Racehorse Topics

BY ERICA LARSON AND STACEY OKE, DVM, MSC

Fatality Rates and Track Surfaces
The horse racing industry is continuously working to make the sport safer for all parties involved, and in 2008, the California Horse Racing Board (CHRB) mandated the use of synthetic track in an attempt to reduce the number of catastrophic injuries that took place on California racing surfaces. To see if the switch was a success, Rick Arthur, DVM, the equine medical director of the California Horse Racing Board, undertook a retrospective study to compare the rates of catastrophic musculoskeletal injury (CMIs) on dirt, turf, and synthetic surfaces at the four major California racetracks (Hollywood Park, Del Mar, Santa Anita, and Golden Gate Fields) from Jan. 1, 2004 to Dec. 31, 2009.

After three years of racing in which California tracks saw a 40% increase in equine fatalities, the CHRB made the decision to mandate synthetic track surfaces for all tracks that featured more than 30 consecutive days of racing in one calendar year, effective Jan. 1, 2008. The decision came after Turfway Park in Florence, Ky., made the switch from dirt to synthetic in 2005 and saw an 85% reduction in the number of catastrophic injuries on the track.

According to Arthur, all horses that die within the racing enclosure at CHRB tracks must undergo a necropsy. He reviewed all of the necropsy reports over the six-year period to obtain his results. Arthur pointed out that he did not include several of the necropsy reports in his study, as they were not related to the track surface. The excluded fatalities were listed by track surface and included starting gate accidents, sudden deaths (such as cardiac events), and other accidents.

Hollywood Park was the first to install the synthetic track in late 2006; the other three tracks followed suit in 2007. From the beginning of the study until the synthetic surfaces were installed on the main tracks, California had a combined rate of 3.09 catastrophic injuries per 1,000 starts, or 181 fatalities out of 58,659 starts, on the dirt tracks.

After the change from dirt to synthetic, the four major tracks in California had a combined fatality rate of 1.95 deaths per 1,000 starts, or 109 fatalities out of 56,031 starts.

The turf courses at the four tracks held a combined fatality rate of 2.44 catastrophic injuries per 1,000 starts, or 89 fatalities out of 36,500 starts. There was no significance difference between 2004-2006 turf fatality rates (2.37 fatalities per 1,000 starts) when the main tracks were dirt and 2007-2009 (2.50 fatalities per 1,000 starts) when the main tracks were synthetic.

However, Arthur also discussed a general nationwide trend that after the changeover and initial reduction in catastrophic injuries sustained on the synthetic track, there tends to be a slight and gradual rise in the number of fatalities. He attributes this to the synthetic material wearing out very quickly and difficulty in maintaining synthetic tracks.

“Turf is a novel technology,” he said. “It’s very difficult and expensive to maintain a synthetic surface, and it also sees a very high volume of horses working and training on the surface.”

Arthur said that he would like continue studying the effects of racing surface on musculoskeletal injuries by finding more data on nonfatal racing injuries and also on injuries that occur in training. Also, he is hoping to make further correlations with a horse’s veterinary history and past track performance, and weather, track composition, and track maintenance.

X Ray Abnormalities in 2-Year-Olds
In the first study of its kind performed on 2-year-old Thoroughbred racehorses, Daniel T. Meagher, DVM, MS, Dipl. ACVS, of Valley Equine Associates, in Ranson, W.Va., set out to determine the prevalence of radiographic lesions and their effect on race performance. A similar study was previously carried out on radiographic abnormalities in yearlings, but Meagher’s study was the first to examine the prevalence of abnormalities in 2-year-olds and what effect those had on their racing careers.

Meagher presented the current study in which he and his colleagues examined carpal, fetlock, stifle, and hock radiographs associated with 2-year-olds in training sales from 1997 to 2001 in Barretts Equine Limited’s repository. Barretts, a Thoroughbred auction company based in Pomona, Calif., gave Meagher access to these radiographs for the research.

Of the 953 sets of radiographs examined, 69% (654 horses) had no evidence of lesions and served as controls, and the remaining 31% (299 horses) with lesions were considered cases. Meagher noted that 63% of the case horses were male, and that 11 horses had lesions in more than one region (in both the knee and the fetlock, for example).

