



Lameness Locator

by HEATHER SMITH THOMAS

Pinpointing the source of lameness in horses is an art as well as a science. Equine veterinarians rely on visual assessment of the horse's movement during a lameness examination, yet the human eye is limited to what it can detect. It cannot pick up small changes in movement between two points in time; the sampling frequency of the human eye is only about 20 to 25 times per second. Now our assessment of gait asymmetry can be augmented with use of transmitted data from body-mounted wireless inertial sensors that can sample at 200 times per second.

This new tool is called the Lameness Locator™ and it improves our ability to detect and quantify lameness. It was developed after 17 years of research at the University of Missouri, and became available to veterinarians in 2009. Before it came on the market, several university clinics and veterinarians obtained these units and helped collect data for ongoing lameness studies.

One of these units is used by Duncan Peters, DVM (Hagyard Equine Medical Institute, Lexington, Kentucky). "It won't replace the practitioner because it cannot tell you what structure is involved, but it will be an adjunctive diagnostic tool to help with some of the cases that are more challenging. It can also help delineate some compensatory or combination-type lamenesses that can be very frustrating to figure out. I think this will be where its main benefit lies," says Peters.

"You have to develop a foundation, in using it, even in cases that are pretty straightforward. It is not something you'll only use for the tough ones. It's very easy to use and the horses tolerate it nicely. We put three sensors on the horse (one on the top of the head, one on the croup and one on the front of the right front pastern), and we've used it on everything from yearlings to 24-year-old horses. I have been pleasantly surprised at how well the horses tolerate this. They don't seem to be bothered by the anklet on the right front foot nor the

attachment on the croup. We used it on about 250 horses in the first year and a half we had our unit," he says.

"It helps to have someone who really knows how to use it. You also need someone who can jog the horse and work the horse in a uniform manner. Some horses may need to be sedated a little if they are nervous and wild—if the environment gets them hyped up and over-reactive," explains Peters. The person handling the lead or the lunge line has to be careful to not influence the horse's movement.

"I've found it works best when jogging the horse on a uniform-type surface, but we've also used it successfully on bumpy roads or uneven fields. Terrain is not a limiting factor, but uniform footing can give you more accurate information. You need someone who can operate the equipment and software while the practitioner is putting the horse through a normal lameness exam. When I use it, the technician who works with me can be running this data while I am doing a routine lameness exam, and it doesn't detract or take any more time. We have a pattern and she knows what we are going to do. We jog the horse up and back and she gets the reading. I do flexion tests, and she is able to use the machine for flexion tests. It gives us objective data," says Peters.

"A number of people can stand there and look at lamenesses together and may grade the same lameness as a one, two or three. One person might say it's the left front and the right hind, and another might say it's the left front and left hind, and some might feel it is just the left front. This unit allows us to sort these out objectively," he explains.

You need a good team, to do this. "It would be difficult for me to set it up and push the buttons and go back and read the data while someone else jogs the horse. I rely on my technician," he says. It helps to have a couple people who are aware of how the system works.

"The person handling the horse needs to understand you



The Lameness Locator™ utilizes the data transmitted from wireless inertial sensors on a horse's head, croup and right front pastern (left to right).

want a nice uniform stride. If they are longeng the horse you don't want it bucking and playing on the end of the longe line," he says.

"This system has worked well for us. I like it, and I've used it in communication with other veterinarians. They may ask me to look at a horse, and I am able to give them objective data rather than me just saying I looked at the horse and it was a two out of five and I blocked him and he improved 50 percent. Now I can say what the horse did initially and what happened after blocking him—he's now a lot more symmetrical and here are the values and they came down within normal range, so essentially this block made this horse go sound. This works well in communicating with other veterinarians, and with owners," says Peters.

"The owner or trainer may tell me the horse still doesn't feel right after treatment. We put the machine on the horse, and can show that now the horse is very symmetrical, and there is nothing showing that the stride is out of sync. This has been useful for some people to know, especially after the horse has been recovering from an injury or after treatment. They then know that it's okay to go on with that horse. It gives the owner or trainer confidence—something more than the veterinarian just saying the horse looks good. It helps the cautious person who wants to do the right thing with that horse, to know that the horse is recovered enough to go back to work," he says.

Peters also uses it in pre-purchase exams. "We've used it on some horses who didn't seem quite right, to try to visualize the gait and determine whether it's normal movement or if there is something significantly awry. This machine can be very helpful, adjunctively, to have something objective for people to see. It gives a printout that people can understand, and number values that are easy to interpret once people know what they mean," he says.

