, Chi-squares were also computed. These results are found in Table 3.

Table 3. Food/Drink items consumed by persons who attended the fundraiser in spring 2005

	ATE FOOD			DIDN'T EAT FOOD			OR	95% CI	p-value
	Ill	Well	Total	Ill	Well	Total			
French Toast	12	13	25	18	34	52	1.74	(0.66-4.60)	0.18
Regular Pancakes	12	25	37	18	20	38	0.53	(0.21-1.36)	0.14
Blueberry Pancakes	15	17	32	15	29	44	1.71	(0.67-4.34)	0.19
Scrambled Eggs	17	24	41	13	26	39	1.42	(0.57-3.52)	0.30
Fried Eggs	10	25	35	19	20	39	0.42	(0.16-1.11)	0.06
Sausage Links	30	46	76	1	5	6	3.26	(0.36-29.3)	0.26
Milk	31	15	46	0	32	32	132.1	(7.57-2303.2)	<0.0001
Coffee	5	21	26	22	25	47	0.27	(0.08-0.84)	0.02
Butter	19	35	54	8	14	22	0.95	(0.34-2.67)	0.56
Syrup	23	46	69	6	3	9	0.25	(0.06-1.09)	0.06

Note: The milk contained a value of zero in the 2 X 2 contingency tables. To correct for this, 0.5 was added to each cell so an odds ratio could be calculated.

Analysis of the data found that ill persons had no other exposures in common except for the fundraiser.

Analysis of the food histories from the fundraiser implicated the milk as the cause of illness. The milk had an extremely high odds ratio of 132.1 (95% CI 7.57-2303.2) and a significant p-value of <.0001, meaning there was an association between drinking milk and becoming ill. The small numbers in some cells in the 2X2 contingency tables can explain the wide confidence intervals. Exposure to milk explains 100% of the illness.

The only other significant association with a food item was coffee, which had a OR less than one, suggesting that the association was protective - those who drank coffee were less likely to drink milk, thus had a lower risk of becoming ill.

Environmental Microbiology Results:

Campylobacter species were not isolated from the milk sample. However, due to the delay in the submission of the milk sample to the laboratory, bacterial testing may have been sub-optimal.

PFGE Results:

Seven *Campylobacter* isolates from the cluster and two *Campylobacter* isolates, one from the same geographic area (2005064132) and one from the same time frame (2005063733), were compared using restriction endonuclease digestion with *Sma* I and *Kpn* I followed by pulsed field gel electrophoresis (PFGE).

Interpretation:

Based on PFGE analysis of all nine isolates, two distinctly different patterns were found for the *Sma* I enzyme. The *Sma* I digest failed for isolate 2005064132. Three different patterns were found for the

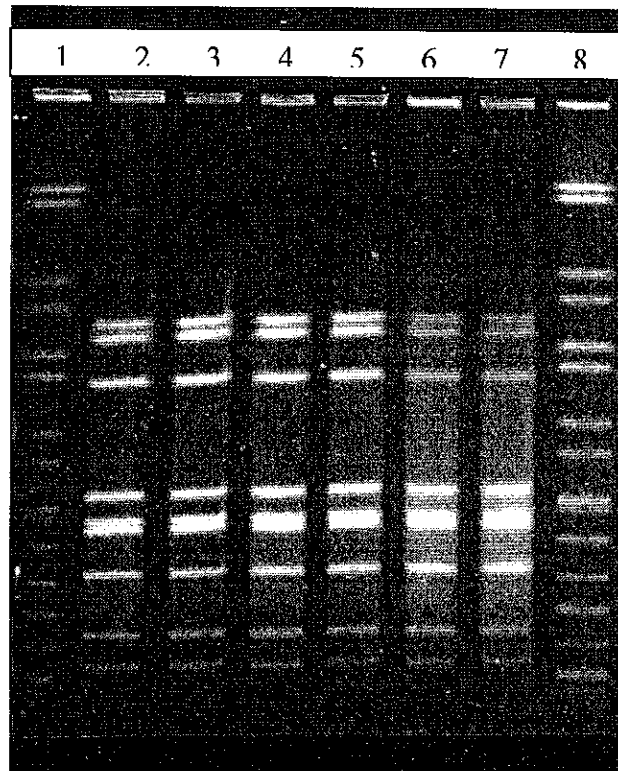
Kpn I enzyme. Each of the different pattern types has been assigned pattern names. Please see the figures 1 and 2.

