factsheet
Pork Information Gateway

Campylobacter in the Pork Food Chain

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Introduction

Campylobacteriosis is a serious foodborne disease in which pork could be implicated. *Campylobacter* bacteria have been found in the intestinal tract of domestic and wild mammals, poultry, wild birds, and in untreated water and unpasteurized milk. Infection in piglets can occur as early as the first 24 hours after birth. The likely route of transmission is from the sow to the newborn; however, the exact routes by which food animals become infected have not been clearly defined. The predominant species of *Campylobacter* in pigs is C. coli, whereas the predominant species in poultry and cattle is C. jejuni. Most human infections in the U.S. are associated with C. jejuni, whereas in Europe, high incidence of human infection with C. coli is also reported. With the exception of abortion in sheep, food animals that are colonized with *Campylobacter* usually don't have any clinical signs. A high percentage of animals at slaughter are infected and this is also an important phase in the farm-to-table continuum where *Campylobacter* usually enters the food chain. Human foodborne *Campylobacter* infection most commonly comes from consuming food that is contaminated or cross-contaminated (i.e. uncontaminated foods that came in contact with contaminated sources) at the post-harvest level. *Campylobacter* can be routinely isolated from retail meat products with the highest frequency found in poultry. Most control methods center on the prevention of contamination and cross-contamination along the food chain. *Campylobacter* does not grow well in food. In that respect, it is different from Salmonella or Staphylococcus which can multiply in poorly stored food.

Objectives

- Describe pre-harvest and post-harvest control efforts to minimize the risk of *Campylobacter* to human consumers.
- Direct swine industry focus to improved production, processing, distribution, storage, and handling of pork products.

Human Disease

Clinical signs of *campylobacter*iosis may include severe bloody diarrhea, nausea, fever, headache, and abdominal cramps. The disease lasts for 2 to 10 days, but some symptoms may reoccur for up to 3 months. Very young, very old, debilitated, and immunocompromised persons are the most susceptible. Other complications can include miscarriage, pneumonia, meningitis, and a highly debilitating form of n autoim-

mune disorder that affects the nervous system called Guillain-Barrésyndrome. The infectious dose can be very low; only 200 to 500 cells. Transmission is typically through consumption of contaminated food or water. Principal risk factors include undercooking meat, or cross-contamination from raw to prepared foods. *Campylobacter*-contaminated household pets with diarrhea can excrete the bacteria and have been shown to infect people. In the developed world, person-to-person transmission does not appear to be very common.

Pre-Harvest Reduction Methods in Pigs

Most *Campylobacter* control procedures currently center on post-harvest intervention. However, some experimental pre-harvest procedures appear to have promise for *Campylobacter* reduction in the pig. It has been shown that if *Campylobacter*-positive newborn piglets are removed from the sow at an early age, then the piglets will revert to a *Campylobacter*-negative status. Perhaps new management procedures could be developed to take advantage of these findings. Certainly, other management practices such as all-in, all-out, and proper cleaning and disinfection of rearing facilities need to be adhered to for on-farm *Campylobacter* reduction. Feed withdrawal, a common practice prior to slaughter, has been shown to increase *Campylobacter* shedding in pigs. Perhaps eliminating or changing feed withdrawal practices would decrease *Campylobacter* shedding. If feed withdrawal procedures were changed, the foremost consideration would be that the changes were practical and cost-effective. Treatment of market pigs with antibiotics has lowered *Campylobacter* numbers in research studies, but because of regulatory and other public health concerns, this treatment will probably never be accepted. Preliminary studies with certain nitrogen compounds indicate that they might be effective pre-harvest treatments to decrease *Campylobacter* in pigs, but more research is needed.

Post-Harvest Reduction

Campylobacter prevalence in the pork food chain is monitored regularly by carcass swabbing at processing plants and by random microbiological sampling of pork at retail meat outlets. Although pork has a lower prevalence of C. jejuni (the most common zoonotic species) than many other types of meat, it is among the common source of the relatively rare but second common species; C. coli. Some post-harvest reduction methods currently used at processing include steam pasteurization of carcasses and carcass washes with acidic solutions. An additional way to lower bacterial numbers is to rapidly cool carcasses (commonly known as blast-chilling) and to maintain them at refrigerated temperatures. Not only does refrigeration keep the meat cool, it dries the carcass surface and this is detrimental to *Campylobacter* numbers. The post-harvest control procedure showing the greatest promise is irradiation. This treatment can essentially sterilize the meat, making it safer and improving the shelf life. However, a number of manufacturing, product flavor, and regulatory issues must first be resolved. Once those hurdles are overcome, there's still no assurance that the consuming public will accept this treatment; nor does it prevent the cross-contamination problem. At present, the most effective *Campylobacter* control procedures center on proper food handling. This means eliminating cross-contamination from contaminated food to other foods, utensils, or food surfaces and maintaining foods at proper temperatures. Cooking to internal temperatures of 160 °F will destroy *Campylobacter* in meat and this is probably the best control procedure. However, as mentioned above on irradiation, cooking does not eliminate the hazard of cross-contamination afterwards.

Summary

Campylobacter are bacteria that can cause foodborne illness in humans and are now considered to be the leading cause of bacterial gastrointestinal disease in developed countries. Also, *Campylobacter* is also among leading cause of pediatric diarrhea in developing countries. Pigs carry *Campylobacter* in their intestinal tract and pork can become contaminated, therefore providing a risk of human disease. It is important that pork be produced, processed, handled, stored, and prepared in such ways as to minimize the risk to consumers.

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