Prevalence of Clostridium difficile in Beef Cattle

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Project Title: Evaluation of the Prevalence and Characteristics of Clostridium difficile in Beef Cattle

Researchers:
Scott Weese, DVM (University of Guelph), Calvin Booker, DVM (Feedlot Health Management Services), Sheryl Gow, PhD, DVM (Public Health Agency of Canada and Western College of Veterinary Medicine), Richard Reid-Smith, DVM (Public Health Agency of Canada and Ontario Veterinary College)

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Prevalence and molecular characterization of Clostridium difficile isolated from feedlot beef cattle upon arrival and mid-feeding period

Background:
Clostridium difficile is a bacterium that can cause diarrhea and other health complications in people, especially if they have recently taken a broad-spectrum antibiotic. Broad-spectrum antibiotics get rid of all the other bacteria normally found in the gastrointestinal tract, leaving no competition to hinder the proliferation of C. difficile. Severity of the illness can range from asymptomatic to life-threatening, and outbreaks are most common in hospitals. Recently, there has been increased recognition of C. difficile infection outside of hospitals, in people without the typical risk factors for infection. The bacterium can be found in various animals, including dairy cattle, as well as in retail meat. Therefore, there has been concern that food and animal contact might be sources of C. difficile infections in humans.

An added concern about foodborne transmission is that cooking at regular temperatures does not destroy the bacterium. It is unknown how common C. difficile is in beef cattle, whether it causes cattle to become sick, or whether the same strains of C. difficile present in beef cattle and humans.

Objectives:
A better understanding of the amount and types of C. difficile present in feedlot cattle populations will determine whether changes in management or other interventions are required to reduce the risk of human C. difficile infection from retail meat.
The objectives of this study were threefold:

1. To determine whether Clostridium difficile is present in healthy cattle upon arrival and prior to departure from the feedlot.
2. To identify which strains of C. difficile are present in beef cattle.
3. To determine if the same strains of C. difficile are present in feedlot cattle, retail meat and infected people.

What They Did:
Fecal samples were obtained from 330 animals from four different Alberta feedlots upon arrival and while on feed in the feedlot. These samples were analyzed for the presence of C. difficile, as well as strain type, and compared to those strains found in retail meat and human infections.

What They Learned:
Even in feedlots under the same management, the incidence of C. difficile varied upon arrival and departure from the feedlot. Average C. difficile shedding was low at both time points (3.3% and 5.5%, respectively). At one feedlot, the incidence of C. difficile did increase over the feeding period, unlike the other feedlots. There was no consistency of feeding or antibiotic use that influenced the results. C. difficile shedding observed in the study was similar to human infections, with one strain (ribotype 078) accounting for all C. difficile isolates identified in this research project. This is a common strain in cattle and other food animals; however, the frequency of this particular strain in this trial was much higher than previously reported in both live cattle and retail meat.

The incidence of C. difficile in retail meat appears to be higher than its prevalence in live feeder cattle. There are few possible explanations, starting with the possibility that C. difficile may be getting picked up during processing, either from humans working with the meat or other sources of contamination.

What It Means:
This study has shown that while C. difficile is present in feedlot cattle, it is uncommon, and standard feedlot practices appear to discourage high rates of C. difficile shedding. These results also demonstrate the need to use appropriate populations when studying the rates of C. difficile in feeder cattle and retail beef, as extrapolating from other populations will lead to the wrong conclusions. Although the dominant strain of C. difficile found in this study, ribotype 078, is of increasing concern in the human population, these results are contrary to recent studies, where other strains were more common in both live cattle and retail meat.

As the presence of C. difficile appears higher in retail than in live cattle, more research is needed to further determine sources of C. difficile contamination, and there may be a need to focus on reducing contamination from human or environmental sources during processing. Other research has isolated C. difficile from vegetables, water, household environments, pets, and healthy humans, which means that exposure to C. difficile happens on a regular basis without causing illness. Although there are no documented cases of human C. difficile infection acquired through the consumption of contaminated meat, research is currently underway to determine if any potential risk does exist.

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Alberta Beef Producers
201 5405 32 Avenue N.E.
Calgary, Alberta, Canada T2E 7H7
Phone: 403-275-4400 Fax: 403-274-0007
abpfeedback@albertabeef.org
http://www.albertabeef.org

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