EQUINE

Lameness and poor performance in horses used for team roping: 118 cases (2000–2003)

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Objective—To determine the types of musculoskeletal problems that result in lameness or poor performance in horses used for team roping and determine whether these problems are different in horses used for heading versus heeling.

Design—Retrospective study.

Animals—118 horses.

Procedure—Medical records of team roping horses that were evaluated because of lameness or poor performance were reviewed to obtain information regarding signalment, primary use (ie, head horse or heel horse), history, results of physical and lameness examinations, diagnostic tests performed, final diagnosis, and treatment.

Results—Among horses evaluated by lameness clinicians, the proportion with lameness or poor performance was significantly greater in horses used for heading (74/118) and lower in horses used for heeling (44/118) than would be expected under the null hypothesis. Most horses examined for poor performance were lame. A significantly greater proportion of horses used for heading had right forelimb lameness (26/74 [35%]), compared with horses used for heeling (7/44 [16%]). Horses used for heading had more bilateral forelimb lameness (18/74 [24%]), compared with horses used for heeling (4/44 [9%]). Horses used for heeling had more bilateral hind limb lameness (3/44 [7%]), compared with horses used for heading (0%). The most common musculoskeletal problems in horses used for heading were signs of pain limited to the distal sesamoid (navicular) area, signs of pain in the navicular area plus osteoarthritis of the distal tarsal joints, and soft tissue injury in the forelimb proximal phalangeal (pastern) region. Heeling horses most commonly had signs of pain in the navicular area, osteoarthritis of the metatarsophalangeal joints, and osteoarthritis of the distal tarsal joints.

Conclusions and Clinical Relevance—Horses used for heading were most commonly affected by lameness in the right forelimb. Horses used for heeling had more bilateral hind limb lameness than horses used for heading. (*J Am Vet Med Assoc* 2005;226:1694–1699)

Lameness, defined as an abnormality of gait such that the horse cannot be used for its intended purpose, is the most common reported[1] heath problem affecting all types of horses in the United States and costs the horse industry millions of dollars annually.[2] On the basis of findings from a national study,[1] it is estimated that 50% of horse operations with at least 3 horses have 1 or more lame horses annually, and on any given day, as many as 5% of the horses on such an operation could be expected to be lame. There are many published studies on the diagnosis and treatment of specific musculoskeletal problems causing lameness in horses, but relatively few[1-3] studies of the prevalence of lameness in the general horse population or prevalence of lameness according to the type of athletic activity the study horses were used for. Studies that do correlate lameness with types of activity have been published pertaining to horses used for English performance events[4,5] and Standardbred[6] and Thoroughbred[7,8] racing. To the authors' knowledge, there are no published reports of the frequency of musculoskeletal injury and resultant lameness in horses used for Western performance events. Published reports[9-13] from data that have been systematically collected and analyzed are limited.

The fastest growing class of horse competition in the United States is the sport of team roping.[12,a] Team roping is a timed event conducted in an arena and begins with a horned steer, weighing approximately 200 to 300 kg (440 to 660 lb), being contained in a chute at the end of the arena. The heading box is to the left of the steer, and the heeling box is to the right of the chute. The first member of the team (header) asks for the steer to be released from the chute, and the steer is allowed a head start, termed the score. The team is assessed a 10-second penalty if the header leaves the heading box before the steer crosses the score line. The heading horse is cued by the rider to leave the roping box and chases the steer at maximum speed, a sequence of events similar to a racehorse leaving the starting gate. As the header approaches the steer, the heading horse is trained to decrease speed slightly once it reaches the level of the steer's hip, allowing the header to rope the steer's horns. After the steer is roped, the header wraps the rope around the saddle horn (the dally) and the heading horse drops its hindquarters to slow the steer's momentum. The heading horse is then turned 90° to the left and pulls the steer in that direction across the arena, maintaining a constant but slower speed that allows the heeler to get into position to rope the steer's hind legs. After the heeler ropes the hind feet of the steer, the heeler dallies the rope around his saddle horn and the heel horse is cued to drop its hindquarters and come to an abrupt stop. The heading horse turns 180° to face the heeler, signaling the end of the run, at which point the time is recorded. Competitive team ropers ride well-trained horses that anticipate riders' signals so that the roper can focus solely on roping the steer. The

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training of these horses typically involves thousands of team roping runs and may involve thousands of miles of travel to competitions. Given the present growth in popularity of the sport, equine practitioners are likely to be asked to evaluate increasing numbers of horses used for team roping.

