Outbreak of Gastrointestinal Illness Associated with Buffalo Bob's Smokehouse — Douglas County, March 2014

Background

On March 31, 2014 at 2:52 pm, the Kansas Department of Agriculture (KDA) notified the Kansas Department of Health and Environment's Infectious Disease Epidemiology and Response section (KDHE) of a foodborne illness complaint. The complainant stated that six out of seven individuals from four different households became ill with gastrointestinal symptoms after eating at Buffalo Bob's Smokehouse (719 Massachusetts, Lawrence, KS 66047) on March 29, 2014. KDHE notified the Lawrence-Douglas County Health Department (LDCHD), and an outbreak investigation was initiated at 3:15 pm to determine the cause and scope of illness and to determine appropriate prevention and control measures. The response expanded into a multi-county effort as complainants resided in Douglas, Shawnee, and Coffey counties.

Methods

Epidemiologic Investigation

LDCHD interviewed seven of eight individuals to obtain demographic information, symptom history, and food history. A case was defined as any individual experiencing diarrhea (three or more loose stools in a 24-hour period) within 24 hours of eating food at the restaurant on March 29, 2014.

Laboratory Analysis

Two stool specimens were collected from two complainants who resided in different households, and were submitted for testing to the Kansas Health and Environmental Laboratories (KHEL). One was collected on 4/1/2014; a second was collected on 4/2/2014.

Food samples were collected by the KDA food inspector at the restaurant on April 1, 2014, and leftover food saved by two cases was collected by Shawnee County Health Agency (SCHA) and LDCHD. On April 17, 2014, samples were shipped to a private laboratory for *Clostridium spp.* testing via bacterial culture.

Environmental Assessment

KDA conducted an inspection of Buffalo Bob's Smokehouse on April 1, 2014 in response to the foodborne illness complaint. Previously, a routine inspection had occurred on February 17, 2014 which had automatically resulted in a follow-up inspection on March 19, 2014.

Results

Epidemiologic Investigation

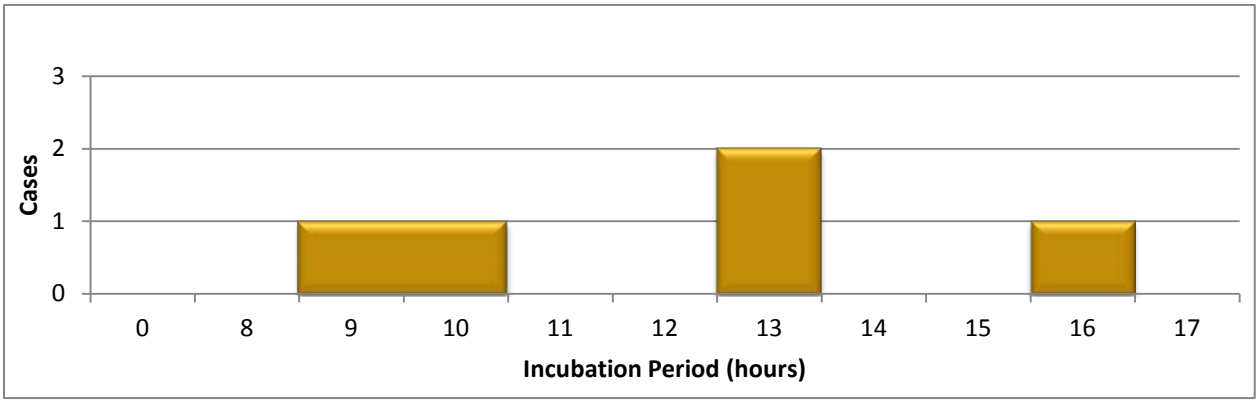
Eight people dined at the restaurant on March 29th; seven (88%) were interviewed by phone. Five (72%) respondents were ill and all met the case definition. Three (60%) of the cases were male. The most common symptoms were diarrhea and abdominal cramping, which was experienced by all cases [Table 1]. Nausea was reported in two cases (40%). No physician visits or hospitalizations were reported.

