OBJECTIVE LAMENESS DETECTION IN HORSES

LAMENESS DETECTION CAN be a challenging and sometimes controversial subject among veterinarians, trainers and horse owners. This can become even more complicated in cases that involve subtle lameness, multiple-limb lameness or lameness that only occurs under certain circumstances (under saddle, soft ground vs. hard ground, right vs. left lead, etc.). Studies have demonstrated that agreement, even among experienced equine practitioners, in detecting mild lameness is low. The ability of experts to detect mild lameness using the naked eye is slightly better than tossing a coin. With detection this difficult, bias begins to play an important role, where we think we see what we thought we’d see.

Objective lameness evaluation is unbiased and quantitative and thus interpreting it is largely a numbers game. It involves a method of data collection, data analysis and interpretation of the results. Horses, as well as humans, bear less weight on a limb with the source of pain compared to that of an unaffected limb. This decreases the pain experienced on the affected limb and protects the limb from receiving additional stress or damage. For example, a horse with a right forelimb lameness will bear less weight on the right forelimb versus the left forelimb. Horses can alter the gait to minimize pain by decreasing either the impact on the affected limb or limbs or by decreasing the force of “push off” of the affected limb or limbs. This causes asymmetric torso movement between the right and left sides of the body, which can be measured and recorded objectively. Numerous variables and systems have been used to collect data for objective lameness evaluation. The author is most familiar with the collection of data and interpretation using a body-mounted inertial sensor system called the “Lameness Locator®”, which is marketed and distributed by Equinosis®, a small, faculty-startup company in Missouri, and that system will be the focus of this article.

The Lameness Locator® was developed by equine veterinarians and engineers at the University of Missouri in collaboration with Hiroshima Institute of Technology in Japan and is marketed as a medical device and sold only to veterinarians. This system involves the placement of three sensors on the horse. One sensor is placed on the head, one on the pelvis or rump, and one on the right forelimb pastern. Instrumentation is simple, quick and non-invasive. The sensors on the head and pelvis simply measure up and down movement. The sensor on the right front pastern measures the position of the right forelimb, which is used to determine stride timing. The horse is evaluated at the trot in hand or under saddle and data is sent wirelessly, via a Bluetooth radio connection, to a tablet computer. Following data collection, data analysis and interpretation of the results. Horses, as well as humans, bear less weight on a limb with the source of pain compared to that of an unaffected limb. This decreases the pain experienced on the affected limb and protects the limb from receiving additional stress or damage. For example, a horse with a right forelimb lameness will bear less weight on the right forelimb versus the left forelimb. Horses can alter the gait to minimize pain by decreasing either the impact on the affected limb or limbs or by decreasing the force of “push off” of the affected limb or limbs. This causes asymmetric torso movement between the right and left sides of the body, which can be measured and recorded objectively. Numerous variables and systems have been used to collect data for objective lameness evaluation. The author is most familiar with the collection of data and interpretation using a body-mounted inertial sensor system called the “Lameness Locator®”, which is marketed and distributed by Equinosis®, a small, faculty-startup company in Missouri, and that system will be the focus of this article.

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Simply put, the Lameness Locator® measures the up and down movement of the head, or front half of the body, and compares the up and down movement caused by the right forelimb impact and pushoff to that caused by left forelimb impact and pushoff. Similarly, the up and down movement of the pelvis, or back half of the body, is measured and compared between right hindlimb impact and pushoff and left hindlimb impact and pushoff. As previously discussed, horses with lameness bear less weight on the affected limb or limbs, or pushoff less from the affected limb or limbs. Data is presented to the veterinarian in numerical and graphical formats depicting the presence or absence of lameness, the limb or limbs exhibiting lameness, the severity of the lameness, and the character of the lameness (impact vs. pushoff).

Baseline data collected via the Lameness Locator® is saved and can be used to evaluate the response to blocking or response to flexion tests. The Lameness Locator® can also be used to evaluate the horse while trotting in a circle and can help the veterinarian differentiate compensatory, or false, lameness from primary lameness, which is sometimes a difficult task.

The Lameness Locator® cannot, and is not meant to, replace the equine veterinarian or substitute for traditional lameness evaluation. It is simply a sensitive tool that measures small differences in torso movement caused by lameness, which the veterinarian can use as a diagnostic aid to assist in his/her normal lameness evaluations, especially in the difficult or complicated cases where small asymmetric movements may not be easily seen by simple observation.

VET’S PERSPECTIVE

BY TYLER HOLTMEYER, DVM

Figure 1 – One sensor is attached to the halter or Equinosis® head bumper
Figure 2 – A second sensor is attached on midline of the horse’s pelvis
Figure 3 – A third sensor is placed on the right front pastern
Figure 4 – A detailed report is presented to the veterinarian for interpretation

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