



HEALTH ZONE

Heart “scans” are another tool in selecting young racehorses

BY HEATHER SMITH THOMAS

A good Thoroughbred must have “heart”—a term that means determination and will to win: a desire to run in spite of anything that might distract or challenge him. Heart, for a racehorse, is crucial both figuratively and literally. Without a good heart (which means a fairly large heart for his age, sex, and size), even the most well-conformed, ideal-looking racing prospect will likely be an “also ran” and not a winner.

The size of a young horse’s heart (all other attributes being relatively equal) has proved to be a reliable predictor of his future racing performance. Jeff Seder and Patti Miller (president and vice-president, respectively, of EQB, a Thoroughbred consulting firm based on Seder’s farm near West Grove, Pa.) have spent many years and many dollars perfecting their methods for taking accurate measurements of horses’ hearts using echocardiography (ultrasound) to “scan” them. The correct term for this, according to Miller, is cardiovascular measurement.

“We image the heart with ultrasound and take various measurements. With those measurements we can compare that individual heart to our large databank,” she said. Miller has taken measurements of more than 50,000 racehorses, comparing horses that are the same age, sex, size, and similar degree of training. From these measurements she can compare the horses and try to predict what their abilities will be further on in life.

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EQB advises clients who buy and sell Thoroughbreds and helps them manage their racehorses. Seder and Miller have offered their heart-measuring services for many years.

“One of the reasons we are good at this is because it took a long time and a lot of money to develop the data, technique experience, and specialized equipment,” Seder said. “The equipment that is used commercially now was not available when we started and is modeled after what we developed. Another reason most people didn’t discover some of these things earlier is because the mathematics and statistics are very complicated. Also it requires a huge database,” Seder explained.

“You can’t compare a 900-pound 14-month-old filly to an 1,100-pound 16-month-old colt. They are not the same. These young horses are different by sex, size, and age. You can’t just do ‘yearlings’ and accurately compare them. You have to know their age in days (within about 30 days), sex, and size (height and weight). They have to be the same in all these aspects to be able to compare them accurately,” he said.

“About half of 1% of the horses that race (and the horses that race are only

half of the Thoroughbreds that are born) become graded stakes horses,” said Seder. “These are the ones you are trying to find when selecting a racing prospect at a yearling sale.

“In order to get several really good graded stakes racehorses in the database to compare to when they were young, you must have hundreds of horses to compare to in each weight/age in days/sex and height category. This means you need thousands of horses in your database, or you won’t have accurate comparisons. This is one of the reasons it took so long to develop our program,” he said.

“Another reason it took so long is the way people were scanning hearts when we started. The veterinary protocol at that time could not give you the same results each time when you were in a stall with a yearling at a sale. It might have worked in a university setting with a million-dollar machine and where they’ve got the horse under complete control, but out in the field it just didn’t work,” explained Seder.

“We actually had to go to the other side of the horse (opposite the heart) and develop a different protocol. We also changed the transducer and the power/megahertz in the signal in the ultrasound, to get a different resolution. We changed the way it was done and changed the equipment it was done with, and then we built up a database.”

In order to have an adequate database it’s necessary to train technicians to do all the measurements.

“You need to have technicians who have done this thousands of times, like you’d

HEART MEASUREMENT RELATED TO AGE

The heart continues to grow as the horse matures and ages. Thus you can’t compare the heart of a yearling with the heart of an older horse.

“The heart you’ll see in a 5-year-old horse versus the cardio you’d see in a yearling is significantly different,” said Patti Miller of EQB.

“A 20-year-old horse, like when

they were doing the autopsy on Secretariat, or even if you were looking at a 20-year-old claimer, you will see a big heart, just because it continues to grow. We have that data now, and know that older horses have bigger hearts, even if they are not great athletes. We were looking at older racehorses and a lot of them had efficient, big hearts

and we were trying to figure this out. Then I looked at some horses in a riding school—retired from race training due to lack of talent on the track. Interestingly enough, we then saw hearts that were significantly smaller for their age and sex, compared with the successful racehorses,” she said.

By Heather Smith Thomas



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DOES YOUR RACEHORSE HAVE RHYTHM?

Atrial fibrillation (AF) is a common cardiac arrhythmia affecting racehorse performance. AF is likely when an irregular heart rhythm is detected when listening to the heartbeat with a stethoscope. An electrocardiogram is necessary to diagnose AF.