The purposes of this study were to determine the frequency of specific types of musculoskeletal problems that result in lameness or poor performance in horses used for team roping and to determine and compare causes of lameness and the limbs affected in horses used for heading versus heeling. We hypothesized that frequency of the limb affected and specific musculoskeletal injuries sustained would differ between horses used for heading versus horses used for heeling on the basis of differences in activities performed.

Criteria for Selection of Cases

Medical records of all horses that were used for team roping and evaluated for lameness or poor performance between January 1, 2000, and December 31, 2003, at the **Texas A&M University (TAMU)** Veterinary Teaching Hospital were reviewed.

Procedures

Information obtained from medical records was compiled by use of a database computer program.[b] Data obtained from each medical record included date of initial examination, signalment, whether the horse was primarily used for heading or heeling, duration of clinical signs, weight, owner complaint, type of horseshoe worn, history of performance changes, medical treatments administered, physical examination findings (ie, hoof conformation, findings from examination with a hoof tester, presence of joint effusion, lameness evaluation, limbs affected, and response to flexion tests), results of diagnostic tests (ie, diagnostic anesthesia, radiographic imaging, ultrasound imaging, nuclear scintigraphic imaging), final diagnosis, and recommended treatment. After determining the frequency of specific musculoskeletal injuries causing lameness in all horses, comparisons were made between horses used primarily for heading and horses used primarily for heeling.

Severity of lameness was graded on a 0 to 5 scale[14] approved by the American Association of Equine Practitioners. In this scale, grade 0 = not lame, grade 1 = lameness inconsistently observed at a trot, grade 2 = lameness almost always consistent at a trot, grade 3 = lameness consistently visible at a trot, grade 4 = lameness obvious at a trot and seen at a walk, and grade 5 = severe lameness such that weight bearing is minimal. All lameness examinations were performed by 1 of 2 lameness clinicians (RMD and GKC). All horses were trotted by hand on a hard surface to observe the lameness. Peripheral or intra-articular diagnostic anesthesia was performed in most of the horses to localize the source of pain. Once the problem area was localized, other diagnostic modalities such as radiographic imaging, ultrasound imaging, or scintigraphic imaging were used to further evaluate the area.

Statistical analyses—The prevalence of each type of musculoskeletal injury was determined. Descriptive statistics were determined for the variables, cumulatively and by category of use (heading and heeling). Categoric variables were compared by use of a χ^2 test or Fisher exact test. The relationships between a horse's primary use (heading vs healing) and independent continuous variables (ie, weight and age) were determined by use of the Wilcoxon rank sum test. A significance level of $P \leq 0.05$ was used for all analyses.

Results

Horse use—The proportion of horses used for heading that were examined for lameness or poor performance (74/118 [63%]) was significantly ($P = 0.022$) greater than that expected under the null hypothesis of no association of lameness with use (59/118 [50%]).

Signalment—All horses were Quarter Horses. Median age of all horses was 11 years (range, 5 to 20 years). Median age for heading horses was 12 years (range, 5 to 19 years), which was significantly ($P = 0.02$) greater than the age of horses used for heeling (median, 9.5 years; range, 5 to 20 years). One hundred ten (93%) horses were geldings, and 8 (7%) were female. Five of the female horses were used for heeling, and 3 were used for heading.

Historical data—Median duration of lameness or poor performance prior to initial examination was 2 months (range, 1 week to 24 months). No significant difference in duration of clinical signs was detected between horses used for heading and those used for heeling. Eighty-nine of 118 (75%) horses were examined because of an owner complaint of lameness, and 29 (25%) were examined because of a decrease or alteration in performance. The proportion (61/74 [82%]) of horses used for heading with a primary complaint of lameness was significantly ($P = 0.05$) greater than the proportion (28/44 [64%]) of horses used for heeling. Overall, 61 of 74 (82%) horses used for heading were examined because of owner complaint of lameness, and 13 of 74 (18%) were examined because of change in performance. Twenty-eight of 44 (64%) horses used for heeling were examined because of lameness, and 16 (36%) were examined because of poor performance.