Result Summary:

The seven isolates associated with the fundraiser were indistinguishable from each other and had the same patterns with both enzymes (*Sma* I pattern campS16.0001 and *Kpn* I pattern campK02.0003). The two unrelated isolates were different from each other and were also different from the cluster isolates by at least one enzyme.

The six patients seen in lanes 2-7 of this gel are the six we received from a local hospital. These patterns were obtained using enzyme 1-*Sma*I

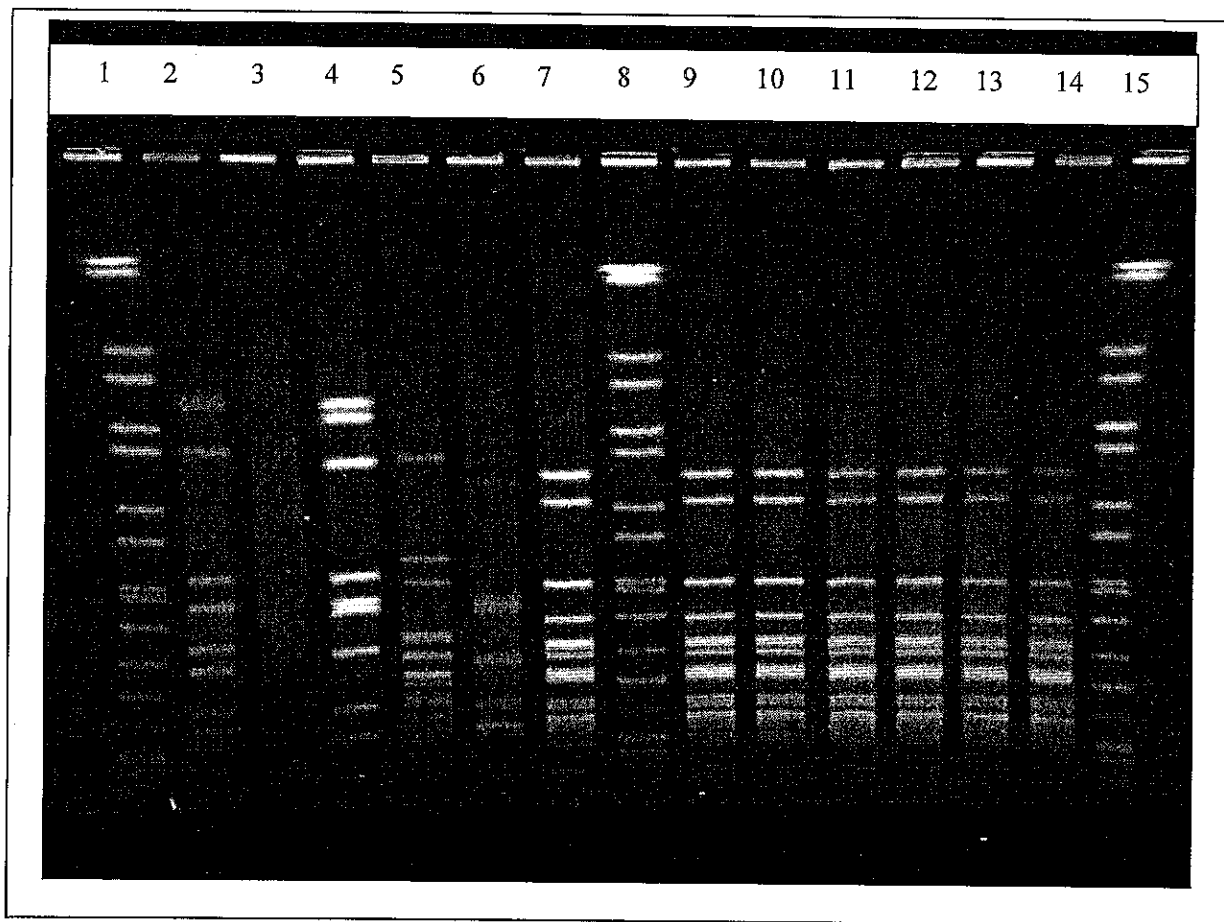
Figure 1



Lane #	UHL #	Initials	Culture Date	Enzyme	Pattern Designation
1	H9812				Standard
2	2005062823			<i>Sma</i> I	campS16.0001
3	2005062824			<i>Sma</i> I	campS16.0001
4	2005062825			<i>Sma</i> I	campS16.0001
5	2005062826			<i>Sma</i> I	campS16.0001
6	2005062827			<i>Sma</i> I	campS16.0001
7	2005062828			<i>Sma</i> I	campS16.0001
8	H9812				Standard

Lanes 9-14 on the gel in Figure 2 are the same six patients from the above gel but they were run with enzyme2-*Kpn*I to make sure the patterns are the same with two different enzymes before they were called indistinguishable. The seventh patient, received from a neighboring state public health lab is in lane 4-enzyme1-*Sma*I and also in lane 7-enzyme2-*Kpn*I. The isolates in lanes 2,3,5 and 6 are non-related *Campylobacters* that were evaluated to make sure that the outbreak pattern was different from the one circulating in the rest of the community.

Figure 2



Lane#	UHL #	Initials	Culture Date	Enzyme	Pattern Designation
1	H9812				Standard
2	*2005063733			<i>Sma</i> I	campS16.0002
3	*2005064132			<i>Sma</i> I	FAILED LANE
4	2005064751			<i>Sma</i> I	campS16.0001
5	*2005063733			<i>Kpn</i> I	campK02.0001
6	*2005064132			<i>Kpn</i> I	campK02.0002
