



## Salmonella and Campylobacter on U.S. Dairy Operations

### Background

In 2002, there were approximately 16,500 laboratory-diagnosed cases of bacterial foodborne illness in humans in the United States.<sup>1</sup> Of these cases, 67 percent were caused by species of *Salmonella* and *Campylobacter*. Both of these pathogens cause fever, abdominal cramping, and diarrhea in humans. Severe cases can result in systemic infections and even death.

The percentage of culled dairy cows shedding *Salmonella* and *Campylobacter* is higher than in dairy cows in normal production. Culled dairy cows represent a substantial portion of the nation's ground beef and may serve as a potential source of foodborne salmonellosis and campylobacteriosis when meat is contaminated with fecal material at slaughter.<sup>2,3</sup>

### Salmonella on U.S. Dairy Operations

Clinical signs of salmonellosis in cattle include fever, diarrhea, anorexia, and decreased milk production. Infection can range from subclinical to endotoxemia and death.<sup>4</sup> Cows can shed *Salmonella* in their feces due to stress incurred during transportation, lactation, and calving, without showing clinical signs typically associated with infection.<sup>4</sup>

Although over 2,000 serotypes of *Salmonella* have been identified, most laboratory-confirmed *Salmonella* infections in cattle are due to a small number of serotypes. Recently, a drug-resistant form of *Salmonella* serotype (Newport) has emerged.<sup>5</sup> These multidrug-resistant isolates have caused disease in humans, adult cattle, and less commonly in calves, and are of concern to both veterinary and public health officials.

The National Animal Health Monitoring System's (NAHMS) Dairy '96 study determined that 27.5 percent of dairy operations and 66.7 percent

of livestock markets studied had at least one cow shedding *Salmonella*.<sup>2</sup> Fecal shedding was higher in dairy cows designated for culling within 7 days and in market dairy cattle than in cows in normal production.

In 2002, the USDA's National Animal Health Monitoring System (NAHMS) conducted Dairy 2002, NAHMS' third national study of U.S. Dairy operations. During Dairy 2002, fecal samples were collected via rectal retrieval from approximately five operations in each of the 21 States\* participating in the study. On each operation, fecal samples were collected from approximately 40 cows. From March 27 through September 25, 2002, a total of 3,669 samples were collected on 96 operations and cultured for *Salmonella*.

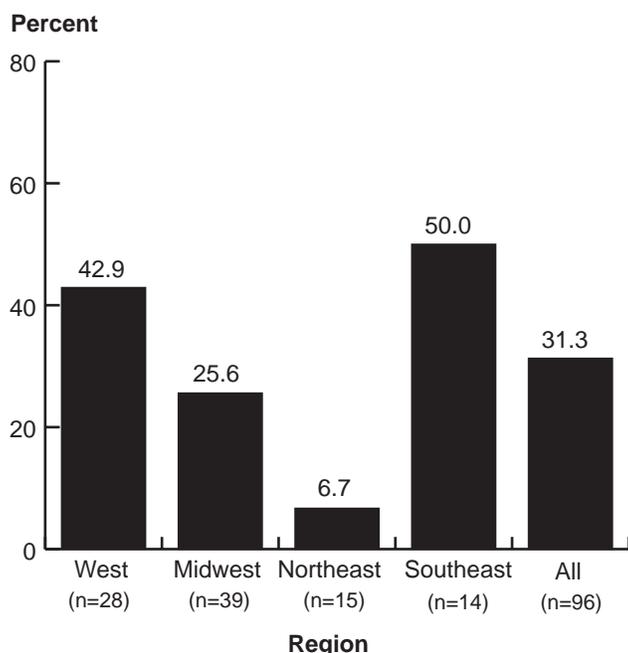
The percentage of cows where *Salmonella* was recovered from feces increased from 5.4 percent in the Dairy '96 study to 7.3 percent in the Dairy 2002 study. This increase was statistically significant. The overall percentage of operations with one or more *Salmonella*-positive cows also increased from 27.5 percent in Dairy '96 to 31.3 percent in Dairy 2002, although this increase was not statistically significant. Figure 1 shows the regional breakout of operations with at least one positive *Salmonella* sample.

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#### \*Regions/States:

**West:** California, Colorado, Idaho, New Mexico, Texas, Washington  
**Midwest:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin  
**Northeast:** New York, Pennsylvania, Vermont  
**Southeast:** Florida, Kentucky, Tennessee, Virginia

**Figure 1. Percent of Operations in Dairy 2002 With at Least One Positive *Salmonella* Sample, by Region**



Overall, 294 *Salmonella* isolates were isolated from the 269 *Salmonella*-positive samples collected during the Dairy 2002 study. The five most common serotypes of *Salmonella* recovered are summarized in Table 1. In addition, *S. Newport* represented 2.7 percent of the *Salmonella* isolates recovered, and seven of the eight *S. Newport* isolates were multidrug resistant.

**Table 1. Percent of Isolates for the Five Most Common *Salmonella* Serotypes Isolated from Cattle Feces Collected During Dairy 2002:**

<i>Salmonella</i> serotype	Percent Isolates
Meleagridis	24.1
Montevideo	11.9
Typhimurium	9.9
Kentucky	9.5
Agona	7.5

### ***Campylobacter* on U.S. Dairy Operations**

Although *Campylobacter* species can be considered commensal organisms or normal flora in livestock, they also may produce diarrhea in neonatal calves, and may cause abortion, infertility, and early embryonic death in adult cattle.<sup>6,7</sup> Foodborne transmission of *Campylobacter* can occur through fecal contamination of carcasses at

slaughter and also through fecal contamination of milk or water.<sup>8,9</sup>

In Dairy '96, it was determined by a multiplex polymerase chain reaction assay that 80.6 percent and 19.4 percent of dairy operations were positive for *Campylobacter jejuni* and *Campylobacter coli*, respectively.<sup>7</sup> Approximately 38 percent of dairy cows had fecal samples positive for *C. jejuni* and 1.8 percent were positive for *C. coli*.

Of the 3,669 samples tested for *Salmonella* in the Dairy 2002 study, 1,450 also were tested for *Campylobacter*. Results from Dairy 2002 showed that 51.4 percent of cows were shedding *Campylobacter* species, as determined through fecal cultures. Overall, 97.9 percent of operations sampled had at least one cow shedding *Campylobacter* in their feces.

### **Conclusions**

The percentage of cows shedding *Salmonella* and the percentage of dairy herds with at least one cow shedding *Salmonella* increased slightly between Dairy '96 and Dairy 2002: 5.4 percent to 7.3 percent of cows, respectively; and 27.5 percent to 31.3 percent of operations, respectively. *Salmonella* Newport, a serotype of *Salmonella* of particular interest at this time, represented 2.7 percent of isolates. *Campylobacter* was isolated from approximately one of two (51.4 percent) cows sampled and was found in at least one cow on 97.9 percent of dairies sampled. Continued efforts by dairy producers to decrease the spread of *Salmonella* and *Campylobacter* will help limit cattle morbidity and mortality, and reduce the zoonotic spread of these organisms.

### **References**

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