

# The Occurrence and Causes of Lameness and Laminitis in the U.S. Horse Population

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Based on this national study, it is estimated that 50% of horse operations with 3 or more horses have one or more lame horses annually and on a given day as many as 5% of the horses could be expected to be lame. Leg or joint problems account for half of all lameness cases in the spring and winter and foot problems account for half of all cases that occur in the summer. Laminitis, although less common, still affects approximately 13% of operations and 2% of horses annually. Improved grazing management could prevent the majority of cases of laminitis. Author's addresses: Equine Orthopaedic Research Laboratory, Equine Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523 (Kane); Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523 (Traub-Dargatz); Centers for Epidemiology and Animal Health, USDA:APHIS:VS, 555 South Howes, Fort Collins, CO 80521 (Losinger and Garber). © 2000 AAEP.

## 1. Introduction

Few health problems have the potential to affect all horses regardless of age, breed, gender, or use like lameness can. In the statewide Michigan Equine Monitoring System (MEMS) study, lameness was the most common health problem reported and had the second highest number of lost performance days of all disease problems reported among all types of horses monitored over a two year period.<sup>1</sup> Sponsored by the U.S. Department of Agriculture: Animal and Plant Health Inspection Service: Veterinary Services (USDA:APHIS:VS), a primary goal of the National Animal Health Monitoring System's (NAHMS) Equine '98 Study was to provide *national* estimates of the occurrence of specific health problems across the U.S. that are a concern of horse enthusiasts. The Equine '98 Needs Assessment Survey identified leg problems such as lameness as

a high priority concern among horse owners, veterinarians, trainers, and other respondents.<sup>2</sup> Although our understanding of the pathogenesis of laminitis has improved tremendously in the last several years, there are few epidemiologic studies of the disease and little is known about the prevalence in the general horse population. Lameness and laminitis were selected for indepth study because of these concerns and the recognized need for more research on the subject.

Specific objectives of the lameness portion of the Equine '98 study were to: 1) describe the occurrence of owner-reported lameness and laminitis in horses and the proportion of operations with one or more affected horses during a 12-month period during 1997/1998 in the U.S.; 2) describe and compare the prevalence of operations and horses with lameness and specifically laminitis during the spring,

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## NOTES

summer, and winter (1998–1999) in the U.S.; and 3) describe the most common causes and outcomes of lameness including specifically lameness due to laminitis and other foot or hoof problems in the U.S.

## 2. Materials and Methods

In collaboration with VS, the USDA's National Agricultural Statistics Service identified a representative sample of equine operations from 28 states<sup>a</sup> willing to participate in the Equine '98 study. Those operations with 3 or more horses present on January 1, 1998 were eligible to participate in the second phase of the study (including the lameness portion).<sup>3</sup> Racetrack premises were excluded from the lameness portion of the study, however racehorses living at off-track premises were included. Horses were defined as adults and foals of all full-size horse breeds that usually stand over 14 hands when full-grown and did not include miniature horses, ponies, donkeys or mules. This sample was estimated (based on NAHMS' projections) to represent 51.6% of operations with horses on January 1, 1998 and 83.9% of horses on January 1, 1998 in the 28 states.

To assess the occurrence of lameness problems and laminitis, Veterinary Medical Officers and Animal Health Technicians administered a questionnaire to owners or operators of the operations that volunteered to participate in the lameness portion of the study. Interviews were conducted on each operation at three times (classified for this report as the seasons, spring: April 20–June 12, 1998; summer: June 15–September 11, 1998; and winter: November 2, 1998–February 26, 1999). Participants in the study were asked about all horses affected by lameness and specifically, laminitis, at each interview. During the spring interview they were asked in detail about the last case of lameness that occurred and this case was followed through the summer and winter visits. There were 1178 operations with 28,026 horses participating in the spring, 1136 operations with 26,845 horses in the summer, and 1072 operations with 24,163 horses in the winter interviews.

Each operation was provided with standardized definitions. A lameness problem was defined as an abnormality of gait such that the horse could not be used for its intended purpose or could only be used if intervention (such as medications, corrective shoeing, or rest) was employed. Horses receiving interventions such as corrective shoeing only for the prevention of lameness were not considered as having a lameness problem. Laminitis was defined as inflammation of the junction between the sensitive and insensitive laminae or layers of the hoof wall, with a severe case also called founder. Information in this report is operator-reported and not directly based on assessments made by the data collectors.