Exercising heart rates in racehorses with AF are 40-60 beats per minute higher than normal (240-260 bpm). This marked increase, combined with irregularity of the heart rhythm, results in a dramatic drop in cardiac output in horses performing maximal efforts, such as racing. The horse appears to “stop” during a race, the performance trailing off suddenly as the competitors accelerate past. Blood coming out of the nose post-race, known as severe exercise-induced pulmonary hemorrhage (EIPH), is another AF sign.

Atrial fibrillation can be intermittent and resolve spontaneously, usually within 24 hours, or can be persistent, and cardioversion is required. AF can occur in otherwise healthy horses with no underlying heart disease, or may be associated with underlying atrial myocardial disease and atrial enlargement. An echocardiogram should be performed to diagnose these conditions.

Drugs that alter potassium balance, such as Lasix® or sodium bicarbonate, or thyroid hormone supplementation, can trigger AF episodes. Both pharmacological and electrical cardioversion methods are successful in correcting this arrhythmia and returning the horse to its previous level of performance. AF should be treated promptly, as longer duration is associated with atrial remodeling and a higher recurrence rate.

By Dr. Virginia Reef, director of Large Animal Cardiology and Diagnostic Ultrasonography at Penn Vet's New Bolton Center

HOW IT STARTED

“So why did we do this? It all started with human athletes,” Seder said. “In 1976 the East Germans walked away with many Olympic medals. Before that, the Olympics had always been a contest primarily between the Soviet Union and the United States. Then all of a sudden one little country was beating both of us. Everyone was shocked and there were rumors that it was because they had mad scientists recruiting kids from kindergarten in secret sports programs. The U.S. started a movement to do sports-medicine for our Olympic athletes. I was a young lawyer (with experience in athletics) and was called in by some of the Olympic coaches in figure skating and the bobsled and luge to try to help them.

“I wanted to do horses, not humans, but I became part of the original Olympics sports-medicine movement,” he said. “For a couple of years the company I created was doing half of the biomechanics research and services for the U.S. Olympics committee through their professors at the University of Delaware. Then the U.S. Olympic Committee went from being broke to having a lot of money because of the Los Angeles Olympics (1984), and built training centers—such as at Lake Placid in New York, and in Colorado. At that point I had to decide whether I wanted to do this full time. I left it in order to develop this technology for racehorses,” he said.

“I wanted to take the technologies being developed for human athletes and see if we could make them useful for helping select and manage racehorses. One of the first things we learned in the Olympic sports-medicine movement was that elite athletes were as different physically from normal people as sick/injured people are from normal people. All the databases in existence were about normal people or sick/injured people,” said Seder. There were no databases for elite athletes; this was uncharted territory.

“They had to build databases for human athletes, and I had to do that for horses. Everything in the textbooks was about normal horses or diseased or injured horses and it didn't apply because these athletes are physically different,” he said.

Seder took what the Olympic sports-medicine studies found to be different in human athletes and looked at these things in horses.

“I looked at about 50 things, but the one that turned out to be the easiest to mea-

find in a good hospital,” Seder said. “So we've had the same person (Patti Miller) doing all of these horses, which is now more than 50,000. We started in the early 1980s so we've been doing it more than 30 years. We needed to do enough horses to show that the data would be reproduc-

ible; we had to do studies to show that we got the same results every time we did the same horse, for instance, and the results of these studies are in our published papers.”

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sure as well as one of the most important was size and functioning of the heart,” he said. “So I went after that aspect—but couldn’t do it because we didn’t have the right protocol nor the right equipment. As it turned out we also needed mountains of data. By the time we arrived at something useful it was 20 years later and I’d spent millions of dollars,” Seder said.

He had been running some very large companies, and spending all the money he earned—on research.

“Now other people read what we’ve published and try to do it themselves, but it’s not the same. A technician who has a three-day seminar training to do this can’t duplicate what we do. I can give someone a violin and an instruction book, but they are not going to be able to play in a symphony until they have a lot more practice!”

HOW IT WORKS

Miller says one of the things that is unique about EQB’s approach is that they don’t throw the baby out with the bath. EQB uses a lot of scientific technology but has not thrown out the common sense.

“If a person is looking at a first grade class in terms of future sports ability, you look first at the kids who appear to have or have a history of having athleticism,” she said. “We do a lot of work at the yearling

sales, trying to pick out the individuals that look like they can run. A big heart, in a horse that can’t run, is just a big heart—and that horse will never be a winner.

“We actually have declined working with farms that don’t already have a good method of trying to select their athletes. The other thing that is important for the database, we use for research and comparisons only data from horses that went on to have enough starts. In other words, we try to look mainly at horses we think have potential and who stayed sound enough to have a 3-year-old career,” she said.

