In this issue of *Equine Connection*

**Care & Treatment:** Colic Surgery, a Personal Story

**Advanced Diagnostics:** MRI, a Positive Experience

**Driven to Discover:** Early Diagnosis of Arthritis
Equine herpes virus update

What a difference a year makes!

In March 2014, several horses in the Midwest and Twin Cities metro area developed equine herpes myeloencephalopathy (EHM), the neurologic form of infection with equine herpesvirus-1 (EHV-1). There are two strains of equine herpesvirus-1: the D strain, or neuropathic form, and the N strain, or non-neuropathic form—which is poorly named because it can indeed cause neurologic disease.

The N strain of EHV-1 was responsible for the 2014 outbreak in Minnesota, and at the time, it was unfortunately not considered a legally reportable disease. As more horses with EHM were reported, the equine community was left scrambling for accurate information on new cases. The horse industry in Minnesota virtually shut down, with many shows and clinics canceled and folks from farriers to feed representatives restricted from entering horse facilities.

This had a devastating economic impact on the local horse industry. Many horse owners across the state voluntarily participated in a policy of no-horse-leaves-the-farm while the outbreak ran its course. By May, normal horse business had resumed.

In February 2015, EHM once again reared its ugly head in Minnesota when a horse in Scott County was confirmed to have the disease. The response of the local horse community, however, was remarkably different compared to the previous year!

In the fall of 2014, horse owners and equine veterinarians from the University of Minnesota and several local practices had successfully lobbied the Minnesota Board of Animal Health to make EHM a reportable disease regardless of the specific virus strain causing it. Upon notification of the Scott County case in 2015, the Board of Animal Health swiftly imposed a formal 21-day quarantine of the affected farm and notified the public through its website. The farm owner was also committed to transparency and provided regular public updates on the situation via the farm website. With ready access to facts rather than rampant rumor, the local equine community remained calm and confident that the outbreak was under effective control.

The horse with EHM was transferred to an isolation facility where it was later euthanized, while other horses on the farm were monitored closely for fever and neurologic signs. One horse with a fever was referred to the isolation facility at the University of Minnesota for observation; EHV-1 infection was confirmed, but the horse did not develop neurological complications and made a full recovery.

Secure in the knowledge that the outbreak was effectively contained, horse owners and businesses across the state were able to continue their day-to-day activities. Hats off to all involved in this outbreak for their quick action and effective public communications, which limited its impact on Minnesota horses and horse owners!
No horse owner wants to hear their vet say, “That is the mother of all impactions... Do you have a trailer?”

I went to that stunned place inside, like someone who is standing on a beach watching the tide rushing off the shore and pulling way out to sea. Little did I know of the tsunami that was about to consume us. Dylan was referred to the University of Minnesota Leatherdale Equine Center at midnight on December 15, 2012. My life was about to be shaken to its very core.

As the veterinarians at the Equine Center resolved the impaction that night, Dylan began to spike fevers. Although he didn’t look it, his blood work showed he had severe systemic inflammation. More test results followed: abdominal ultrasounds, radiographs, a tap of his abdominal fluid to find the source of the fever. Dylan received intravenous fluids through a catheter in his neck, but by the next morning his blood was in a state of increased coagulation called disseminated intravascular coagulation (DIC), and he developed a thrombus at the catheter site. Acute DIC is not a primary disease, but occurs in association with severe inflammation. The proteins that control blood clotting become abnormally active, and if they couldn’t stop it, Dylan would hemorrhage to death. Dylan needed a transfusion to give him a chance, and with help from Hercules, the University’s equine blood donor, Dylan began to turn the corner on day six.

On Dylan’s seventh day of hospitalization, he stopped passing manure, and his veterinarian found that his large bowel was displaced again. Then a second wave hit: They found a mass in his small intestine.

Dylan will be 19 in the spring, and I have always said “no surgery.” I have even written those instructions down every time I have left town. “No surgery.”

Now those words were echoing in my head as I felt myself begin to pass out. I needed space and to feel the cold air outside. I sat in my car, called my husband, and cried. We all have our deal-breakers, and money is one of the biggest players (second to the quality of life for our horses). I had always intended to check into insurance, but was under the misconception that a horse his age was uninsurable.

After a week, we had invested $5,000 in his intensive hospital care because of his dire condition. Now we sat in the little room off the lobby: me, my husband, the resident, and the specialists. They began to explain, in simple terms, what our choices were. None of them sounded like a winner, but none of them were hopeless either. If we were going to do surgery, the sooner the better, while Hercules’ blood-clotting proteins had him ahead of the game.

