Salmonella and *Listeria* in Bulk Tank Milk on U.S. Dairies

Salmonella

Salmonella bacteria are found in humans and virtually all livestock species. The bacteria also are present in all dairy environments. Salmonellosis (infection caused by *Salmonella*) in cattle is not uncommon. Clinical signs can range from severe septicemia (blood infections resulting in diarrhea, pneumonia, and arthritis) in calves, to diarrhea in adult cattle, to no signs at all.

During milking, bulk tank milk can be contaminated by *Salmonella* organisms in the udder or through fecal matter. In a 2000 study of New York dairy herds, *Salmonella* were isolated from 1.5 percent of 404 milk filters;[1] and a study of dairies in California in which individual cow milk samples were taken indicated that 84 percent of 64 dairies had at least one culture-positive cow.[2]

Salmonella also are a leading cause of foodborne disease in humans, and consumption of both meat and milk has been implicated in salmonellosis outbreaks in people. In addition, strains of *Salmonella* resistant to multiple antibiotics have been isolated from dairy cows during salmonellosis outbreaks on dairy operations. These same strains have been isolated from ill people.

Listeria

Listeria bacteria are commonly found in dairy environments, particularly in soil, silage, and manure. Listeriosis (infection caused by *Listeria*) in cattle is generally caused by feeding spoiled silage. Clinical signs include depression, limb weakness, difficulty in swallowing, droopy lower lip, and walking in circles. Abortions that occur in late gestation also may be associated with listeriosis infections. Listerial mastitis is rare but may contribute to *Listeria* found in bulk tank samples.

Listeriosis can be partially prevented by feeding properly fermented silage. Poorly fermented silage, which has a pH greater than 5.0, is ideal for *Listeria* growth. *Listeria* also occurs in pockets of aerobic deterioration in properly put-up silage. These pockets are often indicated by mold growth and should not be fed to cattle. Other moist, preserved feeds such as wet brewer's grains and silage made from other commodities also may support *Listeria* growth.

Listeria also can affect human health. *Listeria* infections in people have been generally associated with the consumption of unpasteurized milk or milk products, although cases of human listeriosis associated with pasteurized milk have been reported. However, there is no evidence that the bacteria survive when subjected to correct pasteurization procedures.[3]

Dairy 2002 Study

The National Animal Health Monitoring System (NAHMS) Dairy 2002 study assessed the prevalence of *Salmonella* and *Listeria* in bulk tank milk. Between February 25 and June 30, 2002, dairy operations with at least 30 milk cows from 21 States* were visited by animal health officials. Timing of bulk tank sample collection from 860 herds ensured that 70 percent of each herd's lactating cows were represented.

***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

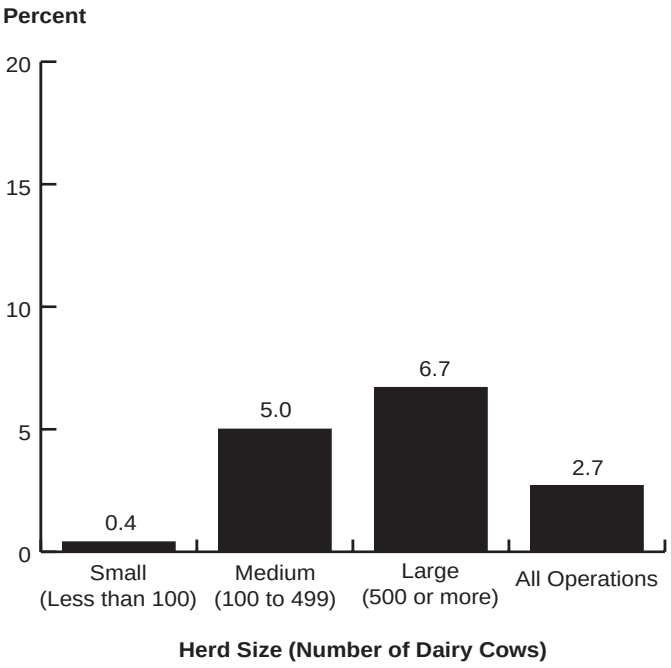
Dairy 2002 Study Results (*Salmonella*)

Dairy 2002 data showed that 2.7 percent of dairies tested positive for *Salmonella* when a single bulk tank milk sample was cultured. The most common serotypes of *Salmonella* isolated were Montevideo (7), Newport (4), Muenster (2), Meleagridis (2), and Cerro (2).