The type of performance change reported by owners differed for horses used for heading versus horses used for heeling. The primary owner complaint in horses used for heading was that the horse quit pulling the steer after it had been roped (10/13). The primary owner complaint in horses used for heeling was that the horse quit stopping after the hind feet of the steer had been roped (15/16).

Twenty-nine of 118 (25%) horses had received prior medical treatment before being examined. Medical treatments included intra-articular medication (23/118 [19%]), nonsteroidal anti-inflammatory medication (28/118 [24%]), polysulfated glycosaminoglycans[c] given IM (10/118 [8%]), and sodium hyaluronate[d] given IV (4/118 [3%]). Information regarding the exact dosage of medication and frequency of administration was not recorded in the medical records. No significant difference was detected in prior administration of medications between horses used for heading versus heeling.

Physical examination—Median horse weight was 530 kg (1,166 lb; range, 441 to 619 kg [970 to 1,362 lb]). Horses used for heading weighed significantly (P = 0.001; median, 545 kg [1,199 lb]; mean, 538 kg [1,184 lb]; range, 473 to 603 kg [1,041 to 1,327 lb]) more than horses used for heeling (median, 490 kg [1,078 lb]; mean, 493 kg [1,085 lb]; range, 441 to 545 kg. The most common type of horseshoe applied to the front feet of all horses was a flat steel keg shoe (60/106 [57%]), followed by a steel-rim shoe (28/106 [26%]); wedged heel shoe (10/106 [9%]); rocker-toe, wide-web shoe[e] (3/106; 3%); egg bar shoe (3/106); and half-round shoe[f] (2/118 [2%]). The shoe type was not recorded for 12 horses. The proportion of horses with steel-rim shoes on the front feet was significantly (P = 0.001) greater in horses used for heading (23/68 [34%]), compared with horses used for heeling (5/38 [13%]).

Information regarding hoof conformation was available in 73 of 118 (62%) horses. Hoof conformation was recorded as normal (30/73 [41%]), mismatched front feet (ie, variation in hoof size or heel angle of the front hooves; 25/73 [34%]), contracted heels (8/73 [11%]), under-run heels (4/73 [5%]), atrophy of the frog (4/73 [5%]), and pigeon-toed (2/73 [3%]). No significant difference in hoof conformation was detected between horses used for heading or heeling.

One hundred three medical records contained information regarding other musculoskeletal findings. Seventy-eight of 103 (76%) horses had effusion in the **metacarpophalangeal (MCP)** joints of the forelimbs. Ten of 103 (10%) horses had synovial effusion in the carpus, 9 (9%) horses had synovial effusion in the digital flexor tendon sheath of the forelimbs, and 3 (3%) horses had an exostosis over the proximal phalangeal (pastern) region of the forelimbs. Thirty of 103 (29%) horses had a bony exostosis located over the medial aspect of the distal tarsal joint in the hind limbs, 22 (21%) horses had synovial effusion in the **metatarsophalangeal (MTP)** joint in the hind limbs, 36 (35%) horses had synovial effusion in the digital flexor tendon sheath of the hind limbs, and 3 (3%) horses had synovial effusion in the stifle joint.

Information regarding hoof-tester evaluation was available for 101 of the 118 (86%) horses. In 46 of 118 (39%) horses, hoof-tester examinations yielded negative results, whereas 42 (36%) horses had a painful response to hoof-tester pressure over the central aspect of the frog, 7 (6%) had a painful response to pressure over the heel region of the foot, and 6 (5%) had a painful response to pressure over the toe region of the foot.

Lameness examination findings—Median lameness grade was 1 and mean lameness grade was 1.8 for all limbs (range, 0 to 4). In the group overall, the most common limb affected by lameness was the right forelimb (72/118 [61%]), followed by the left forelimb (47/118 [40%]), left hind limb (32/118 [27%]), and right hind limb (23/118 [19%]; **Table 1**). The proportion of horses with the right forelimb affected by lameness was significantly (P = 0.002) greater in horses used for heading (53/74 [72%]), compared with horses used for heeling (19/44 [43%]).

