

PORK SAFETY

Title: Campylobacter Colonization Dynamics in Pigs – NPB #07-202

Investigator: Gireesh Rajashekara, DVM, Ph.D.,

Co Investigator: Wondwossen Gebreyes, DVM, Ph.D.,

Institution: The Ohio State University

Date Submitted: February 15, 2009

Scientific Abstract:

Campylobacter are Gram-negative bacteria that can cause disease in humans. The pathogens are transmitted primarily through the consumption of contaminated foods. Furthermore, *Campylobacter* is highly prevalent in food animals, where these bacteria occur as commensals. With the absence of vaccine, the reduction of *Campylobacter* in food animals is considered an ideal approach for limiting its transmission to humans. However, control efforts have not been fully successful, partly because the on-farm sources and the colonization cycle of these organisms are not well characterized. Of particular interest is monitoring the colonization dynamics of these pathogens in the animal host, which would elucidate the progression of infection in the affected organs. We hypothesized that constructing bioluminescent *Campylobacter* strains would allow sensitive, rapid, and real-time monitoring of the progression of colonization in pigs. This can be accomplished by using in vivo imaging systems (IVIS) that allow sensitive detection of bioluminescence in animal tissues. Consequently, we constructed two bioluminescent strains of *Campylobacter* (*C. jejuni* and *C. coli*) by transformation with genes that are responsible for light production in naturally luminescent bacteria. These strains were then inoculated into live pigs and infection was monitored for two weeks. Organs from the pigs were harvested throughout the duration of the experiment and visualized using IVIS. Our results did not reveal consistent colonization with the strains and the bioluminescence signals were mostly not detected, even after culturing extracts from the organs onto enrichment media. Further inspection revealed that our test pigs were significantly pre-colonized with *Campylobacter*, which probably competed with the bioluminescent strains, preventing colonization. However, in one experiment, bioluminescence was detected in the intestines, caecum, and mesenchymal tissues of the experimentally infected pigs. The colonization of the latter tissue has not been observed previously. Despite difficulty in acquiring *Campylobacter*-negative pigs, our preliminary results emphasize the potential of bioluminescence in studying *Campylobacter* colonization dynamics in food animals.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • pork.org
