



U of M Horse Newsletter

Providing research-based information to Minnesota Horse Owners

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Research Update: NSC and Glycogen Repletion

Muscle glycogen is a potentially limiting substrate for horses during intense exercise. Low-starch, high-fat concentrates have become popular for performance horses, but their effect on muscle glycogen usage and repletion following exercise is unclear. Researchers at Kentucky Equine Research completed a study designed to evaluate the effect of non-structural carbohydrate (NSC) intake on substrate utilization and glycogen repletion in thoroughbreds during training and following multiple bouts of intense exercise.

The horses on the study were fed three diets containing varying levels of NSC and fat, including a high NSC and low fat diet (high); a moderate NSC and moderate fat diet (medium); or a low NSC and high fat diet (low). The horses were exercised regularly for 3 weeks before being asked to perform an intensive exercise tests designed to deplete muscle

glycogen stores. Muscle biopsies were taken at 0, 24, 48, and 72 hours post-depletion to determine the effects of diet on muscle glycogen depletion and repletion.

Muscle glycogen depletions averaged 33%, 30%, and 36% for the high, medium, and low NSC diets, respectively. At 72 hours post-depletion, muscle glycogen had increased and averaged 94%, 94%, and 63% of pre-depletion levels for the high, medium, and low NSC diets, respectively. Muscle glycogen repletion was lower for horses fed the low NSC diet 72 hours post-depletion.

This data suggests that low NSC concentrates may not provide enough substrate for glycogen repletion following bouts of intense exercise.

For more information on this research, click [here](#).

Summarized by: Amanda Grev, MS, University of Minnesota

Ask the Expert: Red Horse Urine in Snow

Question: My horse's urine appears red in the snow. My horse seems healthy, but should I be concerned (see photo)?

Response: Horse urine can change color after being voided due to the presence of plant metabolites (pyrocatechines) in the urine that turn a red or orange color when mixed with oxygen. This can happen year around, but is especially noticeable in snow. This can also be noticeable in new, light-colored shavings.

Normal horse urine appears colorless to yellow to dark yellow when voided. If the urine appears red, brown, or orange as it is being voided that can indicate a serious problem and your veterinarian should be called immediately.

Bottom line, if horse urine is an

abnormal color as it is being voided or you observe frequent urination or straining to urinate call your veterinarian immediately. If your horse is passing normal colored urine that turns red or orange in the snow, that is normal.

By: Julie Wilson, DVM, MN Board of Veterinary Medicine and Krishona Martinson, PhD, University of Minnesota, Photo Credit: Chad Martinson



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Upcoming Events

Equine Pasture Management Program
One farm visit and a customized pasture and grazing management plan
April 1 - August 1, 2017
\$650 per farm
Registration opens 4/1/2017

Visit our [Facebook page](#) for "Research Update Monday", "Tip of the Week Wednesday", "Friday Funny" and special events.

Visit (and share) our [Webinar Library](#) for recorded lectures on over 20 horse-related topics.

Check out our latest horse-related videos on our [YouTube Channel!](#)

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The Risk of Administering Intramuscular Banamine

Flunixin meglumine (Banamine) is a nonsteroidal anti-inflammatory agent that is very effective for the relief of pain, inflammation and fever in horses.

Banamine is available in both injectable and oral formulas. Veterinarians routinely use the injectable formula intravenously (IV). Horse owners may have oral and injectable Banamine on hand to relieve pain. It is important for owners to be aware of the risks if they give intramuscular (IM) injections of Banamine or other medications.

Banamine as well as a number of other drugs (ivermectin, progesterone, anti-histamines, phenylbutazone, dipyron, vitamin B complex, synthetic prostaglandins) can cause muscle damage when injected. While this

usually causes few problems, spores of the bacteria *Clostridium* can lie dormant in healthy muscle and begin to proliferate if muscle is damaged. Growth of this bacteria causes Clostridial myositis, a serious and sometimes fatal condition. Within 6 to 72 hours of the bacterial infection beginning, horses develop swelling and crunchy areas of gas under the skin at the site of the IM injection. As bacterial toxins are released into the bloodstream horses quickly become very ill with signs of depression, colic, purple gums, and reluctance to move. Diagnosis of Clostridial myositis is made by identifying gas produced by Clostridia in the damaged muscle using ultrasound and by examining aspirates of the area for bacteria.

It is very important to recognize and treat Clostridial myositis early

and aggressively to decrease fatalities. Antibiotics such as intravenous penicillin and oral metronidazole are used in addition to surgically opening and cleaning any affected areas. Between 31% and 73% of horses survive Clostridial myositis but it may take months for the skin and muscle to heal.

Although the risks of Clostridial myositis are relatively low, whenever possible it is best to administer Banamine orally or have a veterinarian administer the drug IV. If any IM injection is given, the area should be monitored for signs of swelling and gas pockets under the skin and horse watched for fever or depression. Call your veterinarian immediately if you notice these signs.

By: Raffa Teixeira, DVM and Stephanie Valberg DVM, PhD

Breeding with Cooled Semen

By: Scott Madill, DVM, University of Minnesota

As a mare owner, cooled semen gives you access to stallions all over the country, and to some extent internationally. In addition to the stud fee, most stallion owners charge fees per shipment, typically \$250 and up, making it within your interest to only ship once per cycle when possible. Since cooled semen is only viable for about 48 hours after collection, in order to achieve a single shipment breeding you need to closely monitor your mare and have a clear understanding of the stallion's shipping schedule. When looking at your breeding contract there are several things you need to take note of:

1. Which days does he collect? For Quarter horses and Paints, it is common for stallions to collect every-other-day from February 15 to July 15; others may be on a

Monday-Wednesday-Friday schedule and still others might collect any day they are needed.

2. How far in advance do you need to order? For most horses you need to place your order for semen the day before he is collected, a few will allow you to call the morning of (typically by 8 a.m.).

3. How is the semen shipped? If they ship FedEx or UPS you will get it the day after collection. With counter-counter shipment you can pick it up at a local airport the same day as collection (typically late afternoon or evening), but it typically costs more and someone has to go to the airport. If the stallion is collected on a weekend then counter-counter is your only option for those days.

4. Does the stallion have any times when he won't be available?

Sometimes a stallion will be unavailable in a window of time if he is off at a show, so you will need to schedule your mare around this. Monitoring your mare is best done by a veterinarian using ultrasound. When she starts her cycle, an initial exam will decide when she needs to be checked again based on the size of her follicle and the amount of edema in her uterus. Generally, once she develops good edema and has a follicle over 35 mm in diameter it is time to think about ordering semen. If the breeding was timed well, the mare is young and healthy, and the stallion is fertile and a "good shipper" you should expect at least a 60% pregnancy rate. If your mare is not pregnant she should be ready to come back into heat in approximately two weeks and the process can be started over again.