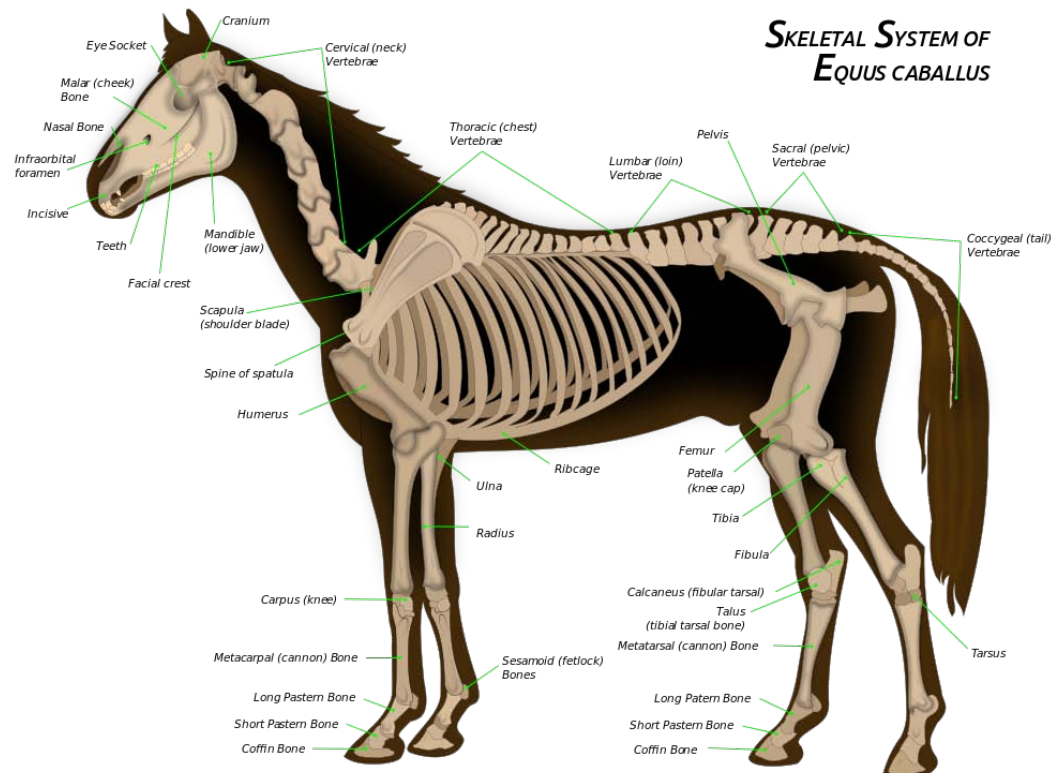




Horsemanship Handbook 2016-2017

Section I: Anatomy of your horse:



Section II First Aid for your horse:

What should be in your first aid kit?

What to have in your first aid kit

- Vet's phone number
- Regional map
- Stethoscope
- Thermometer
- Scissors
- Flashlight and batteries
- Unbreakable bowl
- Latex gloves
- Bandaging material (telfa pads, gauze, cotton sheet or roll, vetwrap, elasticon, tape, duct tape - best if inner layers are sterile)
- Antiseptic scrub and solution (i.e. betadine)
- Sterile saline
- Hemostats
- Pliers (for pulling nails)
- Splint material (i.e. 6" PVC split in half lengthwise)
- Eye ointment
- Diapers or other absorbent pads
- Clean syringe (20cc or larger without needle)
 - The unbreakable bowl and clean syringe are for water or saline and used for rinsing wounds. The hemostat is for picking out dirt and debris from wounds. The antiseptic scrub should only be used for cleaning wounds when diluted to a weak tea color and should not be used around the eye. The eye ointment can be used for other wounds as well as in the eye. Finally, the diaper can be used to absorb blood or other fluids.
- In general, it is safer to call your veterinarian or a referral center than to wait on something that you are unsure about or to medicate the horse yourself. Most importantly, remain calm. If you are nervous (quite natural), contact a friend to help.