Sixty-nine of 118 (58%) horses had 1 limb affected by lameness, 45 (38%) horses had > 1 limb affected by lameness, and 4 (3%) horses had no lameness **(Table 2)**. The proportion (11/44 [25%]) of horses used for heeling with lameness that affected only the left forelimb was significantly (P = 0.001) greater than that of horses that were used for heading (2/74 [3%]). Horses used for heeling had significantly (P = 0.05) more bilateral hind limb lameness (3/44 [7%]) than horses used for heading (0%). The proportion of horses used for heading that had only the right forelimb affected by lameness (26/74 [35%]) was significantly (P = 0.020) greater than that of horses used for heeling (7/44 [16%]). Horses used for heading had significantly (P = 0.040) more bilateral forelimb lameness (18/74 [24%]), compared with horses that were used for heeling (4/44 [9%]; Table 2).

One hundred seven of 118 (91%) horses had peripheral or intra-articular diagnostic anesthesia performed to localize the source of lameness. One

Table 1—Frequency (proportion [%] of horses) of limb involvement in 118 horses used for team roping and examined because of lameness or poor performance. Table includes horses with involvement of single or multiple limbs.

Horse's primary use	RF	LF	LR	RR
Heading	53/74 (72)*	31/74 (42)	18/74 (24)	14/74 (19)
Heeling	19/44 (43)	16/44 (36)	14/44 (32)	9/44 (20)
Total	**72 /118 (61)**	**47/118 (40)**	**32/118 (27)**	**23/118 (19)**

*Significant (P = 0.002) difference between horses used for heading versus heeling. For each horse, more than 1 limb may have been affected.
RF = Right front limb. LF = Left front limb. LR = Left hind limb. RR = Right hind limb.

Table 2—Specific limbs affected by lameness (No. [%] of horses) in 118 horses used for team roping and examined for lameness or poor performance.

Primary use of horse	LF only	RF only	LF and RF	LR only	RR only	LR and RR	LF and LR	RF and RR	LF and RR	RF and LR	3 limbs	All limbs affected	None	Total
Heading	2 (3.0)	26 (35)*	18 (24)*	7 (9.0)	7 (9.0)	0	3 (4.0)	0	1 (1.3)	2 (2.7)	3 (4.0)	3 (4.0)	2 (2.7)	74
Heeling	11 (25)*	7 (16)	4 (9.0)	7 (16)	2 (4.5)	3 (6.8)*	0	3 (6.8)	0	3 (6.8)	0	2 (4.5)	2 (4.5)	44
Total	**13**	**33**	**22**	**14**	**9**	**3**	**3**	**3**	**1**	**5**	**3**	**5**	**4**	**118**

*Significant ($P < 0.05$) difference between horses used for heading versus heeling.
See Table 1 for remainder of key.

Table 3—Number of horses (n = 118) used for team roping and examined for lameness or poor performance that had musculoskeletal problems.

Primary use of horse	Hoof abscess	OA DIP	Back	BFT	DDF	Foot and OA tarsus	NAV and tarsus	NAV	OA carpus	OA MCP	OA tarsus	OA pastern	OA stifle	SBr	SDF	STP	STH	SB	TS	Total
Heading	3	1	1	2	0	0	10*	24*	5*	1	6	3	2	1	1	6*	1	5*	2	**74**
Heeling	1	1	1	0	1	3	2	12	2	6*	4	3	2	1	0	2	0	1	2	**44**
Total	**4**	**2**	**2**	**2**	**1**	**3**	**12**	**36**	**7**	**7**	**10**	**6**	**4**	**2**	**1**	**8**	**1**	**6**	**4**	**118**

*Significant ($P < 0.05$) difference between horses used for heading versus heeling.

OA = Osteoarthritis. DIP = Distal interphalangeal joint. Back = Back pain. BFT = Bruised foot. DDF = Deep digital flexor tendonitis. NAV = Navicular area pain. Foot and OA tarsus = Bruised foot and OA distal tarsal joints. MCP = Metacarpophalangeal joint. SBr = Suspensory ligament branch desmitis. SDF = Superficial digital flexor tendonitis. STP = Soft tissue injury in pastern region. STH = Soft tissue injury in tarsus. SB = Suspensory ligament body desmitis. TS = Digital flexor tendon sheath inflammation.

hundred seven of 118 had a radiographic examination, and 30 (25%) horses underwent an ultrasound examination. Three (3%) horses underwent nuclear scintigraphic imaging.

