Comparison of Racing Fatality Rates on Dirt, Synthetic, and Turf at Four California Racetracks

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Racing fatalities declined 37% after main track dirt racing surfaces at four major California racetracks were converted to synthetic racing surfaces over the period of this study, January 1, 2004 through December 31, 2009. The racing fatality rate was 3.09 fatalities/1,000 starts on dirt before conversion to synthetic surfaces and 1.95 fatalities/1,000 starts after conversion to synthetic racing surfaces. The racing fatality rate on turf was 2.44/1,000 starts over the same 6-yr period. The fatality-rate difference between dirt and synthetic was significant (p < 0.001).

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1. Introduction
In 2006, the California Horse Racing Board (CHRB) mandated synthetic surfaces at California racetracks conducting more than 30 continuous days of Thoroughbred racing in any calendar year after January 1, 2008. The impetus for this action was a 40% increase in racing fatalities at California racetracks between 2003 and 2006 reporting periods and a 85% decrease in racing fatalities at Turfway racetrack in Kentucky after a synthetic surface was installed in 2005 (Beasley R, personal communication).

There were five major racetracks in California that were subject to the CHRB synthetic surface mandate: Bay Meadows, Del Mar, Golden Gate Fields, Hollywood Park, and Santa Anita. One track, Bay Meadows, chose to close rather than meet the racing board’s mandate and was not included in this study. Hollywood Park converted its dirt main track to a synthetic surface in September 2006, Del Mar converted in July 2007, and Golden Gate Fields and Santa Anita converted in September 2007.

2. Materials and Methods
All horses dying within a racing enclosure under the jurisdiction of the CHRB are submitted to necropsy at a California Animal Health and Food Safety Laboratory (CAHFS). CAHFS is a livestock diagnostic laboratory operated by the School of Veterinary Medicine at the University of California at Davis. CHRB records for all fatalities between January 1, 2004 and December 31, 2009 were reviewed for this study. All racing fatalities were identified and classified as occurring on dirt, synthetic, or turf racing surfaces. Racing starts by racetrack and surface were obtained from a commercial source. Fatality rates between surfaces were compared using paired $\chi^2$ analysis.

3. Results
From January 1, 2004 until synthetic surfaces were installed, Del Mar, Golden Gate Fields, Hollywood Park, and Santa Anita had a combined fatality rate on dirt from musculoskeletal injuries of 3.09/1,000 starts (Fig. 1). This totaled 181 racing fatalities.
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The race.

two from starting-gate accidents before the start of exercise induced pulmonary hemorrhage (EIPH) and immediately after the race, including one from excluded; they were three sudden deaths during or otherwise unrelated to track surfaces were excluded. Fatalities that were clearly accidents or otherwise unrelated to track surfaces were used to exclude racing fatalities on synthetic compared with dirt surfaces. The same criteria were used to exclude racing fatalities on synthetic surfaces. Fatalities that were clearly accidents or otherwise unrelated to track surfaces were excluded. For synthetic surfaces, there were five fatalities excluded; they were three sudden deaths during or immediately after the race, including one from exercise induced pulmonary hemorrhage (EIPH) and two from starting-gate accidents before the start of the race.

After conversion of their main tracks to synthetic surfaces, Del Mar, Golden Gate Fields, Hollywood Park, and Santa Anita have had a combined racing fatality rate of 1.95/1,000 (Fig. 1). There were 109 fatalities from 56,031 starts on synthetic surfaces over 21 race meets, a 37% reduction in racing fatality rate on the main track for synthetic surfaces compared with dirt surfaces. The same criteria were used to exclude racing fatalities on synthetic surfaces. Fatalities that were clearly accidents or otherwise unrelated to track surfaces were excluded. For synthetic surfaces, there were five fatalities excluded; they were three sudden deaths during or immediately after the race, including one from exercise induced pulmonary hemorrhage (EIPH) and two from starting-gate accidents before the start of the race.

