



# U of M Horse Newsletter

Providing research-based information to Minnesota Horse Owners

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## Carbohydrates: The Good, The Bad and The Ugly

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 carbohydrate is 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 body weight 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 and founder.

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.

Next month we'll continue our discussion by focusing on feeding carbohydrates.

*Author: Marcia Hathaway, PhD, University of Minnesota.*

## Ask the Expert

By: Marcia Hathaway, PhD, University of Minnesota

**Q:** What is the ideal water temperature during the winter months?

**A:** Most adult horses weighing 1,000 pounds require a minimum of 10 to 12 gallons of water each day for their basic physiological needs. During winter months, water should be kept between 45 to 65°F to maximize consumption.

Waterers should be cleaned regularly, and clean, fresh water should always be available. If using a tank heater to warm water, inspect it carefully for worn wires or other damage, and check the water for electrical sensations or shocks. Snow or ice is not an adequate water source for horses.

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### Upcoming Events

#### Draft Horse Owner Education Program

Saturday,  
February 18, 2012  
Leatherdale Equine Center  
St. Paul, MN

To register (\$25):

[www.regonline.com/DraftHorse](http://www.regonline.com/DraftHorse)

*Topics include: Legal Concerns; Conformation; Shivers; Marketing; Roaring; Hay Selection; Nutrition; and In-Hand Showing*

#### Four State Equine Business Conference (MN, NE, IA, MI)

Saturday,  
February 25, 2012  
Leatherdale Equine Center  
St. Paul, MN

To register (\$30):

[Registration Link](#)

*Topics will be offered both online and in-person and will include equine insurance, liability, accounting, marketing, and a local round-table discussions.*

#### MN Horse Expo

April 27-29, 2012  
State Fairgrounds

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## Maintaining a Good Relationship With Your Farrier

Once you find a farrier that works for you and your horse, the following suggestions will help you keep and maintain a good working relationship with that farrier.

**Scheduling.** Maintain a regular trim schedule (usually every 6 to 8 weeks), even during the winter.

**Work Space.** Make sure you have a flat, clean, well-lit area for your farrier to work in. This will help insure everyone's safety and will allow for better inspection of your horse's hooves. A rubber mat can add traction and comfort for both the horse and your farrier.

**Horse Behavior.** Ensure your

horse stands well, is clean, and well behaved. Tie your horse and practice picking up the hoof; cleaning the hoof should be done on a daily basis. Kicking, biting, leaning, or pulling the leg away should never be tolerated. One bad move from an unruly horse can put a farrier out of business.

**Horsemanship.** Learn how to properly handle and discipline your horse. Ask for help from an experienced or professional horseman if necessary.

**Be Prepared.** Be prepared, have your horse caught, brushed, and ready for the farrier. This is

especially important if multiple horses are scheduled to be trimmed or shod.

**Payment.** Make sure you understand your farriers fee structure, that your payments are prompt, and you schedule appointments in advance. Although emergencies can occur, scheduling in advance will help everyone plan.

**Communication.** Finally, remember that communication between a horse owner and farrier is key to developing a good relationship and ensuring your horse has healthy feet. *Authors: K. Martinson, PhD, U of M and K. Otterson, Cty. Line Farm.*

## Research Update - Diet Affects Dental Needs of Horses

Have you ever wondered if your horse's diet affects their need for dental work? Previous studies have suggested that temporomandibular or jaw joint (TMJ) kinematics (chewing motion) depended on the type of food being chewed or masticated, but accurate measurements of TMJ motion in horses chewing different feeds has not been published. A group of researchers in the College of Veterinary Medicine at Michigan State University set out to determine if the TMJ has a larger range of motion when horses chew hay compared to pellets (grain).

An optical motion capture system was used to track skin markers on the skull and mandible (lower jaw) of seven horses as they chewed hay and pellets. A virtual marker was created on the midline between the mandibles at the level of the 4th premolar teeth to represent the overall motion of the mandible relative to the skull during the chewing cycle.

Frequency of the chewing cycles

was lower for hay than for pellets. Excursions (chewing motion of mandible) of the virtual mandibular marker were significantly larger in all three directions when chewing hay compared to pellets. The mean velocity of the virtual mandibular marker during the chewing cycle was the same when chewing the two feeds.

The range of mediolateral displacement of the mandible was sufficient to give full occlusal contact of the upper and lower dental arcades when chewing hay but not when chewing pellets. These findings support the suggestion that horses receiving a diet high in concentrate feeds (grains) may require more frequent dental prophylactic examinations and treatments to avoid the development of dental irregularities associated with smaller mandibular excursions during chewing compared to horses fed a diet high in forages.

In a separate study conducted at Virginia Tech, chewing direction

both before and after dental treatments was investigated. Seventeen horses were observed while consuming small portions of mixed grass-alfalfa hay. Chewing direction was determined by the horse's jaw motion as either counter-clockwise or clockwise.

Horses chewed counter-clockwise 60% of the time before dental work and 37% of the time after dental work. While chewing direction varied between the horses, there was a significant effect of lateral excursion on chewing direction with counter-clockwise chewers having a greater left lateral excursion. There was also a trend for clockwise chewers to have greater right lateral excursion. Dental treatment did not appear to have an impact on chewing direction.

The take home message: horses should have a yearly dental evaluation, especially if the horse is consuming a diet low in forage or high in grains (pellets).

*Summarized by: B. Allen and K. Martinson, PhD; Univ. of Minn.*