7	2005064751			<i>Kpn</i> I	campK02.0003
8	H9812				Standard
9	2005062823			<i>Kpn</i> I	campK02.0003
10	2005062824			<i>Kpn</i> I	campK02.0003
11	2005062825			<i>Kpn</i> I	campK02.0003
12	2005062826			<i>Kpn</i> I	campK02.0003
13	2005062827			<i>Kpn</i> I	campK02.0003
14	2005062828			<i>Kpn</i> I	campK02.0003
15	H9812				Standard

* indicates isolates that were not associated with cluster.

Conclusion:

An outbreak of gastroenteritis occurred in individuals who attended and ate at a fundraiser in northwest Iowa in the spring of 2005. Illness was characterized by onset of diarrhea or vomiting between one to four days after the fundraiser. Based on laboratory evidence from five stool specimens and the clinical presentation of the affected individuals, *Campylobacter jejuni* was identified as the etiologic agent of the outbreak. Two additional stool specimens from persons known to be at the fundraiser that drank the milk were found to be indistinguishable with the five from the

outbreak. However, these two persons were not able to be interviewed and therefore were not included in our statistical analysis. Based on the epidemiological investigation, the milk was identified as the vehicle in the outbreak. The milk had the highest attack rate of 67.4 percent and drinking the milk explained 100 percent of the illness.

Recommendations:

1. Serve only pasteurized milk at events.
2. Store milk in refrigerator with a temperature maintained at 41° F or less.
3. Educate general public on the hazards of unpasteurized milk.
4. Work with IDALS to educate dairies of the hazards of unpasteurized milk and potential liabilities involved with donation.

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