Turf has been considered a safer racing surface than either dirt or synthetic surfaces. That was not the case in California during the 6 yr of this study. Racing fatality rates on turf in California fall between dirt and synthetic track surfaces. Turf-racing fatalities were 2.44/1,000 starts (Fig. 1). There were 89 racing fatalities from 36,486 turf starts during the 6-yr study period. The same criteria were used to exclude fatalities that were clearly accidents or otherwise unrelated to track surface. For turf surfaces, there were three fatalities excluded: one sudden death immediately after racing and two fatal accidents, one during the post parade before the race and the other when the horse bolted through the inside rail during the race.

The data were analyzed using paired \( \chi^2 \) analysis. There was a significant difference in fatality rates between synthetic and dirt surfaces \( p < 0.001; \) relative risk (RR) = 1.59; 95% confidence interval [CI] = 1.25–2.01). There was no significant difference between turf and synthetic \( p = 0.011; \) RR = 1.25; 95% CI = 0.95–1.66) or turf and dirt surfaces \( p = 0.07; \) RR = 1.26; 95% CI = 0.98–1.63)

4. Discussion

Despite the 37% reduction in racing fatalities, the use of synthetic surfaces in California and elsewhere in North America remains controversial. There are a number of reasons for this. Many traditionalists simply oppose the change. Horse of the Year Rachel Alexandra passed the Breeder’s Cup ostensibly because her owner, Jess Jackson, objected to racing her on a synthetic surface. Other prominent owners and trainers similarly oppose abandoning dirt surfaces. Influential members of the American racing press opposed the change to synthetic surfaces from the very beginning. Most members of the American racing press are professional gamblers. The common perception is that horses do not run to their dirt form on synthetics, and turf horses suddenly became factors in synthetic races. Furthermore, many handicapping services in the United States are based on speed ratings, which are perceived as less useful on synthetic surfaces. This has greatly complicated handicapping and caused frustration among the wagering public. For example, the Pacific Classic, previously one of America’s premier Grade I dirt races, was won by Go Between after the conversion to synthetics. Go Between is a horse that had never raced on dirt and was considered a pure turf horse until synthetic tracks were introduced. For the same reason, the 2008 and 2009 Breeder’s Cup during the Oak Tree meet on Santa Anita’s synthetic surface encouraged many Europeans to compete with their turf runners.

Just as important, synthetic surfaces have proven to be terribly inconsistent and difficult to maintain for racing and training. Sunlight and temperature fluctuations have become important to track-maintenance procedures. Neither of these were factors on California dirt surfaces. Developed for international racing, synthetic surfaces have not been able to stand up to the heavy-training traffic typical at U. S. racetracks. Santa Anita, Hollywood Park, and Del Mar can easily have 1,500 or more horses train each day on their synthetic tracks before afternoon racing. The waxes or polymers dissipate more quickly than expected, and the fiber materials break down under the heavy usage and require maintenance procedures.

There have also been installation and design snafus such as at Santa Anita. Problems with improper materials and construction caused closure of Santa Anita for over 1 wk because of drainage problems. In the first 75 yr of racing, Santa Anita lost 4 days of racing to inclement weather on their dirt track; 14 days have been lost at Santa Anita since the synthetic surface was installed. Dirt surfaces are graded to drain horizontally; synthetic tracks...
are designed to drain vertically, requiring below-surface drainage systems. Contrary to manufacturer assurances, all the California synthetic tracks have required constant maintenance and refurbishment. Synthetic surfaces are primarily sand-coated with a wax or polymer and mixed with various fiber materials. The waxes and polymers content changes dramatically over time, and the fiber materials breakdown or are otherwise lost. When constructed, all materials are thoroughly mixed together before they are put onto the track. Refurbishment in situ has proven more difficult. Uniformly mixing in added wax, polymer, or fiber with the material already in place has been difficult, time consuming, and ineffective. Many times, the refurbishment process has caused major changes in track-surface properties, disrupting training schedules and causing problems for track management because of marked changes in the surfaces after refurbishment.

