Equine Lameness & Equinosis® Q

DIAGNOSTIC TOOL FOR OBJECTIVE GAIT ASSESSMENT

DEFINITION OF LAMENESS

Lameness is defined as an abnormal gait in which the horse does not travel in a sound and regular manner. Lameness can be the result of a conformational defect, overexertion, neurological disorder, injury, or a disease process affecting the muscle, tendon, and/or bone. Horses are very athletic animals and pain will alter their normal gait. As a result horses are often presented for lameness evaluation because a decrease in performance has been noted, not necessarily because the horse has an obvious limp.

HOW IS LAMENESS DIAGNOSED?

The traditional lameness evaluation is conducted in a systematic 5 step approach:

1. History and Complete Physical Exam.
2. Palpation of the neck, back and hip muscles, tendons; signs of joint effusion; digital pulses, and hoof tester application.
3. Body conformational assessment.
4. Brief Neurologic Exam to rule out the presence of a neurological condition as a cause of lameness.
5. Gait Analysis: Examination of the horse at a walk, trot and/or canter, both in a straight line and circling on a lunge line, ideally over hard and soft surfaces. Sometimes this evaluation is conducted while the horse is being ridden. Flexion tests are used to temporarily exacerbate an obscure condition.

After completion of these steps the use of nerve or joint blocks will likely be necessary to localize the source of pain. Once this has been identified other diagnostics such as radiographs, ultrasound, MRI or CT may be warranted to determine the definitive cause of the lameness.

WHAT TO WATCH DURING THE GAIT ANALYSIS

Commonly, lame horses are evaluated in hand, at the trot and in a straight line. If the horse is going away from us we look at the rear end and when the horses is trotting towards us we focus our attention on the front end.

During the gait analysis the veterinarian looks for changes in the normal gait, for example: decreased length of stride or excessive dropping of the fetlocks. In the sound horse, at the walk, the hind feet should land at or in front of the forelimb footprint, and while moving in a tight circle, should be fluid without abnormal postures like "picking up" the head while being turned (a sign of pain in the fore limbs).

"Down on Sound"

If an animal is LAME IN THE FRONT, the head will go down when the sound limb comes in contact with the ground. If the animal is LAME BEHIND, the head will go down when the lame limb contacts the ground.

"Hip Hike"

When a horse is lame, the pelvis will not rise as high when pushing off of the lame limb, or fall as far landing on the lame limb. "Hip hike" is determine by the total vertical displacement of the tuber coxae during trotting. The side which shows the greatest displacement (hip hike) is the lame limb.

"Lunging"

When horses are lunging, their torso is tilted toward the center of the circle. This creates a potential natural asymmetry in both vertical head and vertical pelvic movement. This asymmetry can be quite dramatic in some horses, even when lameness is not present. Lunging typically exacerbates forelimb lameness and masks hind limb lameness.

LAMENESS GRADING SCORE SYSTEM

There are many lameness grading scores systems. One of the most commonly used is the 0-5 lameness score system developed by the American Association of Equine Practitioners (AAEP) where 0 is sound and 5 describes the non-weight bearing horse. However, this system does not imply severity of the condition, it merely describes where the lameness can be seen i.e. at walk, trot, circles, etc. Severity of the lameness (mild, moderate or severe) is given at the discretion of the veterinarian and therefore is very subjective and highly variable.

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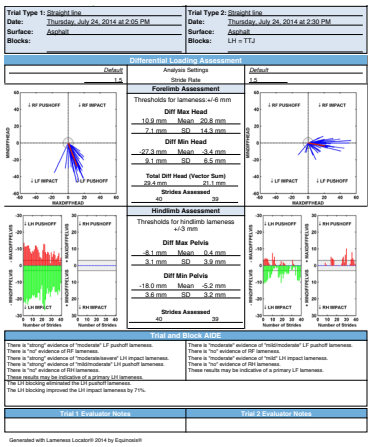
Equine Lameness & Equinosis® Q

EQUINOSIS® Q

Equinosis® Q is a wireless diagnostic tool that utilizes accelerometers and a gyroscope (motion sensors) to objectively quantify how a horse moves through space and bears weight. The data from the motion sensors is transmitted via Bluetooth to a computer program that analyzes the data and detects asymmetries in the gait that may not be detectable to the human eye. [1]

Why use it?

If optical illusions have taught us anything, it is that our eyes are fallible. As a consequence, although the traditional lameness exam has improved over the years, it still relies on our visual subjective measurement of very subtle changes in gait. As a result, even experienced equine veterinarians will differ in opinion on location and severity of a lameness when evaluating the same horse. Furthermore, a decrease in performance does not always correlate to a quantifiable lameness that can be localized with the human eye. [1]



Although Equinosis® Q cannot diagnose a lameness problem independently of a thorough evaluation, it provides an objective assessment of a horse's gait; the system can detect not only asymmetry in the gait, but also objectively interpret worsening or improvement of the gait depending on diagnostic actions such as a flexion test or a nerve or joint block given by the veterinarian. As two added bonuses, the sensors are small and do not hinder the veterinarian's visual evaluation of the horse's gait, providing you with two evaluations at the same time. Finally, the results are stored in a file that can later be compared during reevaluations, objectively assessing the progress of the condition. [1]

How to use it?

After owner and horse information have been entered into the system the three motion sensors are placed on the horse (head, right front pastern and pelvis). The horse is then trotted in a straight line until at least 25 strides are collected to establish a baseline. For lunging trials a minimum of 45-50 strides are collected. These evaluations are done before and after flexion tests, and before and after a nerve or joint block. Once the information is tabulated the system generates a report.

How to interpret the results? [2]

STEP 1: Inspect the ray diagram plots.

a) Is there an accumulation of rays in a particular quadrant?

b) Do the bulk of the rays fall inside or outside of the shaded threshold area?

STEP 2: Inspect the Total Difference Head (Vector Sum or VS)

Total Difference Head is a screening value for the forelimb lameness. It is the equivalent of the length (in mm) of the vector on the forelimb ray plot (Single RED ray). VS > than 8.5 mm is an indicator of forelimb lameness. There is NO Vector Sum for hind limb.

STEP 3: Inspect the Mean Difference Max and Difference Min values with their standard deviations (SDs).

a) Mean Difference Max and Difference Min Forelimb: +/- 6 mm

b) Mean Difference Max and Difference Min Hind Limb: +/- 3 mm

Symmetric (sound) horses tend to have mean Difference Max and Difference Min values within the threshold, with SDs that may be higher than their respective means.

Asymmetric (lame) horses tend to have mean Difference Max and/or Difference Min values outside of the threshold with SDs less than their respective values.

STEP 4: Review the Automated Interpretation and Degree of Evidence (AIDE):

There is "strong" evidence of "severe" LF lameness. There is "no" evidence of RF lameness.

There is "strong" evidence of "mild/moderate" LH lameness. There is "weak" evidence of mild RH lameness.

Use of Equinosis® Q along with the traditional lameness exam allows the veterinarian to more accurately and objectively diagnose the site of the lameness and initiate treatment to return the horse to soundness.

References:

1. http://equinosis.com
2. Quick Guide to Data Collection and Report Interpretation of the Lameness Locator 2/25/2015 LL 2014.1.1

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