The doctors left us alone to make the decision. My husband (the saint) said, “We have to do it. He is a fighter. We have to give him a chance.” So we opted for surgery. We agreed that if it was cancer, then we would humanely euthanize him on the table. We also agreed to no re-sectioning of his bowel. The doctors said that once they were in, they would know in 20 minutes what it was. Twenty minutes came and went, then 30, 40, and 50 minutes. My husband said, “Well, we know it’s not cancer.” Finally, the resident came to tell us that they found something but couldn’t lift it up far enough out of his bowel to identify right then. My heart sank. If we couldn’t find out what it was, then the decision to wake him up was going to be nearly impossible. Her phone beeped and she excused herself. More uncertainty and torture.
I had just spent that last hour preparing myself for the end, so I wasn’t prepared for what came next. All the doctors showed up in that little room to tell me that it was not a tumor; they had found an adhesion (band of scar tissue) on his small colon that had stuck to other pieces of bowel. It was most likely from an old penetration through the bowel wall. They broke down the adhesion, decompressed his bowel, “released the demons,” and put everything back in place. Now they wanted to know if we wanted to wake him up.

“He could do just fine and never look back, or he could go downhill quickly,” one of the doctors said. “We have to remember he was a very sick horse going into this. If we do wake him up, Dylan will let us know over the next 24 to 48 hours if he is going to pull through.”

He was already peacefully sleeping. He would never know. I would go in to say goodbye and be with him while they euthanized him. With all the questions about his health going into this, it could be the kindest option for my dear friend and the easiest one for me. My husband said, “You have to be able to live with your decision. Whatever it is.”

We woke him up. For the next 18 days, Dylan had small setbacks, but against all odds, he walked out of the Equine Center 26 days after he had gone in, and he hasn’t looked back. The care was impeccable, the attention to everything (even me) was second to none, and the bill for us was huge. A typical colic surgery can run from $8,000 to $10,000 beginning to end, but because Dylan was so sick going in, the intensive care, drugs, blood transfusion, and everything else, during and after, added up. Our cost, start to finish? Over $16,000.

I struggled with actually writing the cost down in this story, but I wanted to inform all who may not know, those who haven’t yet decided how they will answer those difficult questions, and those who haven’t prepared emotionally and financially for the worst. The best advice came from Dr. Nicolas Ernst, Dylan’s surgeon: “You know how it works now. You have been through the worst of it and know what to expect. There are no guarantees with horses. You can put them in a bubble and they can still get sick and die. So, with this information, put money aside for the next time, move forward, and enjoy your horse.”

Now that Dylan has had colic surgery, it’s too late to insure him, but it’s not too late to start saving for that “next time,” and there will be a next time. I don’t kid myself anymore.

On one of our last days at the Equine Center, a young horse came in with severe colic. The condition required surgical correction, but surgery was not an option for this family. As they walked out the door in tears, I sat on the couch in the lobby and cried for them and for their horse. That could have been me 20-odd days before, but more than that, I cried for their difficult decision and their horrible pain losing a close, if not the closest, of friends.

My hopes, prayers, and best wishes go out to all of you and to all of the horses. We are so fortunate to be in their company. So be well, be happy, be prepared, and enjoy each day you have with them.

Special thanks and gratitude to all of the veterinarians who dedicate their lives to the care of our animals and to Dr. Kerry Kuhle and Dr. Sara Wefel at West Metro Equine Practice, Dr. Nicolas Ernst, Dr. Sian Durward-Akhurst, Shana Lemmenes, Hercules, and the entire team at the University of Minnesota Equine Center. Thanks also to Heidi Sohn Gobel for all the long, cold days and nights providing Dylan’s aftercare.
Riding the colic roller coaster

By Dr. Stephanie Valberg  
University of Minnesota Equine Center

Colic is one of the most common medical emergencies horse owners confront and one of the most common conditions veterinarians treat. The anxiety horse owners feel when horses have colic comes from the unknown. Colic is not a specific diagnosis; it is only a description of belly pain, and it has many possible causes. Often, it is a passing bellyache due to increased gut spasms. Within a few hours, the horse responds to medical therapy on the farm, and we can all relax. For the unfortunate few horses, something much more serious is going on, and the severity of their pain or lack of response to treatment on the farm indicates that a trip to the hospital is necessary.