Percentages (reported here as %  $\pm$  SE for individual estimates) were calculated as probability-based weighted estimates of the proportions of affected

operations or horses in the population accounting for the complex survey design stratification in the variance estimates.<sup>b</sup> The significance of comparisons between different levels of each factor examined other than season were compared by examining the 90% confidence interval [point estimate  $\pm$  (1.65  $\times$  SE)]. Overlapping intervals suggest no significant ( $p < 0.10$ ) difference between the levels of each factor being compared. Logistic and linear regression techniques accounting for repeated measures were used to identify significant ( $p < 0.10$ ) seasonal effects on the percentages of operations and horses, respectively, affected with lameness and laminitis.<sup>b</sup>

## 3. Results

### A. Lameness and Laminitis during the Previous 12 Months

At the spring interview,  $50 \pm 3.2\%$  of U.S. horse operations with 3 or more horses reported having one or more horses with a lameness problem in the previous 12 months. Operations with at least one horse affected by laminitis in the previous 12 months were less common ( $13.0 \pm 2.0\%$ ). Regional differences in the annual percentage of operations with lameness and laminitis were not significant. The percentage of operations reporting lameness or laminitis problems in the previous 12 months was significantly higher for larger operations ( $>5$  horses) compared with smaller operations. Boarding/training operations were significantly more likely ( $81.6 \pm 6.6\%$ ) to report at least one lameness in the previous 12 months compared with farm/ranch ( $47.6 \pm 5.6\%$ ) and residence (horses for personal use) ( $43.7 \pm 4.6\%$ ) operations. There was a similar pattern for reporting at least one laminitis problem. Boarding/training ( $28.5 \pm 10.2\%$ ) and breeding operations ( $24.5 \pm 7.7\%$ ) were more likely to have had one or more horses with laminitis in the previous 12 months compared with farm/ranch operations ( $6.8 \pm 2.0\%$ ).

Overall, only  $2.1 \pm 0.3\%$  of horses were reported to have had laminitis in the previous 12 months, and there were no significant differences in the percentage of horses with laminitis between regions of the country, size of the operation, or primary use of the resident horses.

### B. Lameness and, Specifically, Laminitis on the Days of the Interviews

Overall, more operations reported having at least one horse with lameness on the day of the interview in the spring ( $24.6 \pm 2.3\%$ ) and summer ( $25.7 \pm 2.6\%$ ) compared with the winter ( $18.2 \pm 2.2\%$ ) ( $p < 0.10$ ). The same pattern was seen for laminitis with more operations reporting cases in the spring ( $4.9 \pm 1.1\%$ ) and summer ( $4.5 \pm 1.3\%$ ) compared with the winter ( $1.8 \pm 0.6\%$ ) ( $p < 0.10$ ). More boarding/training facilities reported lameness ( $p < 0.10$ ) than residence (horses for personal use) facilities at each of the spring, summer, and winter visits.

More horses were reported to be lame at the spring ( $5.4 \pm 0.5\%$ ) and summer ( $4.9 \pm 0.5\%$ ) visits compared with the winter visits ( $3.4 \pm 0.6\%$ ) ( $p < 0.10$ ). This pattern was consistent in every region except the Northeast where no seasonal effects were noted. Laminitis was less common with less than 1% of horses affected during any season. There were no significant regional differences in the percentages of horses with laminitis during any of the three interviews. Operation size did not have a substantial overall impact on the risk of lameness or laminitis for individual horses.

At each visit, the highest percentage of resident horses at least 18 months of age with any lameness was for racehorses. However, only during the spring visit was this percentage ( $17.7 \pm 5.9\%$ ) significantly greater than those for pleasure ( $5.3 \pm 0.9\%$ ), showing/competition ( $4.9 \pm 1.0\%$ ), breeding ( $5.5 \pm 1.2\%$ ), and farm/ranch ( $5.4 \pm 1.1\%$ ) uses.

