

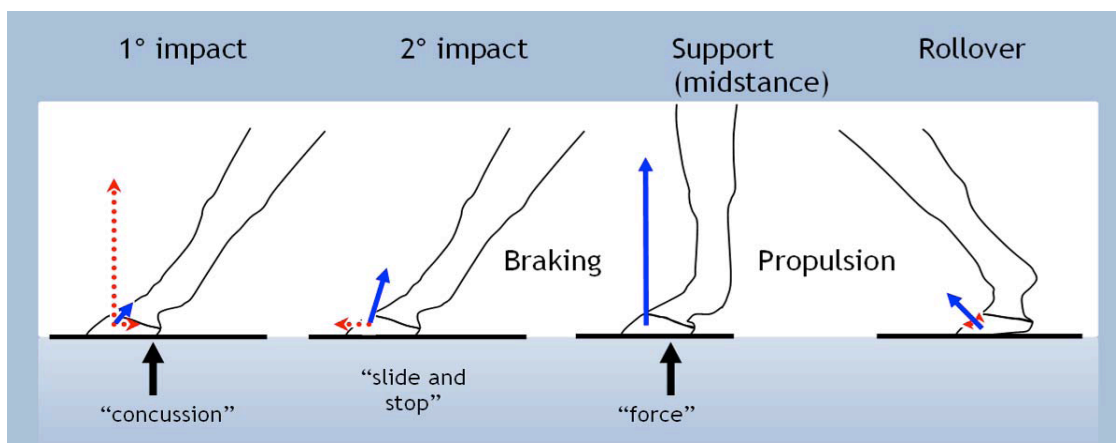
Fun Footing Facts

Chris Pack

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I am pretty excited to write about footing as it has definitely become the single most important aspect of any horse show. Here at Thunderbird Show Park we are in the middle of building another silica ring for the Canadian Premier and BC Open tournaments. The main components are not complex, and when used in combination with the third mat we engineered and produce, not only allows water to fall vertically through the levels into the subterranean drainage, but it also puts a flexing base under the silica that takes dampens shock and stress to the horses' legs.

Dr. Antonio M. Cruz, equine surgeon and lameness specialist, is currently a Board Certified equine surgeon working at Paton and Martin Veterinary Services in Langley, BC. During his tenure at the University of Guelph he had a special interest in investigating catastrophic injuries in horses and ways to prevent them. When a horse lands, ground reaction forces (the forces exerted by the surface upon impact) are transmitted to bone, muscle, tendon and ligament, and if these forces exceed tolerable thresholds, they may result in injury or soreness. Veterinary science cautions that if the thresholds are exceeded repeatedly (for example, during every footfall around a course), the response can be tissue degeneration and breakdown. Dr. Cruz of Paton notes that, "Injuries can occur in two different ways: as a sudden acute event or as the acute manifestation of chronic ongoing injury due to repeated minor overload." Managing the level of forces, and keeping them within tolerable thresholds, is highly affected by footing.



When the horse is in motion, the hoof first meets the surface travelling downward at a high velocity. This initial impact is dependent on the surface's ability to slow down the hoof vertically through the compaction of a loose top layer of cushion. Consequently, an overly "hard" footing can be very problematic for the hoof. But, footing characteristics are most critical in the secondary phase of the footfall: once the motion of the hoof has been slowed or stopped, all the weight of the horse is transferred to the hoof and the harder surface material beneath it. This rate of deceleration controls



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the force that is transferred to the leg, forces that can be as great as two times the bodyweight of the horse. In addition, at the time of secondary impact, the hoof is also decelerating horizontally. Once the hoof is on the surface, the horse's body, which is still in forward motion, tends to push the leg forward causing the hoof to slide and then stop. This combination of vertical and horizontal forces travel up the leg and are absorbed by muscles, bones, tendons, ligaments and joints.

Understanding the relationship of how footing affects a horse's footfall and movement is critical. "If the shear properties allow the foot to slip forward excessively, this action has the possibility of forcing the digital flexor muscles into rapid, unpredicted contraction, which can cause injury. If the foot stops too quickly, it may transmit too much impact to the rest of the system" explains Dr. Cruz. "Of possibly greater consequence," he continues, "a rapid deceleration would exert larger-than-normal bending forces on the cannon bone, which can lead to fracture."

By adapting a surface's mechanical characteristics, the potential for injuries on impact can be reduced. The properties of a surface greatly affect the propulsive phase of a horse's step as well. Too much slippage, or an excessively "soft" surface, can be extremely problematic during this phase, which requires adequate support (resistance) for push-off. During this last phase of the step, Dr. Cruz describes how, "The soil of a soft surface can continue to collapse as the horse tries to push off, resulting in a loss of forward momentum and speed. This increases energy expenditure resulting in muscular fatigue, which taxes ligaments, and is arguably the most important causal factor in show jumping injury."

An appropriate balance of footing characteristics is therefore critical for safety and soundness, but creating and maintaining a suitable surface is extremely challenging. Consequently, top show jumping venues like Thunderbird Show Park have turned to the latest research involving synthetic footing. Finding the perfect footing mix may be a work in progress, but with the new science and testing that has stemmed from the Racing industry, and now through the FEI, we may soon have a means to grade or measure footing 'standards' with data instead of discretion.