Vital Signs	Normal	Call if
Temperature	99-100.5°F	over 102°F
Heart Rate* *heart rate is higher in foals	30-44 bpm	over 50 bpm
Respiratory Rate	8-12 bpm	over 30 bpm
Mucous Membranes	pink, moist	dry, tacky or not pink
Capillary Refill Time	1-2 seconds	greater than 3 seconds

What to do while you wait

You have called the vet. While you are waiting, there are a few things you can do to help your horse with the following issues.

Colic: Keep walking the horse if possible, this helps the discomfort and helps pass manure. The horse can be allowed to lie quietly if it's tired. Remove feed so it doesn't make the blockage any worse. Monitor any vital signs you know (heart rate, mucous membrane color). Give medications **ONLY** if your veterinarian recommends it or okays it.

Choke: Remove food and water. Keep the horse calm and relaxed.

Wounds: Clean any contaminated wounds with tap water or sterile saline. Cover with a clean dry bandage. Check to see when your horse last had a tetanus booster. Do not apply ointment to the wound (unless directed by your veterinarian) until your veterinarian arrives.

Lameness: Find an outdoor extension cord if x-rays might be needed. If the horse is trying to fall over, put the horse in a stall and stay clear. If the horse can walk to the barn fairly well, move it into a stall near water and electricity. If the horse might have a fracture and if your horse is close to the barn, stay there; if your horse is out in the paddock, work on finding a way to get the trailer to the horse.

Nervous system: Put the horse in a stall with minimal objects (including removing hay and grain to reduce the chance of choke) or in a small area by itself. Make sure everyone leaves the stall or area to avoid injury, and try to decrease stimulation (e.g. avoid other horses moving by, noise, lights).

Respiratory/breathing: Minimize exercise and stress. If it could be stranglers, try to isolate the horse, its gear and its caretakers. Take the horse's temperature if it is used to it. If the barn or

horse is hot, put cold water along the horse's backbone and/or chest. Clean, cool water should always be available to your horse, especially in an emergency.

Eyes: Put your horse in a dark stall.

Urinary system (e.g. straining to urinate, discolored urine): Take a heart rate. Collect urine if he/she urinates. Don't exercise the horse.

Emergency preparedness at the barn

- First aid kit
- Veterinary phone numbers
- Names/phone of friends that can assist
- Clear directions to referral center
- Trailering information
- Emergency evacuation plan

Section III Grooming:

How to Groom a Horse

Grooming is very beneficial for horses, not only because it cleans their coats, it adds beauty to the appearance of the horse, and also because it promotes healthy emotional bonding between the horse and the person, and helps to develop trust. Grooming a horse helps to release natural oils into the coat that help protect your horse from natural elements such as wind and rain. It also helps to promote healthy blood circulation. Grooming should be done on a regular basis to keep a horse's coat and skin healthy. In addition, grooming gives you the chance to check over your horse's body to make sure that your horse is healthy and has no external wounds and such. Thankfully, unlike dogs and cats most horses respond positively to grooming, making it an easy and enjoyable task because the horse would stand there but be careful; always go round the back of the horse keeping a hand on its back, that way it knows you are there and think, if it kicks it will kick your leg instead of your head. Don't go in front of the horse because if you go in between the horse and what it is tied to, you could get trapped if it shifts.

Step 1

Secure your horse. Although some horses are trained well enough to stand still while grooming, many will feel the natural need to walk away from you after a time. Keep them in place by tying the lead rope in a quick release knot, securing them to a post, or having a friend or colleague (if you are working with horses) hold them

- If you're tying your horse to a ring or post, always use a quick-release knot. Should something spook your horse and they try to run or fall, a regular knot could cause them to break their neck which is dangerous to the animal but also make sure you don't make the knot too loose that they can escape from you.