Table 1: Symptoms reported among cases (n=5)

Symptom	*# of Cases*	*% of Cases*
Diarrhea	5	100%
Abdominal Cramping	5	100%
Nausea	2	40%

The incubation period ranged from 9.5 hours to 16.3 hours (median: 12.5 hours) [Figure 1]. Duration of illness ranged from 19 hours to 28 hours (median: 24 hours); four of five individuals had recovered at time of interview.

Figure 1: Illness incubation time of gastrointestinal illness cases associated with March 29, 2014 dinner at Buffalo Bob's Smokehouse (n=5)



No common exposures other than the restaurant were reported. Patrons reported eating either sandwiches of ham or turkey served with fries, or a combo platter that consisted of servings of brisket, chicken, sausage, and ribs served with baked beans, coleslaw, and fries. With only a

limited number of food histories from five cases and two other individuals, the cause of illness could not be conclusively linked to a food item by statistical analysis.

Laboratory Analysis

The two stool specimens tested by KHEL were negative for *Salmonella*, *Shigella*, *Campylobacter*, Shiga-toxin producing *Escherichia coli*, and norovirus. These specimens were not cultured for *Bacillus cereus* or *C. perfringens* nor were they tested for any bacterial toxins.

Samples of chicken from the restaurant and ribs, chicken and brisket from takeout containers tested positive for *Clostridium spp.* bacteria by culture on April 22, 2014 [Table 2]. No other food samples were tested.

Table 2: Levels of *Clostridium spp.* bacteria found in food items served at Buffalo Bob's Smokehouse on March 29, 2014

Food Item	*Collected by*	*Disposition*	*Level Found (cfu/g)**
Brisket	*SCHA*	refrigerated	230
Ribs	*SCHA*	refrigerated	20
	LDCHD	frozen	not detected
Smoked Sausage	*SCHA*	refrigerated	20
Chicken	*KDA*	refrigerated	10
	LDCHD	frozen	not detected

**cfu/g = colony-forming units of Clostridium spp. per gram of food*

Environmental Assessment

The initial KDA inspection on February 17, 2014 revealed ten priority violations and two priority foundation violations. The follow-up inspection on March 19th was a scheduled inspection to ensure that two initial priority violations with plumbing and backflow issues were corrected; that inspection identified five unrelated priority and two priority foundation violations. The complaint inspection of April 1, 2014 revealed four priority violations, which were all corrected on site, and no priority foundation violations.

Three of the initial priority violations concerning the separation and protection of food and the proper sanitation of utensils were not observed during the follow-up and complaint inspections. Two initial priority foundation violations concerning proper cleaning and sanitation of food contact surfaces were still noted on the follow-up inspection but the establishment was found to be in compliance during the complaint inspection on April 1st.

The most frequent non-compliance issues with all inspections were priority violations involving the storage of chemicals in or around food and the failure to follow manufacture's guidelines with sanitizer use. Storage violations were observed two times in the initial routine inspection and were observed three times on the preceding follow-up and complaint inspections. An

additional observation during the follow-up and complaint inspections was the priority violation involving the use of improper concentrations of bleach for sanitizing purposes.

Observations made during the three inspections related to maintaining proper food temperatures are outlined in Table 3.

Table 3: Potentially Hazardous Food Time/Temperature Observations made by KDA inspectors during three inspections of Buffalo Bob's Smoke House, 2014

Observation	*Routine Inspection 2/17/2014*	*Follow-up Inspection 3/19/2014*	*Complaint Inspection 4/1/2014*
Proper cooking time and temperatures	Not observed.	Observed in compliance with grilling of hamburger.	Not observed.
Proper reheating procedures for hot holding	Baked beans, BBQ pork, turkey, ham and ribs were not properly reheated to the 165°F or hotter for hot holding.	Observed in compliance with brisket and baked beans.	Observed in compliance with ribs, chicken, sausage, beef, turkey, and pork.
Proper cooling temperatures	Not observed.	Not observed.	Not observed.
Proper hot holding temperatures	Observed in compliance for brisket, turkey, and ham.	Cooked beef maintained at lower than 135°F during hot holding.	Observed in compliance.
Proper cold holding temperatures	Observed in compliance with ribs, baked beans, and raw burger.	Observed in compliance for ham, turkey, beef, coleslaw, pork, and baked beans.	Observed in compliance for turkey, ham, beef, sausage, chicken, ribs, coleslaw, and baked beans.