Final diagnosis—The most common diagnosis for all team roping horses was signs of pain in the navicular area (36/118 [31%]), followed by signs of pain in the navicular area and distal tarsal joint osteoarthritis (12/118 [10%]) and osteoarthritis of only the distal tarsal joints (10/118 [8%]; **Table 3**). Signs of pain in the navicular area was the diagnosis assigned to horses with pain that was localized to the caudal third of the hoof by use of diagnostic methods such as peripheral or intra-articular diagnostic anesthesia and radiographic examination. This diagnosis was used because signs of pain may arise from any of the ligaments or bony structures in the area of the navicular bone and the exact structure causing pain is not always determined. The most common musculoskeletal problems in horses used for heading were signs of pain in the navicular area only (24/74 [32%]), signs of pain in the navicular area and concurrent osteoarthritis of the distal tarsal joints (10/74 [14%]), soft tissue injury (eg, digital flexor tendonitis [n = 3] and straight distal sesamoidian ligament desmitis [3]) within the pastern region of the limb (6/74 [8%]), and osteoarthritis of the carpus (5/74 [7%]). Although the proportion of horses used for heading that had signs of navicular pain and osteoarthritis of the distal tarsal bones (10/74 [14%]) was greater than that of horses used for heeling (2/44 [5%]), the difference was not significant ($P = 0.21$). More (5/74 [7%]) heading horses had lameness associated with the proximal suspensory ligament than did heeling horses (1/44 [2%]), but the difference was not significant ($P = 0.41$). In horses used for heeling, the most common musculoskeletal problems were signs of pain in the navicular area (12/44 [27%]), osteoarthritis of the MTP joints (6/44 [14%]), osteoarthritis of the distal tarsal joints (4/44 [9%]), and osteoarthritis of the pastern joints (3/44 [7%]). The proportion (6/44) of horses used for heeling that had osteoarthritis in the MTP joints was significantly ($P = 0.010$) greater than that of horses used for heading (1/74 [1%]; Table 3).

Treatment—Ninety-two of 118 (78%) horses received treatment at TAMU. Shoeing recommendations as part of the treatment regimen were prescribed for 52 horses. Twenty-eight of 118 (24%) horses were reshod by the hospital farrier on the day of examination. The shoeing recommendations included application of a wedged-heel horseshoe (23/52 [44%]), a rocker toe, wide-web horseshoe[e] (7/52 [13%]), a half-round horseshoe (3/52 [6%]), a steel rim shoe (3/52), and a bar shoe (4/52 [8%]).

An extended period of stall confinement or limitation of exercise to a small-area turnout was recommended in 38 of the 118 (32%) horses. The duration of exercise limitation that was recommended varied depending on the type of musculoskeletal injury. Oral administration of phenylbutazone was recommended as complete or adjunctive treatment in 97 (82%) horses. The amount and duration of treatment varied between clinicians and the type and severity of the musculoskeletal problem. Intramuscular administration of polysulfated glycosaminoglycan was recommended in 15 (13%) horses, and IV administration of sodium hyaluronate was prescribed in 8 (7%) horses.

Intra-articular medication was administered in 90 of the 118 (76%) horses. Ninety horses received intra-articular treatment with corticosteroids (triamcinolone[g] or methylprednisolone[h]) plus 125 mg of amikacin,[i] and 77 (65%) horses received intra-articular treatment with sodium hyaluronate plus cortisone and amikacin. The most common sites treated via intrasynovial injection were the distal interphalangeal joint (51/118 [43%] horses), distal tarsal joints (29/118 [25%]), digital flexor tendon or tendon sheath (13/118 [11%]), and the MCP joint (9/118 [8%]). Other sites that were medicated included the carpal joints, stifle joint, pastern joint, and the navicular bursa. The proportion of horses that received medication of the distal interphalangeal joint was significantly ($P = 0.05$) greater in horses used for heading (37/74 [50%]), compared with horses used for heeling (14/74 [19%]).