Recently, many *Salmonella* Newport isolates have exhibited resistance to multiple types of antimicrobials. Each of the four *S.* Newport isolates from this study also exhibited resistance to multiple antimicrobials.

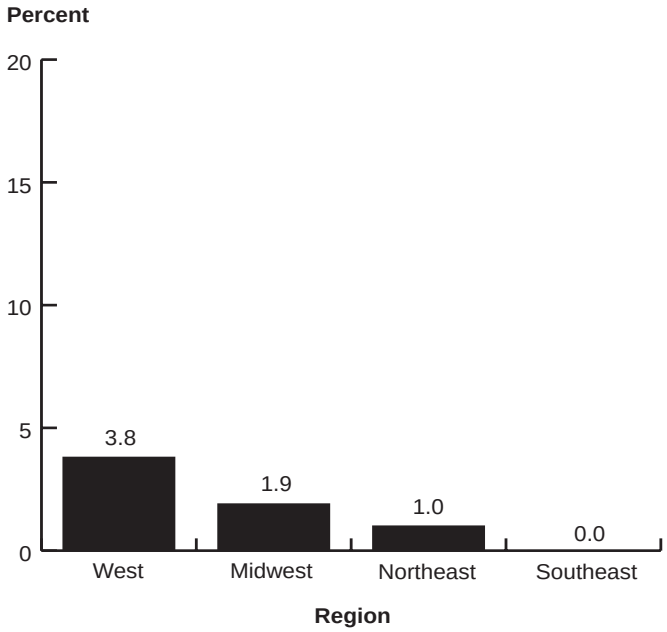
Higher percentages of large (500 or more head) and medium (100 to 499 head) operations had bulk tank samples test positive for *Salmonella* (6.7 and 5.0 percent, respectively) than small (less than 100 head) operations (0.4 percent) (Figure 1).

Figure 1. Percent of Operations that had a Single Bulk Tank Milk Sample Test Positive for *Salmonella*, by Herd Size



In addition, the West region had a higher percentage of operations (3.8 percent) with bulk tank samples that tested positive for *Salmonella* than the Midwest (1.9 percent of operations) and Northeast (1.0 percent of operations) regions. No operations in the Southeast region had bulk tank samples test positive for *Salmonella* (Figure 2). It is important to note that more large herds are found in the West region than in the other regions.

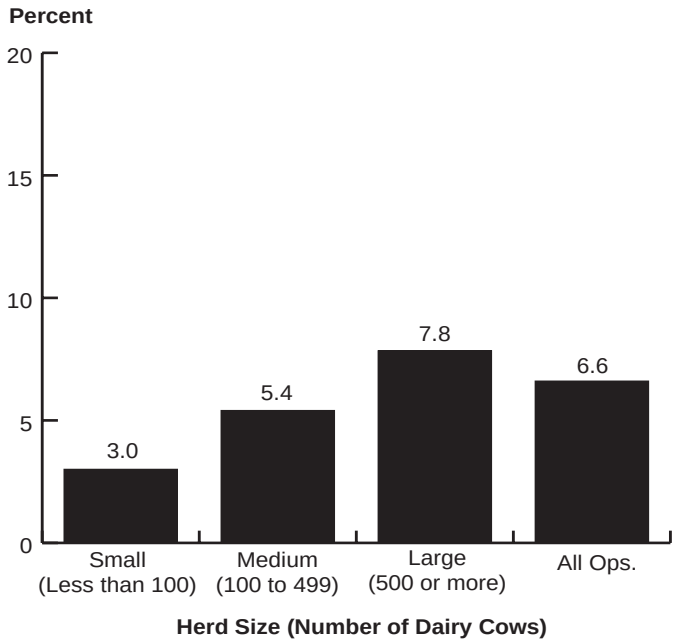
Figure 2. Percent of Operations that had a Single Bulk Tank Milk Sample Test Positive for *Salmonella*, by Region