That is often when the roller coaster ride begins: What is causing the pain? What is the best treatment? What is going to happen? Fortunately, specialty clinics such as the Piper Clinic at the University of Minnesota’s Leatherdale Equine Center deal with cases like Dylan’s on a daily basis, and their team of specialists is dedicated to providing the best in compassionate and comprehensive care.

Initially, the critical factor for Dylan was to get a specific diagnosis for the cause of his colic and to immediately stabilize his condition. The intensive training that internal medicine specialists receive during their residency (imagine Dr. House for horses without the grumpy) prepares them to make the minute-by-minute critical decisions necessary to stabilize a patient like Dylan. During this type of colic case, veterinarians also guide owners through the roller coaster, helping them know what to expect around the next corner and providing the best landing possible. Carolyn’s anxiety and concerns needed to be alleviated by compassionate care, constant updates, and by knowing that the full weight of the technology and experience at the Equine Center was being used to address Dylan’s colic. The team of medical and surgical specialists at the Piper Clinic constantly worked with Carolyn and Dylan to navigate each day’s changes, provide the very best in care, and help make the decision about medical versus surgical treatment. Every case is different, everyone’s emotional investments and financial circumstances differ, and everyone needs some space to make very personal decisions.

When the time came for surgery, Dylan was provided the best chance for recovery through constant monitoring and adjusting of his oxygen levels and blood pressure by an anesthesiologist. The experience of Dylan’s board-certified surgeon was critical for Dylan’s survival and recovery. It is remarkable to see how success rates for colic surgery have improved over the years as a result of research and the training board-certified specialists receive. Veterinarians get emotionally involved with their patients; it puts us on the same emotional roller coaster ride as the owner. We celebrate successes like Carolyn and Dylan’s, and we wish them many years of happiness together!

Preventing colic

The risk of colic can be reduced with some relatively simple steps:

- **Fresh, clean water:** Horses without water for only one or two hours experience increased risk of colic.
- **Pasture turnout:** Horses with access to pastures have lower colic risk.
- **Avoid sand:** Feeding horses on sandy ground can cause gut irritation.
- **Diet:** Feed adequate amounts of hay (no less than 1 percent of body weight). Colic risk is increased when large amounts of concentrates are fed. Feed small amounts (less than five pounds) of grain at each feeding. Make gradual changes in the horse’s diet.
- **Teeth floating:** A horse with a comfortable mouth chews better, which can help prevent impactions.
- **Control parasites:** Deworm all horses at a barn simultaneously and control manure levels on pastures. Alternatively, check fecal parasite egg counts and deworm horses with high counts.
- **Foaling:** Mares have a higher risk of colic within two months of foaling.

Do not hesitate to call your veterinarian if you are concerned about your horse. If you are unsure about the examination or treatment, don’t be shy. Ask questions.

Signs of colic

**Mild**
- Camped-out stance
- Pawing
- Flank watching
- Lying down

**Severe**
- Rolling or thrashing in a dangerous manner
- Elevated heart rate
- Tacky gums, purple gums, dehydration
- Distended abdomen
- Inability to pass manure
It started with lameness
When our young Quarter Horse, Fancy, came up lame, we consulted with our equine veterinarian. She performed an extensive lameness exam, including a physical workup, a radiograph, and ultrasound imaging of Fancy’s front leg. Unfortunately, nothing was found, so we decided to try “resting” our horse—which is not as easy as it sounds!

Several months passed without a sign of improvement, so we called our vet back for more testing. This time, she tried blocking nerves to pinpoint the troubled area and discovered that the injury was low in the fetlock. During this time, we consulted with other veterinarians and tried several treatment options—from new shoes to steroid injections. Each thing we tried seemed to work for a short time, and then the lameness returned.

An MRI referral
After a year and a half of guessing how to help Fancy become sound, we decided we needed better answers. My daughter, Julia, and her horse had missed two show seasons, and we had some big decisions to make. It’s expensive to keep a lame horse; the vet calls and various treatment plans were adding up financially. Our vet suggested we take Fancy to the University of Minnesota for an MRI (magnetic resonance imaging).

When I called the University of Minnesota Equine Center to schedule the procedure, I was completely shocked to discover that it required a three-day hospital stay. Immediately after scheduling the MRI, I searched the Internet looking for information. Instead of calming me, the information I gathered about MRIs caused me great stress. My first thought, that it would be a simple procedure, turned into an emotional ordeal, and concerns about the expense, the risk, and the potential outcomes became overwhelming.