Another place he uses the Lameness Locator™ is when he can't see a lameness. "One client brought a horse that he said was lame a week earlier. He'd driven six hours for us to look at the horse. I looked and did not see anything. I brought two more clinicians out to look at the horse. They are both excellent lameness people here at our clinic. We flexed the horse, but did not see a lameness. We put the horse on the longe line and were at the point of saying take this

horse home and go on with him, but we put the machine on, to verify there was nothing there. It showed up that there was an unevenness on the right front leg. So we blocked the foot out to see if it changed, because 90 percent of lameness issues come from the foot," says Peters.

"We blocked that foot and sure enough the horse went perfectly even. But to all of us watching the horse, the gait did not change. We x-rayed the foot and discovered a bone cyst in the coffin joint. This was a young horse that was just starting into training, and unfortunately this was not a good thing to find. But, it was good that we found it."

He's had a few other cases like this, in which no lameness was evident, but he put the unit on the horse and

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Down on the Farm Cont'd.

something showed up. "I've used it with people riding the horses as well as on the longe line. On the longe line some horses don't travel normally; they are weighting the body one direction or the other while circling, and you have to interpret the graph a little differently and it may take some time for the practitioner to get used to that. Sometimes it's easier to just have someone ride the horse," he says.

Trainers may tell you they can't see a lameness but can feel it while riding the horse. "So we have the horse ridden for the exam, since the sensors are not in the way and don't alter anything. There's not a lot of gadgetry that would make it difficult. They can go out and ride the horse and you can interpret the data while the horse is ridden."

He feels the unit has a lot of applications. "We have just begun to scratch the surface of what we can do with it. It has to be used in conjunction with everything else we do in an exam, and once we are able to isolate the area of soreness, then it enables you to be a little better in trying to figure out exactly what the problem is," says Peters.

"It has been a reliable unit. The sensors have held up well and the software has worked well. We've been involved since the beginning when these units first went into the field, and we've helped give feedback to the developers. We suggested some things that they have now incorporated to make it more user-friendly, as well as making some things better seen—especially when you are out in the field with more challenges."

Peters is also involved with an on-going project in which once you know what the lameness is, you go back and do a variety of standardized readings with the Lameness Locator™. "The researchers will use all this data to try and develop patterns of a specific type of lameness. For instance, a horse with osteoarthritis of the distal hock might typically give you a graph profile, as well as number values within a certain range. If you are then presented with a clinical case of unknown lameness in a hind leg that has a graph profile and numbers similar to the established pattern, you might then be



able to initially target diagnostics or treatment to this area of the hock to diagnose and resolve the condition, rather than explore other regions of the leg. This may ultimately help decrease the cost of diagnostics and increase the effectiveness of treatments," he says. This aspect of diagnosis is still a ways off, but certainly a possibility as more data is collected.

"There is an art to lameness work, and it can be a little frustrating because your eye will see things that your mind will want to interpret a certain way that maybe the machine doesn't. There is a nice balance here, because the machine is totally objective. I've had some cases in which I don't agree with the machine. These have been very few, however, so I've developed confidence in this system. If it tells me something that's different than what I'm thinking or seeing, I will explore that aspect," says Peters.

"I had a horse last year who showed a little bit hot on a bone scan of the hock. I put the machine on, blocked the hock, then came back and watched the horse again and thought it had improved about 60 percent. We looked at the numbers on the machine, and they were exactly the same as before we blocked the hock. My mind had told me it had improved, partly because I wanted it to improve. We can be influenced by our wishes, more than we realize. With the machine, however, I realized that I was wrong, because nothing had changed, and I knew my block was very good," he explains.

"So I went lower and blocked just above the ankle, and the horse went completely sound. The soreness was something lower, that I needed to explore more, even though nothing showed on the bone scan down there. Obviously there was something there that was bothering the horse, and I needed to find out what it is. So this system can humble you, and also stimulate and drive you on to find the problem," says Peters. It can also give a person confidence, verifying what you are seeing.

"It allows you to do better diagnostics. Rather than shooting x-rays of the whole leg and spending the client's money doing that, you can know the problem is in a certain area, where you can then focus your efforts. Economically, it can cut the costs of some things, for the client. You can also target your treatment more appropriately. A lot of us who do lameness work are pressured into taking our best guess because the owner needs to get the horse going as quickly as possible. You may think something is going on in a certain area so you treat that and see what happens. Perhaps 85 percent of the time, that works, but with the other 15 percent you'd be better off to use this machine and try to figure out what's actually going on before it gets worse and before the client must spend a lot of money and do a lot of treatments—or before something minor all of a sudden blows up into something major. There are many benefits with this machine, in helping us sort things out," he says.

"There are a couple of different wireless sensor systems out there, but I feel this one works well. It's based on a lot of gait analysis research over a couple of decades—a lot of video analysis as well as force plate analysis. It has a good foundation in terms of what we are looking at, which is symmetry of stride," explains Peters. 🐾