Meagher’s findings revealed that the case horses were statistically less likely to start a race or earn money. “Eighty-six percent of (case) horses raced, while 91% of control horses raced,” he said.
The researchers revealed that lesions in the fetlock area were most common, with approximately 40% of the case studies (121 horses) showing such lesions. Meagher noted the most drastic difference in performance between case and control horses involved horses with a forelimb proximal P1 chip fracture (a chip in the upper portion of the long pastern bone)—a less commonly found, but still significant, lesion.

“A study examining the effects of arthroscopic removal of P1 chips in racehorses shows that the prognosis is favorable following removal,” he observed. “Therefore, the assumption is that proximal P1 chips are not a big deal on pre-sale radiographs, and this (information) may refute some of that dogma.

“However, caution must be taken in interpreting these results, as no knowledge of pre- or post-sale surgery was known,” he advised.

**Catastrophic Injuries: Thoroughbreds vs. Quarter Horses**

In the Midwest there are several racetracks—featuring both Thoroughbred and Quarter Horse racing—that sometimes slide under the radar of the mainstream racing community. But like all other tracks around the nation, these venues see wins, losses, and, unfortunately, catastrophic musculoskeletal injuries. Andrea L. Beisser, BA, of Iowa State University, and her colleagues analyzed the circumstances surrounding catastrophic musculoskeletal injury (CMI) at three tracks in these regions.

Beisser and her team evaluated a wide range of variables in order to obtain the most complete data set possible from Prairie Meadows in Iowa, The Woodlands in Kansas, and Remington Park in Oklahoma. They found that the average CMI rate of the three tracks was 1.46 fatalities per 1,000 starts. The average CMI count for Thoroughbreds was 1.48 per 1,000 starts, and Quarter Horses averaged 1.36 CMIs per 1,000 starts. Individually, all three tracks delivered similar results. Only dirt tracks were used in the study.

Beisser’s team found that at the Midwestern tracks the highest frequency of Thoroughbred CMIs occurred in claiming races, while the majority of Quarter Horse CMIs happened in stakes or handicap races.

The average distance a Thoroughbred ran before sustaining a CMI was six furlongs, while the average distance a Quarter Horse ran was just 350 yards. Beisser explained that the difference in distance covered was likely due to the fact that Thoroughbreds generally run longer races than Quarter Horses do.

Additionally, the most common location of CMIs in Thoroughbreds was in the left forelimb, with nearly 57% of injuries occurring in that leg. Quarter Horses, however, saw 60% of CMIs in the right forelimb. Both Thoroughbreds and Quarter Horses travel the same direction during races.

**Humerus Stress and Track Surface**

How much impact does a racing surface have on the horse’s body and which parts are stressed most during work? According to Abigail N. Dimock, DVM, MS, of the University of California, Davis, who in collaboration with Kurt Hoffman, DVM, and other colleagues completed a study on the subject recently, track surface has more of an impact on bone stress than was initially thought.

Dimock discussed the study in which the team examined nuclear scintigraphy images of 930 Thoroughbred racehorses in order to determine whether areas of remodeling in the humerus (the bone located between the shoulder and elbow joints) changed when dirt tracks in California were transitioned to synthetic surfaces. The horses raced at three California racetracks (Del Mar, Hollywood Park, and Santa Anita) and the images were collected from Sept. 1, 2005, to July 1, 2009. Although she has no definite history on the horses, Dimock presumes that the horses were scanned after being presented for lameness. The synthetic track was represented by 541 horses and dirt tracks were represented by 389.

In the study a reader (who had no knowledge of which surface the horses raced on) evaluated the scintigraphy scans, rating the severity of humerus lesions as mild, moderate, or severe, and also noting the location of each lesion.

In total, 166 horses from both groups had lesions (characterized by abnormal uptake in the scintigraphy images) in the humerus. Of those, 57 had bilateral abnormal uptake (areas of stress in both humeri). The blinded reader rated 138 of the lesions as mild, 62 as moderate, and 31 lesions as severe. Dimock noted that neither the injury rate nor lesion severity was significantly different between the two surfaces.

Dimock noted, however, that the locations of the lesions on the humerus

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DR. DANIEL T. MEAGHER

The most common type of CMI reported in Thoroughbreds was a sesamoid (small bones behind the fetlock) fracture; such fractures were the cause of nearly 39% of the fatalities reported. Beisser added that humeral (forearm bone) fractures were overrepresented in Quarter Horses.