Discussion

All horses in this study were Quarter Horses. The breed is known for athletic attributes that include the capacity for quick acceleration over short distances and the ability to work cattle. Median age of the study horses was 11 years, and 93% were geldings. This age is similar to that reported in studies[4,15] of horses trained for English performance events (ie, jumping, hunting, and eventing), in which the horses had a mean ± SD age of 9 ± 3 years. This is useful information for equine practitioners because many of the musculoskeletal problems sustained by middle-aged horses are caused by repetitive-type injuries such as osteoarthritis.[12]

Median duration that lameness or poor performance had been present before evaluation at TAMU was approximately 2 months. This delay could be attributed to the roper's competition schedule or failure

to recognize lameness but was most likely attributable to the fact that the types of musculoskeletal problems most commonly diagnosed were associated with underlying osteoarthritis, and such lameness may be subtle initially and become more evident with time and increased use. Twenty-five percent of the horses were evaluated at TAMU because of owner complaint that the horse had behavioral problems rather than lameness. Of these horses, all but 4 had lameness at the time of examination. Failure of the rider to detect lameness may also be influenced by the fact that roping usually takes place in a dirt or sand arena, where subtle lameness may not be apparent, compared with the hard surface used to examine horses with musculoskeletal problems at the hospital. Published subjective reports[9-12,16] from veterinarians that work with Western performance horses, including team roping horses, suggest that behavioral problems in these highly trained, middle-aged horses are often indicative of musculoskeletal pain. In our study, the most common behavioral change reported by owners of horses used for heading was that the horse quit pulling the steer or lunged off-course across the arena while pulling the steer, which are the same changes observed by veterinarians in a previous report.[12] In our study, more horses used for heeling were examined because of behavioral problems, compared with heading horses. These problems were described by owners as a reluctance to stop or stopping incorrectly when the steer's feet had been roped. The type of abrupt stops executed by these horses requires exertion and directs a great deal of strain into the hind limbs.[9-12,16] Osteoarthritis of the distal tarsal joints was a frequent musculoskeletal problem seen in horses used for heeling in our study.

Among the team roping horses evaluated by the lameness service, the proportion of horses evaluated for lameness or poor performance was significantly greater for horses used for heading than would have been expected by chance alone. This may be because of differences in horse conformation or size or variations in the type of activity performed. Heading horses are generally larger in size and heavily muscled, traits that enable them to pull the steer across the arena. They also must run faster than heel horses to catch the steer at the beginning of the run. Typical heel horses are smaller in size and are selected for their quickness and ability to stop abruptly after the steer's feet are roped. It is possible that the activity performed by a heading horse creates more strain on the lower portions of the limbs, compared with the musculoskeletal stresses that occur in horses used for heeling. It is also possible that the increased body weight in horses used for heading may increase the likelihood of lameness in the lower portion of the limbs. Horses with large body mass and small hoof size may be at risk of developing navicular disease[17]; however, this finding was not noted in the medical records of heading horses in our study. In the authors' opinion, horse weight alone was probably not responsible for the right forelimb and bilateral forelimb lameness seen in the horses used for heading in this study. If horse weight alone was responsible for forelimb lameness or navicular-area signs of pain, these problems would be expected to be more common in large horses, such as horses of draft breeds, but lameness resulting from navicular disease is uncommon in those breeds.[17] It is also possible that the weight of the steer that the heading horse must pull is a risk factor for lameness. Further investigation is needed to determine whether horse weight, steer weight, or activity performed is associated with the increased frequency of forelimb problems seen in the horses used for heading.

Findings from a report[12] of clinical impressions of veterinarians working with team roping horses suggest that steel-rim or rocker-toe horseshoes are frequently used in the shoeing of team roping horses; however, in the present study, 51% of horses wore a flat steel horseshoe, 24% wore a rim shoe, and 3% wore a rocker-toe horseshoe. It is possible that certain types of shoes worn by the overall population of team roping horses help prevent lameness problems, but that these horses were underrepresented in the present study, which evaluated only lame horses. Reports based on systematically collected data pertaining to the types of horseshoes worn by horses in Western performance events are rare in the literature. A relationship between the type of horseshoe worn and risk of musculoskeletal injuries has been revealed in studies[18,19] of Thoroughbred racehorses. Findings from those studies revealed that horses shod with a higher heel angle were less likely to sustain a musculoskeletal injury and earned significantly more money than horses with lower heel angles[19] and that increasing the height of toe grabs was associated with increased risk for catastrophic injury. Similar studies are needed for English and Western equine performance activities.