### C. Description of Lameness Cases

Leg problems were the most common cause of lameness in the spring ( $51.3 \pm 3.5\%$ ) and winter ( $49.1 \pm 5.6\%$ ). Foot problems (including laminitis) were most commonly the cause of lameness problems in the summer ( $50.4 \pm 4.7\%$ ). Laminitis, navicular disease, and sole bruises or abscesses were the most common causes of foot problems, and together explained 70–80% of the foot problems reported in any season.

The breed distribution of lameness was no different than one might expect given the breed distribution of the horses included in the study. A veterinarian was consulted for a higher ( $p < 0.10$ ) percentage of lameness cases in the winter ( $80.5 \pm 4.9\%$ ) compared with those reported in the spring ( $64.8 \pm 5.8\%$ ) or summer ( $70.6 \pm 4.3\%$ ) interviews. Regardless of season, approximately one-third of lame horses received some form of corrective shoeing for their current lameness problem.

Grazing lush pasture was the single most common perceived cause ( $45.6 \pm 11.5\%$ ) of laminitis in the most recent cases of lameness described. Other known causes such as feed problems and complications of injury, obesity, or pregnancy were responsible for  $26.9 \pm 11.1\%$  of laminitis cases. Grain overload, colic, diarrhea, and retained placenta combined reportedly caused less than 15% of laminitis cases described.

## 4. Discussion

With half of U.S. operations with 3 or more horses having one or more lame horses in the previous 12 months, it is clear that lameness is a major health problem in this country. Laminitis, although less common, still affects horses on almost 15% of operations. Although larger operations are more likely to report having a lame horse, this probably reflects the greater combined probability of having at least

one lame horse because more horses are present on the operation. Results of the MEMS study suggested that individual horses residing on smaller operations were at increased risk of lameness, though the increase was small.<sup>4</sup> The study reported here did not identify a substantial association between risk of lameness or laminitis for individual horses and size of operation.

More operations reported having lame horses and individual horses were at greater risk of being lame in the spring and summer compared with winter. This could also be due to exercise intensity during these popular seasons for riding and an increased awareness of lameness at these times. Exercise intensity is recognized as a risk factor for lameness and injury in performance horses.<sup>5–7</sup> Boarding or training operations reported having at least one horse with lameness more frequently compared with operations functioning as farms or ranches and residences with horses for personal use. This difference could also be due to more rigorous exercise schedules and a greater awareness of lameness on boarding or training operations compared with farms, ranches, and personal residences, or simply a tendency for boarding or training operations to be larger. Future studies of these factors should include measures of exercise intensity if possible to provide adjusted estimates. As a group, racehorses appeared to be at increased risk for lameness. Because only racehorses living off the track were included in this study, it is possible that these horses were more likely to be recuperating on a lay-up than the general racehorse population.

The seasonal increase in risk of laminitis in the spring and summer compared with winter is more likely to be related to true seasonal factors such as grazing behavior and the nutritional content of forages used for grazing. A peak in the occurrence of laminitis has been reported in one study,<sup>8</sup> however other investigators failed to identify a significant association between season and risk of laminitis.<sup>9,10</sup> It is clear that operators recognize grazing lush pasture as a major cause of laminitis, and improved forage management should be an effective intervention strategy to help prevent laminitis.

Based on this national study, it is estimated that 50% of horse operations with 3 or more horses have one or more lame horses annually and on a given day as many as 5% of the horses could be expected to be lame. Leg or joint problems account for half of all lameness cases in the spring and winter, and foot problems account for half of all cases that occur in the summer. Emphasizing leg, joint, and foot care in research and in practice could prevent most cases of lameness. Laminitis, although less common, still affects approximately 13% of operations and 2% of horses annually. Improved grazing management could prevent the majority of cases of laminitis.

## References and Notes

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<sup>a</sup> Western Region: CA, CO, MT, NM, OR, WA, WY; Northeast: NJ, NY, OH, PA; Southern Region: AL, FL, GA, KY, LA, MD, OK, TN, TX, VA; Center Region: IL, IN, KS, MI, MN, MO, WI.

<sup>b</sup> SUDAAN, Version 6.4, 1996. Research Triangle Park, NC 24409-2194.