

Race surface studies for injury prevention

A study funded by the Southern California Equine Foundation enables further knowledge about how race surface characteristics affect injuries in racehorses. Race surface is one of the factors that affect the likelihood of injury in racehorses. Consequently, race surfaces are intensely managed with the goal of preventing racehorse injuries and fatalities. In addition, new race surfaces have been installed (at great expense) with the goal of further reducing the incidence of injuries. The problem is that there is little scientific evidence to guide the selection of race surface materials and management of these materials on the racetrack.

Fetlock injuries are the most common cause of racehorse fatalities. Fetlock injuries include fractures of the cannon, sesamoid, and long pastern bones; and tears of the suspensory ligament. These structures are also commonly injured without causing fatality, but cause reduced athletic performance and racehorse attrition. These injuries not only affect the health of racehorses, but have a huge toll on owners, trainers, and industry economics.

High limb loads and fetlock overextension during high speeds increase the likelihood of injuries. Interaction of the hoof with the race surface affects limb loads and fetlock hyperextension. The nature of the interaction is highly dependent on the mechanical characteristics of the race surface. In general, the harder the surface, the higher the loads transmitted to the hoof, and the higher the forces transmitted up the limb. However, the interaction between the hoof and limb is more complicated. This is the reason that research is needed to understand how different surface properties affect the hoof and limb structures.



Measurements at one racetrack demonstrated that the loads transmitted to the hoof were lower on the synthetic surface than on the dirt and turf surfaces. Hoof accelerations were also lower on the synthetic surface. Results could be different on other racetracks because dirt surfaces and synthetic surfaces can be highly variable between racetracks. However, this demonstrates that designing surface materials and engineering surfaces have the potential to reduce the incidence of injuries.

Researchers at the University of California at Davis are taking a multi-pronged approach (with additional funding from the Grayson Jockey Club Research Foundation and the California Horse Racing Board) to determine the effects of race surface characteristics on hoof loading and fetlock biomechanics. In order to study factors that affect surface performance, the research group is developing instrumentation and a method for reconstructing different surfaces in the laboratory setting. In order to measure hoof and fetlock motions, racehorses galloping at the racetrack are being studied on dirt and synthetic surfaces. Eventually measurements will also be used in computer models to simulate hoof interaction with 'virtual' surfaces to develop standards for optimal surfaces.