

Clostridium perfringens

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The Organism: *Clostridium perfringens* are anaerobic bacteria that can produce spores. The bacteria can exist as a vegetative cell or in the dormant spore form in food. Thorough cooking (140°F) will kill the vegetative cells, but spores may survive. At temperatures between 70°F and 120°F, the spores can germinate into vegetative cells and produce a toxin. Germination of the spores and outgrowth into vegetative cells occurs in food inadequately refrigerated. Toxin production normally occurs in the intestinal tract.

Sources of the organism:

- Intestinal tracts of animals and humans
- Soil
- Sewage
- Any raw food may contain the spore or bacteria

Associated foods:

- Cooked meat and poultry products
- Roast beef
- Gravy

Microorganism Characteristics: Gram positive spore forming anaerobic rod shaped bacteria that can produce an enterotoxin which is released in the intestine.

Growth conditions:

- Temperature range: 15-55°C (59-131°F)
- Optimum Temperature: 43-47°C (109-117°F)
- pH range: 5-9
- Lowest reported A_w for growth: 0.96
- Salt Tolerance: 5%

The Disease: Perfringens food poisoning causes gastroenteritis from consuming the vegetative cells. A toxin can be produced by the bacteria in the intestinal tract which can also cause a food borne illness.

Symptoms include:

- Abdominal cramps
- Watery diarrhea
- Nausea

Onset time:

- 8-24 hours

Infective Dose:

- Large numbers ($>10^8$ cells) of *Clostridium perfringens* need to be consumed for symptoms of the illness to develop.

Duration of symptoms:

- 24-48 hours

Control:

- Properly cook meat and poultry products.
- Reheat foods to 165°F for 15 seconds.
- Refrigerate foods at 41°F or below. Foods must reach 41°F within 4 hours.
- Proper cooling techniques are necessary to prevent spore germination.