Some horses for various reasons have not had enough starts or the water is being muddied by the fact that the horse is extremely unsound.

“These things can affect the database,” Miller said. “I think what Jeff has done, and the thing that makes him so special in this business, is that he has amassed a database that only includes previously selected athletes that can run—that can go on and train and are able to train—and he then throws in another add-on for the selection process. This is a much stronger approach, involving a more comprehensive genetic package for selection.

“It doesn’t matter how many hearts

you have in your database if these are not the hearts of horses that were pre-selected as athletes. You’ll get the wrong formulas, versus subsequent success. This makes an extremely critical difference between our scanning and many people’s heart scanning,” she explained.

Seder says they don’t even look at the heart of a horse until it has passed three or four of their other tests. Heart measurement is the frosting on the cake; this is how to separate the good horses from the potentially great horses.

“We are trying to distinguish between allowance horses and graded stakes horses,” Seder said. “Our database is a massive database of rare specimens. Then we know what is different about the good ones; it’s the heart, in the ones that succeeded. They all had good conformation, good throats, good pedigrees, etc. The difference between them is in the heart,” he said. If a horse isn’t sound enough to race or doesn’t have the conformation to run well, it won’t be in this group. It’s not just about big hearts. It’s also all about having the right heart, for the size, age, and sex of the horse. There are about 10 variables that we evaluate.

“We have published our findings and have shown that it works, statistically. Our published paper (in the *Journal of Equine Veterinary Science*, in 2003) was the result of scanning 10,000 horses and watching them in every race they ran during their 3-year-old year. We then compiled all the statistics to compare only horses of the same age, sex, and size, etc. Our data showed that even if you eliminated all the other differences between these horses, and then looked at who succeeded and who didn’t, the heart (and all the things about it) was the variable that made the difference. It’s no longer just a theory. It’s proven in the research and proven in the services we’ve done. We’ve helped select many grade I winners,” he said.

Heart measurements can be a clue to racing ability.

“For instance, American Pharoah has a phenomenal heart,” he said. “He was at the (Fasig-Tipton) yearling sale at Saratoga when we looked at his heart. When we looked at that colt we thought, ‘Oh, my God!’ and we and other members of Zayat’s team advised him to keep the horse.”

Miller has done a lot of cardio measurements on a lot of great horses. “If you were

BEHAVIORAL HEALTH IS ESSENTIAL TO OVERALL HEALTH

Stressful situations are part of life for most horses, from trailering and transporting to veterinary visits and new routines. Horses communicate stress externally through stall walking, refusal to work, pawing, kicking, head bobbing, and other changes in behavior and appetite. What may surprise you is that some events and situations also trigger internal changes that can negatively affect your horse’s overall health and quality of life.

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A GREAT HEART DOES NOT GUARANTEE A GREAT RACEHORSE

EQB's Patti Miller points out that there first has to be a system for selection (looking at everything: conformation, pedigree, soundness, stride, etc.).

"From that selection system, evaluating the heart is an add-on tool. A horse that can run, with a smaller heart, will beat a horse that can't run, with a larger heart," she explained. The heart measurement is simply part of the larger picture.

"We work with some of the best clients in the world and they are all great managers of their horses," she said. "When they put cardiovascular measurements to task, they are adding it into a program that works. They are exceptional managers of racing stock, in their own way, to begin with. So the important thing is to never throw

anything out of the equation. The heart measurement is not the cure-all," she said.

People are trying to get the best possible horses at auction, and using the heart measurements to maximize their chances.

"Though all horses don't have great hearts, many of them can still race very effectively. It doesn't mean the horse can't run, it just means that he probably can't run as well in lead company," said Miller.

A good horse also needs the will to run.

"If they quit when they are tired, they are done," said EQB's Jeff Seder. "A great horse has the drive to excel, to be out in front, even when it's difficult. They have to want to run."

That desire can make all the difference. An illustration of this is a story Seder tells about a claiming race he watched. Normally as the horses come around the turn in a six-furlong race they are all strung out. At this particular race a collie dog ran out on the track and all the horses sped up.

"The dog chased them up the stretch and they finished as a tight bunch! That's what happened when they were all trying! But at the top level, those horses already want to run. Good racehorses want to be in the lead," he said.

"We never discount desire, but of all the thousands of super graded stakes winners, we've never seen one with a really tiny heart," said Seder.

By Heather Smith Thomas

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to compare horses in the Kentucky Derby (gr. I) at the quarter pole, you would see a lot of good horses, but it's a different kind of heart that carries them on from there to win. When you get to that caliber of racing, there are other things that limit them. Not their heart," she said.