Beisser reported that when she and her colleagues compared 3- and 4-year-old Thoroughbreds, the 4-year-old Thoroughbreds were twice as likely to sustain a CMI. Additionally, she stated that the sex of the horse was not a significant factor in the study.

Beisser relayed that the Quarter Horse population of the study was small, so results should be interpreted with caution.

“The differences identified between Thoroughbred and Quarter Horse CMIs should allow regulatory veterinarians at mixed meets to focus the evaluations on horses and anatomical regions at greatest risk,” Beisser wrote in the study.

“Racing in smaller Midwest jurisdictions has similar injury rates to larger jurisdictions,” said Scott McClure, DVM, PhD, Dipl. ACVS, assistant professor in the department of clinical sciences at Iowa State and one of the co-authors on the study. “When we are pursuing further work in this area, we may want to consider the differences between Thoroughbreds and Quarter Horses.”
differed drastically between horses running on dirt and synthetic tracks. She found that horses that ran on synthetic surfaces had a much higher likelihood of developing a lesion in the distal (or lower) humerus, while the proximal (or upper) region was more common in horses that ran on dirt.

“The study confirmed that the lesion location changed with the change in track surface,” Dimock said.

It is unclear why the location of lesions changed with the change in track surface, she added.

“Continued monitoring is necessary to determine whether this change is associated with a change in the configuration of stress remodeling in other bones or the incidence of catastrophic fractures,” Dimock wrote.

**Equine Scapular Fractures: Incidence in Racehorses**

About 2% and 6% of all racetrack fatalities in Thoroughbreds and Quarter Horses, respectively, are the result of scapular (shoulder blade) fractures, according to Stuart A. Vallance, BVSc (Hons), who, with Susan Stover, DVM, PhD, Dipl. ACVS, and a research team at UC Davis’ JD Wheat Veterinary Orthopedic Research Laboratory, has investigated the risk factors for this fracture so prevention strategies can be developed.

Vallance and his colleagues examined the necropsy reports of 73 Thoroughbreds and 28 Quarter Horses, as reported by the California Horse Racing Board postmortem program. These animals were euthanized after suffering scapular fractures on a racing surface between 1990 and 2008.

The team discovered, through visual and CT examinations, that fractured scapulas showed signs of stress fractures that resulted in a region of weakness within the bone. Such weakness can predispose the bone to complete fracture when a horse is racing or working at high speed.

They reported that when the exercise histories were compared to those of live matched control horses, Thoroughbreds and Quarter Horses sustaining scapular fractures had fewer races and works, fewer days in active training, less total distance schooled, and longer layup periods.

“We also found that females were underrepresented in this study,” Vallance said, indicating that males were more likely to sustain a scapula fracture. Additionally, Thoroughbred and Quarter Horse racehorses with scapular fractures were more likely to be 2 years old or 5 years old or more when compared to the racetrack population. The team also noted that the fractures occurred most commonly in the right forelimb.

Quarter Horses sustained most of their scapular fractures while racing, whereas Thoroughbreds sustained most of their fractures while training. The majority of the scapular fracture-related deaths during races occurred in claiming races, with many of them being the horse’s first (maiden) race.

The team also reported that while Quarter Horses were more likely to sustain a scapular fracture than Thoroughbreds, the Quarter Horse racing population had a 50% lower incidence of musculoskeletal deaths when researchers considered all fracture types and fatalities.

Vallance believes that scapula fractures are a preventable hazard of racing that can be identified on lameness examination or via nuclear scintigraphy or ultrasound prior to catastrophic fracture.

“Unfortunately, we do not know at this stage why horses with a scapular fracture are not keeping up with the rest of the training cohort,” Vallance said. “But it is interesting that the two breeds that have very different race distances are suffering the same fracture.”

This study was supported by the Center for Equine Health through a gift from the Patterson Foundation of St. Paul, Minn., and the Dolly Green Foundation Endowment, and made possible by the California Horse Racing Board Postmortem Program conducted through the California Animal Health and Food Safety Laboratory System, UC Davis.

**Bone Chips in the Knee and Racing Potential**

Before purchasing a yearling it’s important to review his health records to ensure he is healthy and sound enough for a successful racing career. Jennifer L. Higgins, DVM, gave potential buyers insight into specific lesions that could reduce a horse’s career earnings when she presented a retrospective study on the subject.

