In-Shoe Force Measurements Help Farriers Address Hoof Balance

by: Tracy Gantz
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The concept of a balanced foot can be subjective, but farriers are now using technological advances to take some of the guesswork out of the process. Patrick T. Reilly, chief of farrier services at the University of Pennsylvania's New Bolton Center, discussed evaluating hoof balance with in-shoe force measurements.

After volunteering to participate in a study on how the human foot hits the ground, Reilly experimented with using similar technology to measure how the equine foot lands when the horse moves across the ground. Researchers have already used force plates built into floors to measure forces between the shoe and the ground, but Reilly wanted to examine forces between the shoe and the hoof.

"If we put a shoe on, I really want to know what the effect of that shoe is going to be," said Reilly. "How is that going to change the tendencies of the horse to land, to load?"

By cutting an F-scan mobile in-shoe force measuring system (designed to measure forces between foot and footwear**)** to the shape of a horse's hoof and placing it between the hoof and the shoe, Reilly examined what the shoe does to the hoof. In this way, he explained, "We could see what the different shoes were going to do for us. How is an egg-bar shoe going to transmit force to the foot differently than, say, an open-heeled shoe? This could be very important information in the mechanical treatments of problems such as quarter cracks or navicular syndrome."

In one case study, Reilly and his team examined the right front foot of an 18-year-old Quarter Horse mare that was pasture sound. Given her conformation and the way she walked, Reilly and his colleagues expected the center of force to be on the medial (inner) side of the foot at the walk. What they discovered was that she actually put more weight on the lateral (outer) side of the foot while moving.

They also found that horses change the loading patterns on their feet depending on gait. This mare exerted 65% of the force on the medial side and 35% on the lateral side while standing still. At the walk, those percentages reversed to 34% on the medial side and 66% on the lateral side, and at the trot, they evened up to 50-50.

With further tests on different subjects, Reilly was able to examine how a horse's stride alters with a rider aboard. For example, the load on the left and right front feet will change at the trot depending on what diagonal the rider is on (the forces are greater on the sitting side).

This type of testing allows Reilly to experiment with different types of shoeing and observe how they adjust a horse's way of going and the stresses on his feet. The resulting information could prove invaluable not only in approaching farrier care for sound horses, but also for horses with suboptimal conformation or soundness issues.

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Readers are cautioned to seek the advice of a qualified veterinarian before proceeding with any diagnosis, treatment, or therapy.