After a week of inner turmoil, I called the Equine Center with a list of questions, ready to pull the plug on the MRI if the answers weren’t to my satisfaction. The receptionist must have sensed my anxiety, as my call was immediately transferred to the surgeon involved in performing Fancy’s MRI, Dr. Nicolas Ernst.

Talking to Dr. Ernst not only erased my fears about the MRI, but he helped me understand how lucky horse owners are to have the Large Animal Hospital, the Leatherdale Equine Center, and the Piper Performance Clinic right here in the Twin Cities. I had no idea we had the equine equivalent to the Mayo Clinic right in our backyard. The call was also good because it reminded me that getting information from the Internet—while it may be good—is like taking a drink from a fire hydrant.

The Large Animal Hospital
The MRI machine is shared by horses, dogs, and cats, so it is located in the University of Minnesota’s Large Animal Hospital, directly below the Small Animal Hospital. A member of the veterinary staff met us at the equine entrance. After helping us get Fancy settled into her hospital stall, we were given a tour. Many of the medical staff members also owned horses and empathized with us. On the tour we learned that the Large Animal Hospital performs several MRIs a week and that they are ranked as one of the top equine veterinary schools in the country. We also learned that the MRI machine used there is the best in the Midwest, as it has twice the imaging precision of other machines. They explained it as having double the number of pixels, which creates twice the picture, and that is huge because highly detailed images are easier to read.

The MRI
An MRI is a noninvasive procedure that creates detailed pictures of soft body tissue, bone, and organs without
the ionizing radiation that X-rays and CT scans have. MRI machines use a strong magnetic field, radio waves, and complex computer equipment to give two- and three-dimensional images and cross sections of body parts. Several hundred images are taken during the procedure. A big advantage of the MRI is its ability to change the contrast of an image, as different contrast settings will highlight different tissues and allow pathology to stand out. An MRI makes the changes in the chemical makeup of tissues more visible. MRIs performed on live horses have been around for only the last 15 years. This relatively new tool in veterinary medicine has allowed for improved medical diagnostics.

At the University of Minnesota, you are able to view your horse’s surgery through a surgical window, but due to the nature of the MRI, we weren’t allowed to watch. The veterinary technician working with us, Sheryl Ferguson, explained the following process horses go through during an MRI:

After your horse arrives at the hospital, they make sure their shoes are pulled. Then basic radiographs are taken to detect metal. The MRI machine contains a huge magnet, and metal can be hazardous to the patient and staff. If metal is detected—for example, from nail shards in the hoof from horseshoes—a technician must remove each metal piece prior to the MRI. After checking for metal, the horse is weighed, given a thorough bath, and put to bed in a comfortable stall for the night.

The second day is a busy one, as the staff prepares and performs the MRI. A catheter for the IV is placed early, and then the horse’s mouth is flushed to cleanse for intubation (the breathing tube). When all 10 to 12 members of the veterinary team are in place, the horse is sedated. Because horses generally weigh more than 1,000

A horse undergoes an MRI at the University of Minnesota Veterinary Medical Center.
pounds, the sedation is done in a small, padded stall so the horse doesn’t injure itself. Once the horse is sedated, a special electrical hoist is used to position the horse on a padded MRI table. The anesthesia team then goes to work to connect the oxygen and anesthesia machines to the horse. It is their job to monitor the horse’s breathing and fluids during the MRI, and also to keep the horse comfortably asleep.

When the horse is ready to go into the MRI imaging room, veterinary technicians work together to ensure the horse is in the correct position. Precise placement of the horse for an MRI can be crucial for taking exact images. It is also important for the veterinary staff to monitor how long a horse is in a certain position to ensure that there isn’t too much pressure on any given area for an extended time, as this can cause myopathies (muscle soreness). The horse is then wheeled into a softly-lit room where a large, doughnut-shaped MRI machine stands. The MRI process takes between 30 and 90 minutes, depending on what needs imaging. During the MRI, veterinary staff members work together as an orchestra, each with a specific job conducted by a surgeon—in our case, Dr. Nicolas Ernst.

During the MRI, the technologist operates the MRI machine from a computer located in another room. She works in tandem with Dr. Natasha Werpy, an equine diagnostic imaging specialist located at the University of Florida. MRI images are digitally sent to Werpy, who reads and interprets the MRI images from more than 1,000 miles away.

