MILNE Lecture

Exertional Rhabdomyolysis

Not Just Tying-Up Anymore

COURTESY AAEP

ERICA LARSON

Few things are scarier than watching a horse sweating, trembling, and twisting in pain during a tying-up episode. Stephanie Valberg, DVM, PhD, Dipl. ACVIM, ACVSMR, professor at and director of the University of Minnesota (UM) Equine Center, in St. Paul, and other scientists have worked tirelessly to understand the disorder and its cause, and they continue to uncover ways to manage it. She chronicled her work in unraveling the causes of tying-up, or exertional rhabdomyolysis (ER), during the Frank J. Milne State-of-the-Art Lecture.

To help the audience understand the various manifestations of ER, Valberg gave an in-depth review on muscle function. Then she described research (Read more at TheHorse.com/31322) and reviewed the latest on assessing and treating ER types.

Evaluating ER Horses

Different ER types require distinct treatment approaches, so it's important to seek a clear diagnosis. To evaluate horses veterinarians should:

- Obtain a detailed history;
- Perform a full physical exam;
- Take blood samples for laboratory tests;
- Perform an exercise response test; and
- Collect and evaluate a muscle biopsy.

After determining specific diagnoses, they can make treatment recommendations. Here we'll focus on Valberg's suggestions for managing specific types of ER.

> "A detailed history is the foundation for evaluating ER because the disorder can be intermittent in nature and not evident on physical examination."
>
> DR. STEPHANIE VALBERG

Sporadic ER

Veterinarians typically see sporadic ER in horses with "adequate" performance histories. Causes include muscle trauma, overexertion, exhaustion, and dietary and electrolyte imbalances.

Practitioners should manage cases similar to how they would initially manage acute ER: rest, paddock access, and weekly serum creatine kinase (CK, an enzyme that indicates muscle damage) checks. If horses can't be turned out, hand walk them a few minutes at a time, gradually increasing to longer spans.

She also recommended balancing vitamins and minerals in the diet and providing a salt block or supplementing feed rations with salt to ensure the horse maintains proper sodium levels. And although it hasn't been proven scientifically, anecdotal reports indicate selenium and vitamin E supplementation can help prevent ER episodes.

Chronic ER

Several chronic ER types impact horses:

Recurrent exertional rhabdomyolysis (RER) is caused by an abnormality in muscle contraction and relaxation regulation, and excitement can trigger it. It shows up most commonly after low-intensity work. There is no genetic test for RER, so veterinarians diagnose it based on clinical signs and presence of risk factors, and they often look at serum CK and aspartate aminotransferase (AST, another enzyme indicator of muscle damage) levels to confirm muscle degeneration. To manage RER:

- Keep at-risk horses in a quiet environment and in a routine to reduce stress;
- Exercise affected or at-risk horses daily, and choose relaxing/quiet workouts;
- Consider placing affected horses on a high-fat, low-starch diet, which provides them with adequate calories for their work but reduces the amount of muscle damage sustained during exercise; and
- Ensure horses consume 30 to 50 grams of salt daily and consider electrolyte supplementation when it's hot/humid.
- Practitioners can consider administering dantrolene, a drug that slows calcium release from muscle storage sites, 60-90 minutes before exercise.

Suppressing estrus could help mares prone to RER during heat cycles, and some complementary therapies, such as massage, done by experienced professionals could help promote muscle relaxation.

Malignant Hyperthermia (MH) Anesthesia drugs can trigger MH-associated rhabdomyolysis (characterized by a high fever, metabolic failure, and death under general anesthesia), she said, and MH is difficult to control via diet/exercise. Consider genetic testing if horses' family members have/are suspected of having the disease.

She recommended treating affected horses with dantrolene 30-60 minutes prior to inducing anesthesia, but remember that cardiac arrest is difficult to prevent once rhabdomyolysis begins.

Convention Tweet

Christy Corp-Minamiji, DVM
@cminamiji

Fascinating! PSSM mutation may have been selected for in Middle Ages w/development of the great horse.

PSSM Types 1 and 2 Since PSSM1 involves a genetic mutation, the gold standard diagnostic test is a genetic test, Valberg said. Veterinarians can also use clinical signs, consistently elevated serum CK and AST levels, and muscle biopsies as adjunct diagnostics. They must diagnose PSSM2 with a biopsy because researchers haven't yet identified a genetic mutation in affected horses.

Management recommendations for PSSM are based on strict diet and exercise. When planning a diet for a PSSM horse:

- Select hay comprised of 12% nonstructural carbohydrates (NSC) or less to help keep plasma insulin concentrations stable; insulin encourages additional glycogen production, which leads to problems;
- Ensure PSSM horses consume additional fat to aid oxidation in skeletal muscles. Common fat sources include vegetable oils, rice bran, and animal-based fat (such as lard and fish oil); and
- Consider feeding a commercially available low-starch, high-fat concentrate feed if you find managing fat supplements cumbersome.

Dealing with overweight PSSM horses can be particularly challenging, so:

- Rather than supply additional fat to the diet, fast overweight horses for six hours pre-exercise. This elevates free fatty acid levels in the blood plasma, which has a similar effect to feeding extra fat; or
- Find forage with a very low (around 4%) NSC concentration and provide additional calories via fat and concentrates.

Valberg recommended working with your veterinarian on choosing feed for an overweight PSSM horse.

The other key aspect of managing PSSM is providing exercise, Valberg said, noting that neither management approach alone will effectively control the disorder. After a horse suffers an ER episode, limit total stall rest time to 48 hours or less, then turn the horse out. Excitable horses might need mild sedation before turnout to prevent excessive galloping. Limit hand walking to five to 10 minutes immediately after an ER episode, as even this amount of exercise could trigger another episode.

Prior to beginning an exercise regimen, give the horse two weeks to adjust to turnout and diet changes. Then begin quiet, relaxed ground work that includes lots of stretching in a long and low frame. Begin with about four minutes of walking and trotting and add two minutes daily.

Valberg said it usually takes about three weeks to build up to under saddle work, and she encouraged adding two minutes of collection or canter after the relaxed warm-up period. Build the horse back up slowly if no additional ER episodes occur.

Learn more about acute and chronic signs of PSSM1 and PSSM2 by visiting TheHorse.com/31322.

Seasonal Pasture Myopathy

This fatal rhabdomyolysis type is most common in pasture-kept horses in the fall. Until recently veterinarians did not know the cause. But Valberg identified the box elder tree as a common denominator in pastures affected horses inhabited. Box elder seeds contain the amino acid hypoglycin A, which is also found in a related fruit known to cause severe illness in humans.

Scientists found conjugated hypoglycin A metabolite methylenecyclopropylacetic acid, known to be toxic in other species, in affected horses' serum and urine.

A similar disease in Europe—equine atypical myopathy—is likely caused by the compound found in the European sycamore tree seed. Valberg and Swiss and Belgian researchers identified these in pastures housing affected horses.

This disease is preventable by removing horses from pastures containing box elder or European sycamore trees.

Take-Home Message

"It's not just tying-up anymore," Valberg said. ER now encompasses myopathies including metabolic disorders, calcium regulation deficits, and more.

"It's been a remarkable and wonderful journey being able to piece these things together," she concluded.