



U of M Horse Newsletter

Providing research-based information to Minnesota Horse Owners

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Research Update: Meal Frequency and NSC

The inclusion of starch-rich concentrate feeds is a common practice among horse owners in an effort to increase the caloric density of the horse's diet. If a horse is fed ample concentrate (greater than 4.5 pounds per day), feeding these concentrate meals only one or two times per day may result in larger meal sizes and may result in altered insulin and glucose concentrations, fluid balance and behavior.

Researchers at North Carolina State University set out to determine if both meal frequency and dietary energy source affect postprandial changes in glucose and insulin concentrations in horses.

Eight mature idle gelding horses were rotated through treatments. Horses received either two or three meals per day for 7 days. Meals included a high (43%) and low (18%) NSC concentrated feed. Combined, treatments formed four groups: low NSC concentrate in two meals per day, low NSC concentrate in three meals per day, high NSC concentrate in two meals per day and high NSC

concentrate in three meals per day. On day 7 of the treatments, blood was collected before feeding (baseline) and for 5 hours after feeding the morning meal.

Baseline insulin concentrations tended to be higher for horses fed high NSC compared to low NSC concentrates and in horses fed two compared to three meals per day. In addition, the baseline glucose-to-insulin ratio was higher in horses fed high NSC compared with low NSC concentrates. Horses fed high NSC concentrates had higher area under the curve and peak insulin after feeding compared to horses fed low NSC concentrates.

These findings suggest that NSC content of a concentrate feed has an impact on baseline insulin, glucose-to-insulin ratios, and on insulin concentrations. Meanwhile, the number (and therefore size) of meals per day had fewer impacts on glucose metabolism.

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

Summarized by: Krishona Martinson, PhD, University of Minnesota

Horse Hearing

By: Ashley Griffin, MS, eXtension HorseQuest

A horse's hearing is much keener than humans. They use their hearing for three primary functions: to detect sounds, to determine the location of the sound, and to provide sensory information that allows the horse to recognize the identity of these sounds. Horses can hear low to very high frequency sound, in the range of 14 Hz to 25 kHz (human range = 20 Hz to 20 kHz).

Horses' ears can move 180 degrees using 10 different muscles (compared to three muscles for the human ear) and are able to single out a specific area to listen to. This allows horses to focus on the direction from which the sound is coming, isolate it, and run the other way.

Horses are very sensitive to the tone of voice. Owners need to use a confident tone and avoid overly emotional tones such as shrills and high pitches. Owners also want to give voice commands in a way that gives the horse tools to distinguish them.

For example, if you are longeing a horse at a walk and want to perform an upward transition to a trot, you may want to divide the word "trot" into two syllables and raise your voice an octave as you say "to – rot"! When performing the downward transition to the walk, you would lower your voice an octave on the second syllable of "wa – alk."

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Upcoming Events

Equine Castration Clinic

Saturday, May 9 2015

Cambridge, MN

Appointments required

612-625-6776

Lunch and Learn Webinar

Wednesday, June 17, 2015

Noon to 1 pm (central)

"Managing Marish Behavior" presented by Dr. Scott Madill, Univ. of Minn.

To join, click [here](#).

Equine Pasture Management Program

One farm visit and a customized pasture and grazing management plan.

April 1 through August 1.

\$650 per farm. To register:

www.regonline.com/EquinePastureManager2015

Visit our [Facebook](#) page for

"Research Update Monday", "Tip of the Week Wednesday", "Friday Funny" and events.

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Ask the Expert: Hiring Someone to Plant a Horse Pasture

Question: I recently purchased 10 acres that was soybeans last year. I want to plant a horse pasture, but I have no equipment and I'm not sure what to plant. How do I find someone to plant it and what should I plant?

Response: For help in planting a pasture, horse owners have several options:

1. Find a local farmer and pay him or her to plant the pasture.
2. Contact a local Ag Coop to determine if they have a division that specializes in planting pastures. Central Sota and Federated Coop are examples of Ag Coops.
3. Contact your local Soil and Water

Conservation District to see if they offer planting services; many of them do.

4. There are private companies and individuals that offer pasture services including Prairie Restoration, United Farmers Coop (UFC), and Farmers Mill and Elevator are examples.
5. Finally, you can rent equipment from a local equipment rental site and plant the pasture yourself.

Assuming you have well-drained sandy loam soils, we recommend planting either [BLM # 4](#) or [CHS # 4](#). Recent research has shown these grass pasture mixtures yield well and are preferred by horses.

However, before you hire someone or plant your pasture, make sure to take a soil sample. Watch our [YouTube video](#) to learn how and why its important.

For additional information on pasture management, visit our [website](#). The University of Minnesota also offers a fee based pasture management program; information is available [here](#).

Note: The companies listed in this article are meant to serve as a resource and are not endorsed by the University of Minnesota. The listed companies do not represent a complete list.

By: Krishona Martinson, PhD, University of Minnesota

Carbohydrates: the Good, the Bad and the Ugly

Take home message: it is usually the amount of carbohydrates fed at one time, not the inclusion of carbohydrates, that causes problems in the healthy horse.

Carbohydrates are a hot topic in the horse industry. Carbohydrates are essential in all horse's diets. There are, however, different kinds of carbohydrates found in horse feeds.

The good: The most common kind of carbohydrates are hemicellulose and cellulose present in forages. Cellulose is digested by microbes that reside in the horse's hindgut. The microbes break the cellulose down into individual sugars; using the sugars themselves. As a by-product of that process, they produce volatile fatty acids which the horse can absorb and use as its primary energy source. In many cases, all of a horse's energy requirements can be met by forages.

More good: Another common kind of carbohydrate is starch; present in high quantities in cereal grains, like oats, corn and barley. Starch is digested into individual sugars by enzymes produced by the horse in its foregut. There, the individual sugars can be absorbed by the horse and used as an energy source if the horse requires more energy than can be provided from forages alone.

The bad: If the horse's capacity to digest and absorb the sugars from starch is not adequate, the sugars pass from the foregut to the hindgut. The amount of starch that can be digested and absorbed in the foregut depends primarily on the amount of starch fed and the amount of time it spends in the foregut before it is pushed along the gastrointestinal tract and into the hindgut. A general rule of thumb is that no more than 0.5% of the horse's bodyweight in cereal grains

should be fed in one meal. For a 1,000 pound horse, it can digest and absorb the sugars from 5 pounds of cereal grains at one time. To feed more than that amount runs the risk of overwhelming the horse's digestive and absorptive capacity of the foregut and consequently having starch overflow into the hindgut. If more than 5 pounds of grain is necessary per day, it should be divided into two feedings per day.

The ugly: If starch overflows the foregut and enters the hindgut where microbes utilize it as their personal energy source, the by-products produced in this scenario result in a more acid environment that alters the microbe population and the integrity of the lining of the hindgut. Both of these changes are hazardous to the health of the horse and can potentially lead to laminitis.

By: Marcia Hathaway, PhD, University of Minnesota