INFO SHEET
Veterinary Services

United States Department of Agriculture
Animal and Plant Health Inspection Service

Prevalence and Antimicrobial Susceptibility Patterns of *Salmonella* from Beef Cows

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Salmonellae have been isolated from nearly all vertebrates, and infection has been associated with both animal and human disease. Human *Salmonella* infections in the United States have been estimated in the millions annually. In some of these cases, foods of animal origin have been implicated as the source of the pathogen. In addition to being a food-safety concern for humans, *Salmonella* can cause illness or death among cattle. There is worldwide concern that many bacteria, including *Salmonella*, are becoming resistant to antimicrobial agents. Trends in antimicrobial susceptibility patterns of *Salmonella* isolates are being monitored.

The USDA:APHIS:VS conducted a study of health and management of cattle and calves on cow-calf operations as part of the National Animal Health Monitoring System's (NAHMS) Beef '97 study. This study was designed to determine the prevalence of *Salmonella* shedding in feces of beef cows on cow-calf operations throughout the U.S., and to determine antimicrobial susceptibility patterns for all Salmonellae isolated. A stratified random sample of cow-calf operations from the 23 major cow/calf states[1] was selected for the Beef '97 study. A total of 2,713 producers participated.

A convenience sample of 187 operations in 21 states was selected to submit fecal samples (operations in Arkansas and Wyoming were not tested). Fecal samples were collected between August 1997 and January 1998. Culture work was performed at the Richard Russell Research Center in Athens, Georgia, and the serotyping was done at the National Veterinary Services Laboratories in Ames, Iowa. Up to 40 fecal samples were collected from the ground on each operation, depending on herd size. All *Salmonella* isolates were serotyped. In addition, all *Salmonella* isolates were screened for resistance against a panel of 17 antimicrobials[2].

A total of 5,049 fecal samples on 187 operations were cultured for *Salmonella*. *Salmonella* spp. were recovered from 21 operations (11.2 percent). Seventy samples (1.4 percent) tested positive for *Salmonella*, and from these samples, 78 *Salmonella* isolates were identified. Most of the isolates (64.1 percent) were recovered from two operations (46.2 percent from one operation and 17.9 percent from another). Only one serotype was recovered from the majority of operations. The five most common serotypes of *Salmonella* isolated from samples were *S. oranienburg*, *S. cerro*, *S. anatum*, *S. bredeney*, and *S. mbandaka* (Table 1).

Table 1. The Five Most Common *Salmonella* Serotypes Isolated from Cattle Feces

Serotype	Number of Positive Isolates	Percent Isolates	Number of Positive Operations	Percent Positive Operations
Oranienburg	17	21.8	3	14.3
Cerro	17	21.8	1	4.8
Anatum	8	10.3	2	9.5
Bredeney	7	9	3	14.3
Mbandaka	4	5.1	2	9.5

Herds were classified into one of five geographic regions (Figure 1). Herds also were classified into one of five herd size categories based on the number of beef cows reported on the date of sample collection. The herd prevalence of fecal shedding of

Salmonellae was compared by geographic region and herd size using chi-square analysis.

Herd prevalence was related to geographic region (Table 2). The largest proportion of operations tested was positive in the Southcentral region followed by the Central region. More herds with 1 to 25 beef cows or 26 to 49 beef cows had positive samples, though prevalence by herd size was not significantly different (Table 3). Most of the isolates (87.2 percent**)** were sensitive to the entire panel of antimicrobials tested. The most common resistance identified was to Sulfamethoxazole and Streptomycin (11.5 percent of isolates each) followed by Tetracycline and Gentamicin (2.6 percent of isolates each). For all other antimicrobials, fewer than 1.5 percent of isolates were considered resistant.

Table 2. Number of Operations with at Least One Positive Sample for *Salmonella*, by Region

Region	Number Operations Tested	Number Positive Operations	Percent Positive Operations
West	26	1	3.80
Northcentral	37	1	2.70
Southcentral	42	9	21.40
Central	39	6	15.40
Southeast	43	4	9.30
Total	187	21	11.20

Table 3. Number of Operations with at Least One Positive Sample for *Salmonella*, by Herd Size

Herd Size (Cows)	Number Operations Tested	Number Positive Operations	Percent Positive Operations
1-25	46	7	15.20
26-49	42	7	16.70
50-99	41	3	7.30
100-249	40	2	5.00
250 or more	18	2	11.10
Total	187	21	11.20

While the prevalence of *Salmonella* within beef cow-calf operations appears to be variable, in general it is very low. Only 1.4 percent of samples and only 11.2 percent of the operations were cultured positive for Salmonellae. Factors that may have influenced the outcome of these results include the time of year samples were collected, quality and number of samples collected, and the presence or lack of environmental stressors affecting shedding by the cattle. A higher proportion of the herds that tested positive came from the Southcentral, Central, and Southeast regions, which could be related to weather conditions at the time of sampling that were more conducive to detecting *Salmonella.* Determination of the full significance of the antimicrobial susceptibility patterns for *Salmonella* isolates will have to await further studies. Prudent use of all antimicrobics by producers and veterinarians will help ensure that these products remain effective and available.

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Amikacin, Amoxicillin/Clavulanic Acid, Ampicillin, Apramycin, Ceftiofur, Ceftriaxone, Cephalothin, Chloramphenicol, Ciprofloxacin, Gentamicin, Kanamycin, Nalidixic Acid, Streptomycin, Sulfamethoxazole, Tetracycline, Ticarcillin, and Trimethoprim/Sulfamethoxazole.