Dairy 2002 Study Results (*Listeria*)

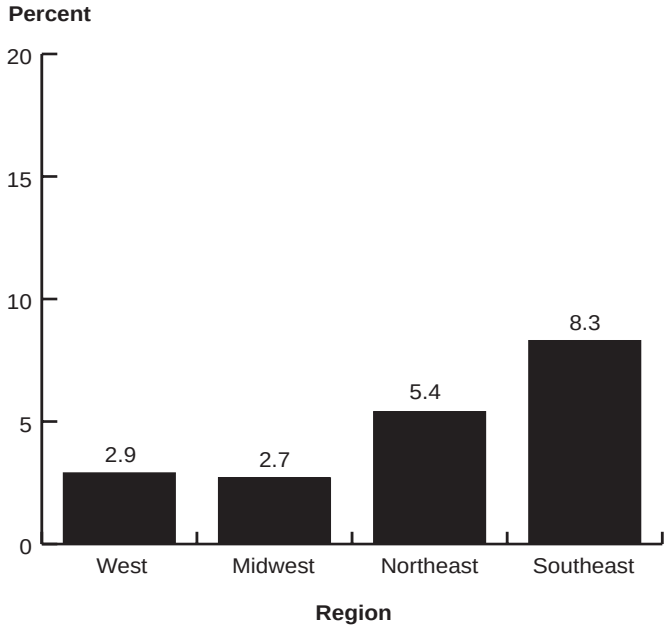
Overall, 10.4 percent of operations had a single bulk tank sample test positive for *Listeria*. However, only 6.5 percent were positive for *Listeria monocytogenes,* the only *Listeria* species known to be pathogenic to humans. A higher percentage of large operations (7.8 percent) had bulk tank samples test positive for *L. monocytogenes* than medium (5.4 percent) and small (3.0 percent) operations (Figure 3).

Figure 3. Percent of Operations that had a Single Bulk Tank Milk Sample Test Positive for *Listeria monocytogenes*, by Herd Size



The Southeast region had a higher percentage of operations (8.3 percent) with bulk tank samples that tested positive for *L. monocytogenes* than the Northeast (5.4 percent of operations), West (2.9 percent of operations), or Midwest (2.7 percent of operations) regions (Figure 4).

Figure 4. Percent of Operations that had a Single Bulk Tank Milk Sample Test Positive for *Listeria monocytogenes*, by Region



Conclusions

Due the abundance of *Salmonella* on dairies, elimination of the organism from the environment or from cows is not practical. Specific recommendations to control *Salmonella* on dairy operations are difficult to provide. Results of the NAHMS Dairy '96 study, the predecessor of Dairy 2002, indicate that use of flush water systems, feeding brewer's products, large herd sizes, and region of the country were associated with fecal shedding of *Salmonella*.

In other studies, factors associated with *Salmonella* on dairy operations include addition of replacement animals without testing them, failure to routinely test feed components for *Salmonella*, poor control of wild birds and rodents, and inadequate sanitation in calving and calf-rearing areas. Improvements in any of these areas will reduce the risk of *Salmonella* transmission and decrease transmission of many other fecal-borne pathogens. Adherence to strict hygienic milking practices will prevent most *Salmonella* from entering bulk tanks.

Similarly, it is not possible to remove all *Listeria* organisms from dairy environments, but reducing exposure to cattle can be accomplished by feeding properly fermented silage and reducing contact with manure. *Listeria* have been shown to stick to stainless steel surfaces in milking systems, indicating that strict adherence to proper cleaning and sanitization procedures of milking systems is key to keeping *Listeria* out of bulk tanks.[4] Eliminating *Listeria* from milking systems should be a goal of all producers.

References

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