Once the MRI is complete, the horse is removed via the electrical hoist from the imaging table and placed in a padded recovery room. Many horses’ first response to their unknown situation and surroundings is “fight or flight.” The veterinary staff carefully observes the horse as it comes out of anesthesia to ensure it doesn’t stand up too quickly, possibly injuring itself. An air mattress-like floor keeps the horse from standing right away, and staff members monitor the inflation level of the mattress to keep the horse comfortably resting until it’s able to get up. Once the horse is up and moving, it is brought back to its hospital stall. At this point, we received a call from the hospital telling us that Fancy was doing well and that they were able to get good MRI images.

The University of Minnesota’s Large Animal Hospital likes to keep horses under observation for approximately 24 hours after an MRI. When we picked up our horse the following day, she looked great. She had a few patches of hair that were matted down, which a veterinary technician explained were from the surgical tape needed to position the oxygen and anesthesia tubes. Fancy also had a shine to her coat from the ShowSheen they used to more easily keep the horse comfortably resting until it’s able to get up. Once the horse is up and moving, it is brought back to its hospital stall. At this point, we received a call from the hospital telling us that Fancy was doing well and that they were able to get good MRI images.

The MRI report
The day after we brought Fancy home, I received a call from the Equine Center staff checking up on her. I also received an e-mail report from Werpy, the equine diagnostic imaging specialist at the University of Florida. The MRI showed that Fancy had significant tendonitis of the deep digital flexor tendon and a depression of the navicular bone—indicating degenerative navicular disease. Our vet recommended a new type of shoe with pads and a rounding of the toe to take the pressure off. She also advised using a newly approved medication, Osphos, which slows bone degradation.

We all have to make decisions on to how to best care for our animals based on our own circumstances. There isn’t one answer to fit all situations. For us, having an MRI was a good decision. We needed answers so we could make informed decisions. Looking back, I wish we had done the MRI sooner. A lot of time and money were spent not knowing what was wrong. We may have even allowed the disease to worsen, as we didn’t know what we were dealing with. Through this process, we’ve come to realize how lucky we are to have such knowledgeable medical staff and incredible equine medical resources available to help us when things go wrong.

Thanks
I would like to thank the Equine Center’s staff for making our MRI experience such a good one. I especially thank veterinarian and equine surgeon Nicolas Ernst, veterinary technician Sheryl Ferguson, MRI imaging associate Susan Steward, and chief development officer Bill Venne for their time, knowledge, and dedication to horses.

Postscript
It has been one month since the Osphos injection, and Fancy seems to be improving. While barrel racing may no longer be in her future, we are looking to introduce her to a new job as a lesson horse.

This story was originally posted on the Cornerstone blog in December 2014.
Dr. Troy Trumble paves the way for early diagnosis of equine osteoarthritis

Arthritis. Most of us have some experience with this painful inflammation of the joints, whether we have it ourselves or have witnessed it in loved ones—humans, horses, or dogs. Popular belief depicts it as a chronic progressive disease, only diagnosed when a significant amount of damage exists. By then, treatment can only aim to manage the pain. But is this true?

Dr. Troy Trumble, who has an active research program in equine osteoarthritis at the University of Minnesota, hopes to change this perception. Trumble and his team are working to diagnose arthritis in its early stages, before damage has progressed to a chronic state and early enough that it can be effectively treated. His work has been funded by the National Institutes of Health (NIH) and even the National Football League.

The key, he believes, is biomarkers. Biomarkers are metabolic byproducts of either newly formed or recently broken-down components of the joint. They can be measured in joint fluid, blood, and urine, and are accurate indicators of damage to cartilage or bone. Finding the biomarker molecules that best correlate to early joint damage may one day help veterinarians make an early diagnosis of osteoarthritis that will also help define the extent of the disease long before changes are apparent on radiographs. Trumble and his team have studied more than 25 different biomarkers, investigating which ones correlate best to the degree of damage of specific structures in a joint with osteoarthritis.

In one of his most extensive studies, Trumble and his team created a model of mild osteoarthritis in the fetlock (ankle) joint by creating a small chip fracture. The chip mimics a common naturally occurring injury that often leads to osteoarthritis in horses. The goal was to determine which biomarkers identified the earliest detectable damage to the cartilage, bone, or joint lining. With this information, a veterinarian could intervene early and possibly slow down the process of osteoarthritis.

