Checkerboard Square
St. Louis, MO 63164

The Cafeteria Disease

Clostridium perfringens is one of the most common food pathogens in the US and Europe. It is estimated to cause >10,000 cases of food poisoning in the US annually, although it is seldom reported. *C. perfringens* is found in meat, vegetables and grains. It is most commonly associated with food borne illness from meat and gravy. Why is *C. perfringens* such a robust pathogen? It is a Gram-positive, sporeforming, anaerobic bacteria that can tolerate low levels of oxygen. It is found in the intestinal tract of animals and humans and is also associated with soil, dust, insects and sewage. The spores survive the cooking process. It can take up to an hour boiling for one log reduction of spores present in a food. It has a wide growth range (50F to 125F) and high optimum growth temperature (110F). *C. perfringens* has the ability to double in 7 - 10 minutes in the optimum growth range. This can place *C. perfringens* at unacceptably high levels within an hour if food is mishandled. This organism can also remain at unusually high numbers in a food product for a long period of time. Once the contaminated food product is ingested, *C. perfringens* sporulates in the intestinal tract and produces an enterotoxin that causes severe stomach cramps and diarrhea (8-22 hr onset / symptoms last 12-18 hours). *C. perfringens* food poisoning is not often reported because it is over so quickly and it very seldom causes death. It is sometimes called the "Cafeteria Disease" due to the large number of reported outbreaks originating from foods served cafeteria style.

A case of *C. perfringens* food poisoning was reported in Ohio involving deli cooked corned beef for St. Patrick's Day. Around 1,400 lbs of corned beef were boiled for 3 hours. The meat and broth were allowed to cool at room temperature and then refrigerated. Cooking, cooling, and 4C storage of the 1,400 lbs were staged over 4 days prior to March 17th. The deli removed the corned beef from the refrigerator, sliced the meat, then held it in a warmer at 120F while it was served at the party. After the celebration, 156 people came down with food poisoning. Not a good way to celebrate a festive holiday!

Ralston Analytical Laboratories
Checkerboard Square
St. Louis, MO 63164

Where did the deli go wrong? The three main mistakes were 1) not **rapidly** cooling the cooked product in **small portions** so that the meat was quickly cooled below 40F, 2) not reheating the product to an internal temperature of 165F, and 3) not holding the reheated product at a serving temperature of greater than 140F. Proper cooling would have prevented *C. perfringens* growth, proper reheating would have inactivated any vegetative
C. perfringens present after storage, and the proper serving temperature would have prevented growth during serving.

Current methodology is found in the FDA-BAM. The method includes an enrichment procedure for the detection of low levels of *C. perfringens* (<10 cells per gram) and a plating procedure on selective media (Tryptose sulfite cycloserine agar) if higher levels are suspected. Complete biochemical confirmation is required to substantiate the presence of *C. perfringens* in a sample.