During the initial inspection, the inspector interviewed the person in charge concerning the cooking, cooling and reheating of food items. The person in charge indicated that items such as pork, baked beans, turkey, and brisket were cooked, cooled and then held in a walk in cooler overnight prior to being reheated for serving the next day.

The inspector distributed educational material on proper hand washing, hot and cold holding, reheating temperature logs, daily self-inspection checklist, storing food, and food temperatures during the course of the three inspections. Violations other than the two violations requiring maintenance were corrected on site during the inspections with the reheating of food or discarding of potentially hazardous food.

Discussion

Five cases of gastroenteritis were associated with consuming food prepared by Buffalo Bob's Smokehouse restaurant on March 29, 2014. These illnesses may be the result of *C. perfringens* intoxication. The clinical specimens collected during the investigation were negative for common enteric agents and the clinical history reported by ill individuals was consistent with *C.*

perfringens intoxication. All ill persons reported eating a type of meat product that would have been cooked and cooled 24 hours prior to reheating and serving at the restaurant. Improper reheating of cooked meats was documented in a recent restaurant inspection. *Clostridium spp*. was detected in low levels in the chicken, smoked sausage, and ribs and was found in moderate levels in the brisket .

Clostridium spp. is a type of bacteria that is often found on raw meat and poultry, some strains can produce a toxin that causes gastrointestinal illness when consumed. One type *C. perfringens* is estimated to cause nearly a million cases of illness each year, making it one of the most common causes of foodborne illness in the United States[1]. The most common symptoms of *C. perfringens* food intoxication are diarrhea and abdominal cramps, which typically develop within six to twenty-four hours of consuming contaminated food and usually last fewer than twenty-four hours. Complications and severe illness are rare, and the disease is not spread person-to-person[2].

Outbreaks of *C. perfringens* often occur when foods such as meats, poultry, or other pre-cooked foods are prepared in large quantities and then kept warm for long periods of time, or are improperly cooled and then reheated, before serving and consumption. *C. perfringens* spores can withstand cooking temperatures, therefore,food must be held at appropriate temperatures between preparation and consumption to prevent bacterial growth. When food is held between 40°F and 140°F, *C. perfringens* spores germinate and the bacteria multiplies[3]. If food continues to be held at improper temperatures, particularly between 109°F and 117°F, the bacteria concentration will rise rapidly. After consumption, the bacteria inside the intestine can produce a toxin that causes gastrointestinal illness[4].

Guidelines for the microbiological quality of ready-to-eat foods suggest that while the identification of 20 - <100 cfu/g of *C. perfringens* may be acceptable for sale, amounts greater than 100 cfu/g are unsatisfactory and those above 1000 cfu/g are potentially injurious to health and unfit for human consumption[5,6]. Amounts between 10-1000 cfu/g can also be viewed as evidence of poor processing of foods, particularly in the cooling stages[7]. During this investigation and in previous recent inspections, the cooling practices at the establishment were not observed, but the levels of colony forming units present in the food may suggest evidence of poor processing.

It should be noted that the levels of colony forming units detected may not represent the levels present at the time of consumption. In examining foods for *C. perfingens*, the colony forming units will lose their viability when foods are frozen or held under prolonged refrigeration. Such losses may make it difficult to establish that *C. perfingens* as the specific cause of a food poisoning outbreak[8]. In our investigation the foods had been refrigerated for nearly 20 days before testing. Those foods that were frozen did not have any detectible colony forming units.

The epidemiological investigation was limited by several factors. Clinical specimens from ill individuals were obtained for testing, but KHEL is unable to culture for *C. perfingens* or identify the bacterial toxin in clinical specimens. Additionally, one complainant was not interviewed, and the restaurant's cooking and cooling of the implicated foods was not observed. Buffalo Bob's Smokehouse restaurant voluntarily closed permanently on April 29, 2014; therefore, KDA was not able to conduct a Hazard Analysis and Critical Control Points (HACCP) inspection on the preparation and handling of the implicated products.

This investigation was aided by the quick response of and cooperation between LDCHD, CCHD, SCHA, KDHE, and KDA, which allowed for timely initiation of the outbreak investigation. The initial inspection of the restaurant was completed by KDA within twenty-four hours of receiving the foodborne illness complaint.

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