Higgins, an associate veterinarian at Northern Lakes Veterinary Hospital in Ashland, N.H., completed the study with a team from Rood & Riddle Equine Hospital in Lexington, Ky., when she was an ambulatory intern. The team reviewed more than 5,000 radiographs of Thoroughbred yearlings offered for public sale from 2004 to 2007. They examined bone fragments located in the backs of the horses’ knees on the articular joint surfaces of the accessory carpal bone that were previously considered to be mild problems, hoping to determine whether these fragments affected racing prognosis.

The researchers narrowed their focus to 45 yearlings that met their inclusion criteria. Of these 45 case studies, 23 horses had lesions in the left knee, 19 in the right, and three had lesions in both knees. Due to the retrospective nature of the study, there was no way of knowing how or when the horses sustained the lesions.

They then pulled complete race records on the 45 horses, mainly focusing on the number of starts, earnings per start, and career earnings.

“We compared these records to those of (siblings on) their dam’s side,” Higgins said. The comparison with the maternal siblings allowed the researchers to have controls in the study.

Higgins and colleagues revealed that the lesions in the accessory carpal bones didn’t have an effect on the number of starts the study horses made, but they had an appreciable effect on career earnings.

“Both the study horses and their siblings made it to race,” Higgins said. “But the study horses made significantly less money per start than the siblings during their 2- and 3-year-old campaigns.”

Higgins noted that the siblings made roughly, on average, $1,500 more per start over their 2- and 3-year-old campaigns than did the case horses. Subsequently, the siblings had higher career earnings than the study horses.

Higgins did point out that the small study size may have impacted the results. She added that there was no way of knowing how long fragments had been in joints at the time the radiographs were taken, so it was unclear if fragment chronicity impacted the results.

“Racing is complex and outcomes are influenced by multiple factors,” Higgins said. But, she added, in this study bone fragments of the accessory carpal bone had a significant negative impact on racing performance.
Surgical Methods of Correcting Angular Limb Deformities

Angular limb deformities (ALDs) of the carpus (knee) are a common problem in foals and yearlings, and researchers have narrowed the surgical treatment options down to the two that present the best results. Eric R. Carlson, DVM, an equine surgery resident at the University of Illinois’ Veterinary Teaching Hospital, gave a presentation on these options.

“ALDs are important because they affect how weight bearing is transferred through the lower limb, and they can have negative effects on performance and on sale value,” said Carlson.

When one side of the limb grows faster from the growth plate than the other, an ALD arises. If the lateral aspect (outside) of the limb grows faster than the medial aspect (inside), then the limb deviates inward and is called a varus deformity. In contrast, a valgus deformity is caused by the medial aspect of the limb growing faster, causing the limb to deviate outward away from the midline.

The two standout surgical correction techniques that Carlson discussed were the screw and wire or the single transphyseal screw (STS) technique.

“The screw and wire technique works by placing a screw above and below the growth plate that is growing too quickly and using a wire to tighten the growth plate to slow the rate of growth,” said Carlson.

The STS technique uses a similar principle, but the screw is placed directly through the growth plate to slow the rate of growth and straighten the foal’s limb.

To determine if one technique is better than the other, Carlson and colleagues reviewed the medical records of 568 Thoroughbred foals admitted to Rood & Riddle Equine Hospital, in Lexington, Ky., that were treated with either screws and wires (253 foals) or an STS (315 foals).

Key findings of the study:
- Lateral placement of the screws and/or wire for treatment of carpal varus was most common;
- Surgeons left STS in place for a shorter period of time than the screws and wire; and
- Complications such as inflammation of the growth plate (physitis) post-treatment and metaphyseal collapse (a collapse of the area between the growth plate and the shaft of the bone) were significantly more common in foals treated with STS than with screws and wires.

“Both treatment options are viable for management of ALDs in yearlings,” noted Scott Hopper, DVM, MS, Dipl. ACVS, of Rood & Riddle, and co-author on the study. “The primary benefit to using the screw and wire method is the decreased chance of physitis or metaphyseal collapse postoperatively. The primary benefits to using the STS are the ease of implantation and the shorter duration to correction.”

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