United States Department of Agriculture

Animal and Plant Health Inspection Service

Veterinary Services

Monitoring Salmonella in Humans & Cattle

National Animal Health Monitoring System

Over one-third of human outbreaks of foodborne diseases are due to *Salmonella*, a bacteria. These bacteria can be found in poultry, beef, and pork as well as other foods of animal and plant origin.

Data from different points in the food production continuum can provide valuable perspectives to respond to food safety concerns. Figure 1 illustrates four points:

1) Active Surveillance: The USDA's Animal and Plant Health Inspection Service conducted an on-farm dairy study through the National Animal Health Monitoring System (NAHMS). NAHMS provides active surveillance of disease, because samples are taken from a random selection of operations. The 1991 and 1992, NAHMS study of dairy heifer health, the National Dairy Heifer Evaluation Project (NDHEP), was conducted on herds randomly selected from 28 states and represented 78 percent of the U.S. milk cow population. Fecal samples were collected from 6,863 preweaned calves on 1,063U.S. operations and cultured for *Salmonella* at USDA's National Veterinary Services Laboratories (NVSL).

2) NVSL: At point #2, the animals leave the operation for slaughter, are sold to another producer, or may be sick or have died prematurely, prompting producers and veterinarians to submit samples to laboratories for examination. If *Salmonella* is cultured, an isolate may be sent to NVSL for serotyping. Summaries of the serotyping service are available from NVSL for *Salmonella* monitoring.

3) Post-harvest: After the animals are slaughtered, the carcasses are monitored for visual signs of fecal contamination before being processed for human consumption. Samples may be cultured for *Salmonella*.

4) Human Health: Once the food is consumed, disease resulting from bacteria is monitored through reports submitted to the Health and Human Service's Centers for Disease Control and Prevention (CDC).

Salmonella data from the NDHEP, NVSL, and CDC provide information on how dairy and beef cattle sources of bacteria compare to human cases of salmonellosis.

Figure 1. Farm-to-Fork Continuum and Points for Salmonella Surveillance

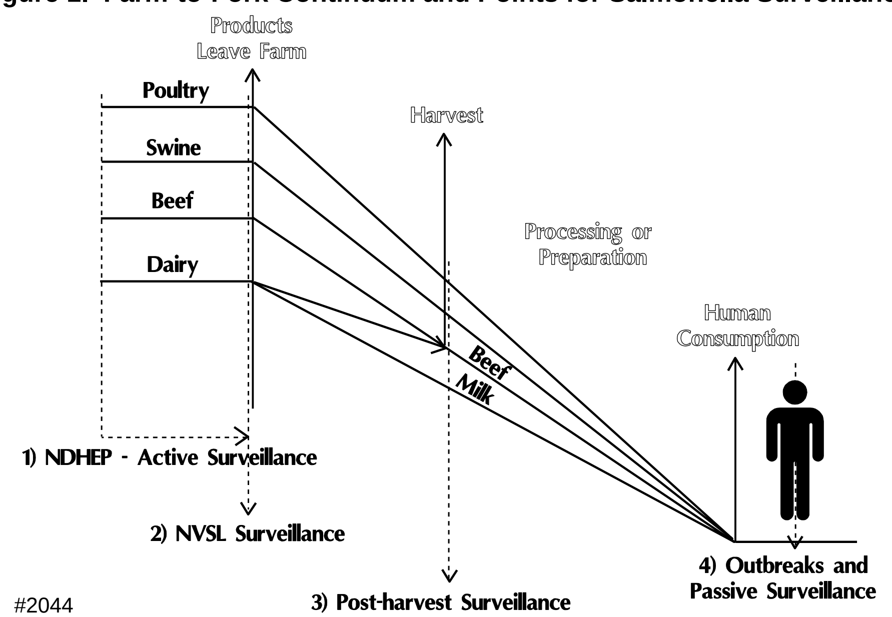

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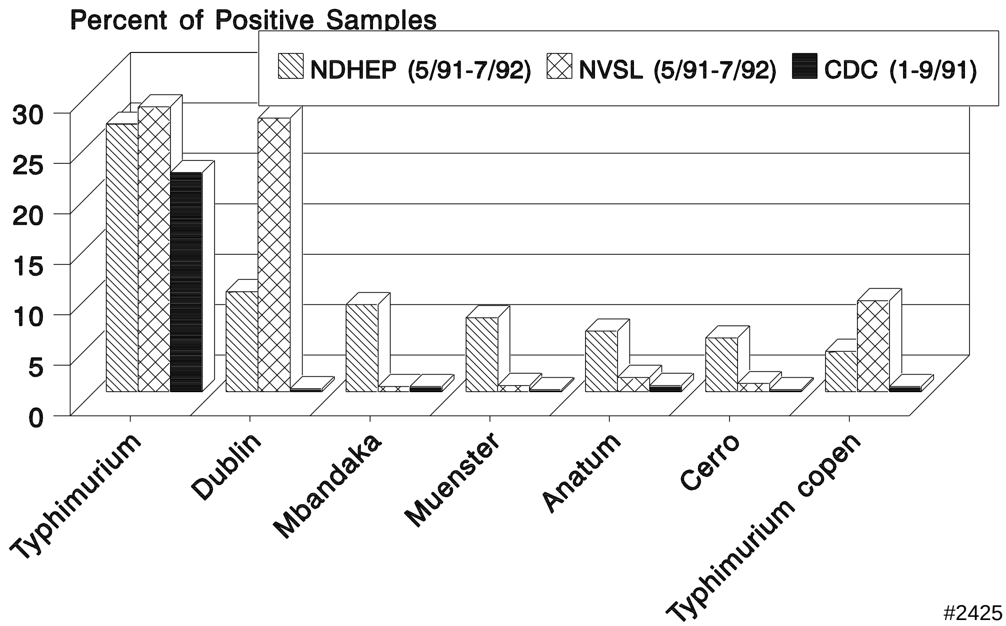
Figure 2. Comparison of Salmonella Serotype Distributions



There are nearly 2,000 *Salmonellas* which are differentiated by serotypes. Figure 2 shows that *S. typhimurium* was the most common serotype from all three sources (26.5, 28.2, and 21.7 percent of all the positive samples from NDHEP, NVSL, and CDC respectively). Other than *S. typhimurium*, there was little similarity in serotype distribution among the three sources.

There are several reasons results from the two animal sources differ: 1) class of cattle monitored (NDHEP=dairy cattle only, NVSL=dairy and beef); 2) animal age (NDHEP=calves up to approximately 8 weeks, NVSL=cattle reported as 'immature;' 3) region of origin (NDHEP=representative of national dairy population, NVSL=samples submitted voluntarily from all regions). Most importantly, NDHEP calves were both sick and apparently healthy calves, while NVSL isolates were submitted primarily from sick animals. Figure 2 suggests that *S. typhimurium*, *S. dublin*, and *S. typhimurium variety copenhagen* more commonly cause clinical disease in calves compared to other serotypes.

The CDC data came primarily from ill humans. A comparison of the human and cattle data shows few similarities, suggesting very little overlap of *Salmonella* between cattle and humans.

While this information shows that *S. typhimurium* represents 26.5 to 28.2 percent of the *Salmonellas* found in dairy cattle, other studies show it is also common in poultry and pork.

Comparisons of data from different production points can help prevent foodborne disease by identifying food sources representing reservoirs for bacteria that are most likely to cause human illness. On-farm data may be used to predict increases in specific serotypes to allow increased watchfulness and intervention strategies.

NAHMS collaborators included the National Agricultural Statistics Service (USDA) and State and Federal Veterinary Medical Officers. For more information, contact:

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