The records of 73 horses included information regarding hoof conformation. Mismatched front feet were observed in 25 of 73 (34%) horses. This condition had a prevalence of 56% in a group of 25 horses with pain in the navicular area in a previous study.[20] In horses of this report, 78 of 103 (76%) had synovial effusion in at least 1 MCP joint, yet only 7 horses (7%) had lameness involving the MCP joint. Thirty-six of 103 (35%) horses had synovial effusion in the hind limb digital flexor tendon sheath, but few (4%) had lameness associated with the tendon sheath. These findings suggest that the presence of synovial effusion in the MCP joint or hind limb digital flexor tendon sheath is not correlated with lameness, in that site in horses used for team roping.

Many horses had a painful response when hoof testers were used to create pressure over the central aspect of the frog, which overlies the navicular bone. This finding is not surprising because 41% of horses in the present study had a diagnosis of signs of pain in the navicular area. In a recent study,[20] 21 of 25 (84%) horses with navicular disease had a painful response to hoof-tester pressure applied over the central region of the frog. Evaluation with hoof testers is useful when used in conjunction with peripheral anesthesia and other diagnostic tests to identify the specific site of injury within the hoof capsule. Turner[21] demonstrated that only 45% of horses with signs of navicular pain had a positive response to hoof testers. Hoof conformation, severity of disease, and hardness of sole are likely factors that affect response to hoof testers and vary from horse to horse; therefore, this test is used in

combination with other diagnostic tests in the localization of lameness.

A significantly greater proportion of horses used for heading had right forelimb lameness, compared with heeling horses, a finding previously reported[11,12] in team roping horses. As the heading horse sets the steer and initiates the 90° turn to the left, the right front limb is extended cranially and laterally in the process of decelerating and bracing against the forward momentum and weight of the steer. In this action, structures of the right forelimb incur a tremendous amount of weight and strain. These actions and forces may explain the increased frequency of right forelimb problems in horses used for heading. Horses used for heeling had more left forelimb lameness, compared with the right forelimb, and had a significantly greater frequency of hind limb lameness, compared with horses used for heading. As the heading horse turns the steer to the left, the heel horse must also change directions while galloping, turning quickly to the left to position the roper near the steer's left hip. After the rope is thrown, the horse executes an abrupt stop. These actions and forces may account for the higher frequency of left forelimb involvement in horses used for heeling and may also direct musculoskeletal stresses into the hind limbs. Bilateral forelimb lameness was more common in heading horses than in heeling horses, and bilateral hind limb lameness was more common in heeling horses than in heading horses. Thus, the findings in this study suggest that the limbs of team roping horses affected by lameness appear to be associated with the type of primary activity.

The finding that signs of pain in the navicular area was the most frequent diagnosis made in both heading and heeling horses was not surprising because all horses were Quarter Horses, a breed with a high prevalence of navicular disease.[17,20] Osteoarthritis of the distal tarsal joints was also observed frequently in the horses of this study, in both heading and heeling horses. Osteoarthritis of the distal intertarsal joints is the most common hind limb musculoskeletal problem diagnosed in middle-aged horses that perform English or Western performance activities.[4,16,22] Horses used for heeling had a higher frequency of osteoarthritis in the MTP joints of the forelimbs, compared with heading horses, a finding that may be associated with repetitive abrupt stops.

The frequency of certain types of musculoskeletal injuries in team roping horses in this study differed from that reported in other studies.[11,12] In previous reports, clinical impressions of veterinarians working with team roping horses in the setting of private equine practice are described. It is possible that clinical impressions are somewhat subjective in nature, may be unintentionally biased, and are therefore less accurate than systematically collected data. Also, the prevalence of musculoskeletal injuries in the horses that were examined at this university referral hospital may differ from what would be encountered in a general equine practice. The frequency distribution of specific musculoskeletal injuries seen in team roping horses in our study may have been different if a larger sample of horses was studied.

a. Bray K, United States Team Roping Cowboys, Stephenville, Tex: Personal communication, 2003.
b. Epi-Info, CDC, Atlanta, Ga.
c. Adequan, Luitpold Pharm Inc, Shirley, NY.
d. IV Legend, Bayer Corp, Virginia Beach, Va.
e. Natural Balance Horseshoe, Equine Digital Support System, Penrose, Colo.
f. Half-round horseshoe, C & M Horseshoes, Conroe, Tex.
g. Triamcinolone, Fort Dodge Animal Health, Fort Dodge, Iowa.
h. Methylprednisolone, Pharmacia & Upjohn, Kalamazoo, Mich.
i. Aminoglyde, Fort Dodge Animal Health, Fort Dodge, Iowa.

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