

## **NAHMS Dairy '96: Status on U.S. Dairy Operations About E. coli 0157 and Salmonella**

E.coli 0157 and Salmonella are bacterial pathogens currently receiving extensive media coverage due to public health concerns. They have been recovered from various types of foods and environmental and water sources. The bacteria live in the intestinal tracts of various animal species, including cattle, that therefore represent a major reservoir for human food-borne disease pathogens. Salmonella can also cause disease in animals.

Humans become infected primarily through fecal contamination of food products or water. Another source of human infection, primarily limited to farm families, is contact with ill animals. Lactating dairy cows pose a minimal public health risk through milk and dairy products because of pasteurization, though higher risks are associated with farm families and others drinking unpasteurized milk. Another source of human exposure to these bacteria is culled dairy cows, through meat contamination during slaughter. In this article E. coli 0157 will be discussed.

Why is E. coli 0157 important?

E. coli 0157 has been recognized as an important food-borne pathogen since the 1980's, notable because it can cause hemolytic uremic syndrome as well as bloody or nonbloody diarrhea. In 1993, deaths of four children and widespread media coverage due to an outbreak of human disease caused by E. coli 0157 in the western U.S. led to an outpouring of consumer demands for safe foods. In response, education campaigns were begun to enlighten consumers about their role in food safety, research projects were initiated to better understand the ecology and epidemiology of this and other bacteria, and new regulations were developed regarding the slaughter/processing inspection process.

How common is E.coli 0157 on U.S. dairy operations?

As part of the USDA's National Animal Health Monitoring System (NAHMS) Dairy '96 Study, fecal samples from dairy cows across 19 states were collected and sent to the USDA's National Veterinary Services Laboratories for testing. The laboratory tested samples from 91 dairy operations (over 3,600 milk cows and 600 cows to be culled within the subsequent 7 days) and 97 cull dairy cow markets (over 2,200 cull dairy cows). Results showed that, while prevalence of fecal shedding of verotoxigenic E. coli 0157 in dairy cows at a single sampling was low (0.9% of milk cows and 2.8% of milk cows to be culled within the subsequent 7 days, Figure 1), prevalence across operations was higher. At this one-time sampling, 24.2% of operations and 30.9% of markets had at least one culture-positive cow (Figure 2).

These results are similar to those from previous, more regionalized studies of dairy cattle and those of the 1995 NAHMS Cattle on Feed Evaluation. That study found 1.1% of fecal samples and 63% of 100 feedlots culture positive for verotoxigenic E. coli 0157. A study with repeated fecal sampling suggested that nearly all dairy operations will be positive for E. coli 0157 if sampled often enough.

In the NAHMS Dairy '96 Study, fecal samples were collected over a 6-month period from February through July 1996. A clear seasonal pattern of E.coli 0157 shedding was noted. Over half of the herds tested on or after May 1 were culture positive, compared to very few herds sampled before May 1. Additionally, milk cows, other cows to be culled within 7 days and culled cows at markets sampled on or after May 1 were more likely to be culture positive than those sampled before May 1. These results are consistent with other studies of cattle shedding and parallel the trend reported in human E. coli 0157 disease.

The Dairy '96 Study focused on culled dairy cows to compare fecal shedding of cows going to slaughter with the general population of milk cows. Once estimates were adjusted for season and other factors, there were no significant differences in fecal shedding of E.coli 0157 between milk cows intended for culling within the next 7 days and other milk cows. Fecal shedding of E. coli 0157 were higher in larger-sized herds (39.1% of herds with 100 or more milk cows compared to 8.9% of herds with fewer milk cows), though season may have confounded this relationship.

How can we reduce fecal shedding of E. coli 0157?

Due to the epidemiology of this organism, E. coli 0157 does not appear to be eradicable using test and cull methods that have been successful for pathogens causing persistent cattle infections, such as those causing bovine tuberculosis and brucellosis. For on-farm control of pathogens like E. coli 0157 that have a typically short duration of shedding (1-2 months), it seems likely that the most effective controls will be identification and removal of sources of new infections. Once understood, this process, including use of key preventive management practices, could be part of a herd quality assurance program. In addition, it is possible that delaying marketing of slaughter cattle, until shedding has ceased in herds undergoing high shedding periods, could reduce contamination of meat products.

From previous studies, risk factors associated with fecal shedding of E. coli 0157 in dairy cows are unclear. Dietary stress appears to be involved; one clinical trial showed that fasted calves shed the organism longer than nonfasted controls. Similarly, pens of feedlot cattle that were on feed less than 20 days were more likely to have positive cultures than those pens on feed longer. Another study suggested cow drinking water as a source of E. coli 0157. Factors previously evaluated but not consistently found to be associated with fecal shedding include type of feed ingredient and spread of manure on pasture. Until further research is completed, documented herd management practices to prevent E. coli 0157 shedding from cattle on farm are not available.

In the next issue NAHMS Dairy '96 , Salmonella - Status on U.S. Dairy Operations