But it's only one of many variables.

EXAMINING YEARLINGS AT SALES

Heart scanning is becoming more routine now at yearling sales and there are several people doing it. Seder says some of them are winging it, however.

"They don't have the database and some of their technicians don't have enough experience," he said.

Miller compares it to having a human ultrasound.

"They tell you to have the same technician do it each time, and if possible the same machine—to have consistency," she said. "I am still dragging around this old machine but it gives a very clear image.

"All ultrasound machines have distortions as you go deeper. Thus it is hard to compare heart sizes from two different kinds of machines. Any ultrasound tech will tell you that they become very comfortable with the machine they have, and they don't want to keep changing," she said.

"To be really good at cardiovascular measuring a person also has to do a lot of homework and know a lot about anatomy. Horse's hearts are all different and they aren't always exactly in there at the proper angle. Veterinarians understand anatomy, but an ultrasound technician doesn't—unless you've taken courses and spent a lot of time understanding what you are looking at. The first couple years I measured hearts, 20 years ago, I wasn't as good at it," she said.

A buyer also wants to have someone who is an expert handling horses. "Patti was one of the first women jockeys; she's been on horses since she was 2, and she's been a racehorse

trainer,” said Seder. “Her handler for the horses we ultrasound is a person who has worked with racehorses their whole life and that’s all they do. When they go into a stall to do a young horse for a sale, they are professional and know how to keep that horse calm. You can’t just hire someone and send two people and an electrical machine in there with a yearling or you risk a disaster. In all our scans we’ve never had a safety issue.”

Seder also developed one of the first heart rate meters that was accurate for racehorses.

“We did a lot of research on heart rate,” he said. “You can walk into a stall with one of these horses and the resting heart rate can jump from 30 to 120 beats per minute if that horse gets upset. You may not be able to detect any outward sign yet the heart rate jumps to four times normal rate. So you must have people who know how to not let that happen or else your data is no good.”

“You are walking into a stall with someone’s long-term investment,” said Miller. “You have to treat it like it is a fine instrument and be very careful. We take this very seriously.”

In all the years they’ve been working with these horses they have never had a horse injured.

“This is no accident,” said Seder. “As my dad used to say, five flukes is a trend. One of the reasons we’ve succeeded is that I hired statisticians from major universities, doctors and engineers, and veterinarians from New Bolton (Center, the University of Pennsylvania) to design and write up the studies. All of these experts were important, but we also had Patti to do the horses, and Billy Turner working with us when he was training Seattle Slew. Lifetime racehorse people were keeping us grounded; they have always been the reality check. We would have made a lot of dumb errors without them. It was the combination that made this successful and it would never have worked otherwise. In the early years, before we got real horse people involved, we did a lot of technical things very well and a lot of basics very badly. The team effort is crucial.”

Miller says they’ve also spent a lot of time understanding how the sale system works.

“We do these measurements at a sale and have to be in the stall long enough to have the horse comfortable and get the

heart rate down below 40 beats per minute,” she said. “We are quick, because we’ve done tens of thousands of these. We can probably do one in four to five minutes if the horse is agreeable.”

In order to make sure the horses are calm, they often do these measurements at night, when there are fewer people around and less distraction for the horses.

“After they stop showing the horses, that’s when we start, often continuing until 11 p.m.,” she said. “We’ll still do some during the day, but the problem is that we have to go a lot slower. There’s all these people standing at the door of the stall, and if everybody is there looking in I have trouble getting the heart rate down below 40. People think I’m unfriendly because I always tell them to go away.”

“Anything that changes blood pressure can change the accuracy of the exam because we are looking at the left ventricle at peak diastole,” she said. “Some people might tranquilize the horse so we can work on it, but that destroys the data. Any-

thing that influences peripheral dilation, or if the horse has been terrified or had a bad experience a few minutes before we come into the stall, it won’t be accurate.

“The interesting thing about this examination is that you can err on the side of being wrong, but if a horse has a great heart it stays a great heart on our exam unless there’s some kind of stress mechanism involved. You can get a false negative (a good heart might show up as a poor one if the horse is stressed) but you’ll never get a false positive (a small heart will never show up as a large one).

“Sometimes we’ll be looking at a horse that has a very good heart and all of a sudden it doesn’t look as good when we are looking at it again—and it turns out that the horse is sick or something is affecting it at that moment. When scanning a horse at a sale, sometimes I don’t know what’s happened to that horse before I got there. Maybe the vet was just there and scoped that horse and scared it,” she explained. **BH**

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