Everyday maintenance has proven just as difficult and is often more intensive than for dirt. The synthetic surfaces were marketed as nearly maintenance-free. That is far from the case. Special equipment and maintenance procedures have been required. Some tracks require considerable water-in rather than being water-free, as expected. Track superintendents have had to develop new maintenance techniques in an effort to keep tracks consistent for the heavy use on California tracks.

Although racing fatalities have decreased, many trainers are convinced that synthetic surfaces are associated with an increased incidence of long-term non-fatal injuries and an increase in hindlimb injuries. Unlike the decrease in racing fatalities, there does not seem to be a similar decrease in training fatalities on California’s synthetic tracks. Efforts are underway to better evaluate the non-fatal-injury issue, but all objective parameters examined to date, including number of surgeries, ultrasound and radiographic examinations, nuclear scintigraphic examinations, and horses not finishing their races, have all failed to support that synthetic tracks result in increased long-term non–fatal-injury rates. Veterinarians and trainers report that synthetic surfaces are associated with a different menu of injuries than seen on dirt. This would not be surprising; many surgeons have reported a drop off in arthroscopic surgeries on synthetic tracks. Efforts are underway to objectively evaluate racing-injury distribution on synthetic surfaces and compare those with historical records.

Synthetic-surface opponents have contended that increased scrutiny with prerace examinations and more stringent medication penalties for non-steroidal anti-inflammatory drugs (NSAIDs) explains the significantly lower fatality rates on synthetic surfaces. However, using turf racing as an internal control, there is no difference between fatality rates from 2004 to 2006 (2.37/1,000 starts) and from 2007 to 2009 (2.50/1,000 starts). Numerous factors from shoeing practices to genetics have been identified as possible factors contributing to the high fatality rate seen in U. S. racing. These have been well-discussed at racing-industry forums.

California racetracks have spent millions of U. S. dollars converting to synthetic surfaces, but they have not been the panacea that some had hoped. Although racing fatalities have decreased, there is little confidence that the reduction in racing fatalities can be maintained. The synthetic tracks simply wear out much more quickly than anyone anticipated. The cost of maintenance and refurbishment will very likely prove too much for tracks to bear. Santa Anita, despite two very successful Breeder's Cups at their fall Oak Tree meet, is expected to reinstall a dirt surface at their first opportunity. The current synthetic track, although much safer for racing, has simply brought other problems. Just recently, the Jockey’s Guild has expressed concern over synthetic surfaces after two jockeys were paralyzed with spinal-cord injuries within months of each other this summer after falls while racing on Arlington Park’s synthetic surface. The jockeys contend that the synthetic surfaces do not allow jockeys to slide when they fall as on dirt or turf.

Synthetic surfaces are promising and may very well replace dirt surfaces in the future, but they are a novel technology. More research and development is needed before they can be recommended for the heavy racing and training use at major American racetracks. Some research is just beginning. There is very good evidence that the synthetic surfaces do have lower peak vertical biomechanical properties using an instrumented horseshoe compared with dirt and turf. The experiment in California and elsewhere with synthetic surfaces has stimulated a greater interest in track-surface research on all racing and training surfaces.

Anyone who has seriously examined the high injury rate in U. S. racing has recognized track surface to be just one of many contributing factors. The Jockey Club-sponsored Welfare and Safety Summit addressed numerous issues in examining the high injury rates in American racing. Track surface was just one of the many issues identified as a potential factor. The similarity of turf-racing fatality rates to the fatality rates on dirt and synthetic is contrary to reports outside of North America. Turf racing internationally on the flat is generally well below 1 fatality per 1,000 starts. California turf racing is two times that with over 2 fatalities per 1,000 starts. A reasonable conclusion would be high racing-fatality rates in North America are related to more than just track-surface factors.

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References and Footnotes


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