The National Animal Health Monitoring System (NAHMS) is a non-regulatory unit within the United States Department of Agriculture (USDA). The USDA, Animal and Plant Health Inspection Service (APHIS), Veterinary Services (VS) established NAHMS to collect timely, accurate and user-friendly information on animal health and management. Since 1990, NAHMS has provided information regarding baseline management practices and animal health as well as assisted with identification of emerging issues for national animal industries. One objective of the NAHMS Equine ‘98 study was to collect questionnaire data and biologic samples in order to estimate the prevalence of Salmonella sp. shedding and the prevalence of Salmonella sp. in on-premises feed sources for U.S. horses.

A representative sample of operations with one or more equids was included in the first phase of the Equine’ 98 survey from the 28 states. (Figure 1) A total of 2904 operations provided equine health and management data based on a questionnaire administered in the spring of 1998. A subset of this sample of operations was eligible to be included in the subsequent phases of the study which included 3 additional visits to the operations by Federal or state veterinarians or health technicians for completion of questionnaires. To be eligible for phase 2 of the study operations had to have 3 or more horses on 1/1/98. This 28-state target population of operations was estimated to represent 51.6% of operations with horses and 83.9% of the horses in the 28 states. A total of 1,178 operations agreed to participate in phase 2 of the study, 971 (82.4%) of these operations participated in the fecal sampling aspect of the study. For further information on the design and implementation of the NAHMS Equine ‘98 see the tabular reports Part I-IV.

Each of the horses had feces sampled only once and each operation had horses sampled either in the summer of 1998 or in winter of 1998-1999. The number of horses sampled per operation was based on a sliding scale, for less than 10 resident horses on the operation all horses were sampled; 10 to 19 resident horses, 10 horses were sampled; 20 to 49 horses, 15 were sampled; and if there were 50 or more horses, 20 were sampled.
A single grain/concentrate sample was collected from each of the premises and was cultured for *Salmonella* sp. The grain/concentrate selected was that which was fed to the majority of the horses most of the time. The grain/concentrate sample was to be collected from the container holding the grain just prior to the actual feeding of the horse. Grain/concentrate from different sources or types were not mixed even if they were mixed when fed to the horses. Feces and grain samples were shipped overnight and cultured for *Salmonella* sp. at the Agricultural Research Service Laboratory (ARS) in Athens GA using a previously described technique.\(^5\)

A total of 8,417 fecal samples were cultured for *Salmonella* sp. There were 4,643 samples collected in the summer sampling time period (June 15, 1998 to September 11, 1998) and 3,774 samples collected in the winter sampling (November 2, 1998 to March 3, 1999). The following results represent weighted estimates and standard errors of the prevalence of *Salmonella* sp. fecal shedding by horses and prevalence of operations with at least one positive fecal sample.

The NAHMS study estimated that 0.8% (standard error = 0.5) of horses shed *Salmonella* sp. in their feces. The prevalence of fecal shedding of *Salmonella* sp. by horses in the southern region was 1.4% (SE=1.0) and in the northern region was 0.2% (SE=0.2). An operation was considered positive if it had one or more horses or horse foals whose feces tested positive for *Salmonella* sp. The prevalence of operations with one or more horses shedding *Salmonella* sp. in the feces was 1.8% (SE = 0.7). A total of 14 different serotypes were identified with the most common serotype being *S. muenchen*. A total of 895 horse operations had grain/concentrate tested for *Salmonella* sp. The prevalence of positive grain/concentrate samples was 0.4%. The serotypes identified in the grain samples included *S. senftenberg*, *S. johannesburg*, and *S. cubana*. All positive grain samples were identified in the winter sampling period. None of the horses on the operations with positive grain/concentrate samples cultured positive in their feces.

This national study of *Salmonella* sp. fecal shedding by horses is unique because of the scope, the population sampled, and the sampling scheme. Therefore comparison to previous studies regarding *Salmonella* sp. shed by or infection of horses would be inappropriate. Most of the previously reported information in the literature has focused on determining the infection status of the individual horse, rather than the prevalence of fecal shedding by the horse population.\(^6,7\) Most previous reports have been based on hospital populations or smaller groups of horses.\(^7\) The objectives of the NAHMS Equine ’98 study was to estimate the prevalence of fecal shedding by the general horse population in the U.S., rather than the prevalence of infection in individual horses. If the goal were to identify the infection status of each horse then collection of multiple fecal samples per horse or a rectal biopsy would have been a more appropriate sampling scheme.\(^7\)

The results of this study would be useful to the veterinarian faced with interpreting culture results from horses. For instance, veterinary practitioners need a reference point for what would be considered the norm when interpreting fecal culture results from a herd of horses to determine
the if the etiology of an outbreak of diarrhea is likely to be *Salmonella* sp.

References:


![Regions for Equine '98 Salmonella Analysis](image-url)

**Figure 1** States participating in the *Salmonella* sp. testing depicted as the Southern and Northern region.