Trumble found that the biomarkers that correlate with osteoarthritis come in two phases. The first phase, which occurs immediately after and in response to the injury, is designed to help remove damaged cartilage. The second phase occurs a few months later, when continued exercise of the horse results in an imbalance between cartilage breakdown and regeneration.

Trumble’s current goals are twofold: First, he is refining the testing technology used for biomarker research, with the goal of making the sample of fluid needed as small as possible. This will allow for diagnostic use on small joints like the lower hock joints, where arthritis is a common problem. Second, he is using the biomarkers he has identified as the best indicators of early inflammation to determine whether commonly used
ostearthritides therapies have the effect they claim to have.

It is critically important to have impartial research into these often expensive therapies. The ultimate goal is to test all the commonly used joint therapies to determine which are best for different stages of osteoarthritis.

Trumble and his team are making significant progress toward his vision of developing a panel of biomarkers that could be used in the field—a “stall-side” test, if you will, using a joint fluid sample that would indicate the stage of disease in an individual horse.

“Biomarkers can tell us a lot more than things like radiographs and the response to treatments,” he explains. “I could see using the results to indicate that in one horse, option A might be better than option B for treatment, whereas another result might indicate option B would be the best treatment. In essence, it doesn’t matter what that horse does for a living. It would become an individualized piece of medicine.” Armed with this biomarker panel and with his research on how different treatments show different biomarker results, a veterinarian could formulate an individualized plan for each horse they treat.

This final goal may be a long way off, but Trumble asserts that osteoarthritis is more treatable than people think. The key point is to diagnose it as soon as possible and start doing something about it early. We know that osteoarthritis gets worse over time, but Trumble hopes that, with early intervention, the treatments veterinarians currently have in their arsenal can do more and stave off chronic degeneration.

In the meantime, Trumble and his team will keep working to improve the diagnosis and treatment of osteoarthritis in the horse. It’s a long process, and Trumble realizes that his goals won’t be met overnight or even in a span of five years.

“This is a life’s work,” he says. “I hope that the information we generate will inspire others to continue to help our equine athletes perform as long as possible.”
Events and programs at the Equine Center

It has been another busy year at the Leatherdale Equine Center, with events and undergraduate programming filling the calendar.

Jennifer Truett has become a regular dressage clinician, coming to the Twin Cities every three months to give riders a sense of the biomechanics of riding. Other clinicians included Dom Schramm, a renowned three-day eventer and host of a popular horse TV show. He provided a two-day stadium-jumping clinic, using jumps provided to the Equine Center by a generous donor. Paul Belasik taught classical dressage to enthusiastic riders in a two-day clinic.

The eighth annual Trainer’s Challenge of the Unwanted Horse was held in September, and the ninth is scheduled this year on September 19. This event raises funds for the Minnesota Hooved Animal Rescue Foundation.

Upcoming events are now listed on the Equine Center website at www.cvm.umn.edu/umec on the homepage as well as on the Facility Information page.

Undergraduate programming is going strong in horseback riding, horse health, and basic horsemanship. More courses are under development as student interest increases and resources improve. Students are responsible for all the care of the horses at the Equine Center and are really getting to know what it takes to be a horse owner!

The Piper Clinic Trainer Series, a series of lectures by Equine Center faculty on horse health and sports medicine, was held the last two weeks of March and the first two weeks of April. Topics included equine vision, anatomy, rhythm and balance, and prepurchase examinations.

For more information on programs and opportunities at the Equine Center, visit www.cvm.umn.edu/umec or contact Kelly Vallandingham at valla020@umn.edu.
Host your next event at the Leatherdale Equine Center’s Barenscheer Arena and Nutrena Conference Center

West Metro Equine Practice 763-479-2932

Is your horse ready for spring?

Here’s a checklist:

- **Coggins test**
  An annual blood test required for traveling and showing

- **Vaccinations**
  Help protect your horse against West Nile virus, eastern and western encephalitis, tetanus, rabies, and more

- **Parasite control**
  Customized for your horse based on fecal egg counts

- **Dental care**
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The University of Minnesota Equine Center offers a great event space with the Barenscheer Arena and Nutrena Conference Center. For best availability, reserve your event space now. Contact cvmumec@umn.edu or 612-625-1452 for more information.

Visit the University of Minnesota Equine Center on the Web at [www.cvm.umn.edu/umec](http://www.cvm.umn.edu/umec)