Step 2

Pick your horse's hooves. To pick up his foot, run your hand down his leg and gently squeeze his tendon. If he doesn't lift his foot, lean against his shoulder and lift it off the ground. Using a hoof pick, start at the heel of the foot and pick forward to the toe, carefully removing all rocks, dirt and other foreign objects. Make sure to clean the grooves on either side of the frog. The frog (the V-shaped squishy part of the hoof) is more sensitive, so avoid using the hoof pick there. Using a hoof pick on the frog could cause lameness as it is very sensitive. ^[1]

- By picking out the feet first, you are more likely to notice lameness before you've finished grooming the horse. It is highly recommended as not only can you spot any lameness, but you can help prevent it by removing stones and dirt that could pierce the frog or cause bruising. Picking the hooves out before riding is almost essential, especially if your horse is shod, as it makes it a lot more comfortable for the horse. Picking your horse's feet can also help remove and prevent thrush, a sticky black fungus that develops around the frog.
- There is really no specific time in grooming as you can take your time to pick a horse's feet, as long as it's done before and after your ride as it is important to remember this.

Step 3

Use a curry comb to remove loose hair from the horse. Rubber curry combs are built to loosen up dirt, mud, and bits of things caught in your horse's coat which generally you follow the direction of the way that the fur goes. It should always be used before brushing for the best

results and to keep the horse well maintained. Use the curry in vigorous, small circular motions over the horse's muscles, avoiding bony areas like the face, spine and legs.

- On one side, work your way from the neck, to the barrel, and all the way to the rump. Then, repeat on the other side of the horse.
- The curry comb should be rubbed in a circular motion in the direction opposite of the hair growth. This will pull up loose hairs and dirt that otherwise would just be brushed over.

Step 4

Use a dandy brush (also called the hard brush). A dandy brush is a hard-bristled brush used to take off the dirt and hair brought out by the curry comb. Use the brush in short straight flicking motions to allow the bristles to get all the way through the coat and whisk the dirt out. Start at the neck and work towards the tail. It's not recommended to use a hard brush on the horse's legs as they are much more sensitive than the body. The legs are bony and narrow and it is uncomfortable for the horse if brushed too hard with the dandy brush.^[2]

- Do not use on the face, ears, mane, tail, legs, or any clipped area, as this can cause the horse to be in immediate discomfort. This can stress the horse or make them scared or startled.
- If necessary use a soft cloth on any parts of the horse that the horse resents being brushed with the dandy.

Step 5

Clean up with a soft brush (also known as the body brush). The soft brush, as its name suggests, can be used on all areas of the horse as a result of its texture(Be careful around the face though). The soft brush removes any remaining surface dust, and hair. Finish up your body-grooming by brushing down the entire body, including on sensitive areas like the face and legs.

- If you want to use a separate brush for the face, use a face brush. They are designed for brushing horses' faces. They look like miniature soft brushes and are much easier to fit on a horse's face.

Step 6

Clean the horse's face. Take a wet sponge or washcloth and wipe your horse's eyes and clean out his nose. Use a different sponge/cloth/wipe for the dock area (under the tail). Because

these areas are constantly moist, dirt and mucus build up and need to be cleaned out. Always remember to be gentle when doing this; these areas are sensitive.

- Use different sponges/cloths for each horse (if you are grooming multiple) to avoid spreading infection.

Step 7

Brush out the mane and tail. Use a wide- bristled mane comb or brush to get tangles out of the mane and tail. Before you start, use your fingers to separate the hairs caught in large tangles. Hold the whole tail/large section of mane in one hand (to avoid tugging) and brush it out with the other. When brushing the tail, stand to the side of the horse to prevent startling them or causing them to kick. This way if the horse kicks out you are in a safer position and less likely to be hurt. Continue taking small pieces from the side until you have brushed the whole tail.

- Make sure to talk to the horse and keep your hand on the horse so that it does not get spooked.
- If you want to use hair product, use natural mane/tail sprays that are all natural rather than silicone based. Spray it on, work it in, and other than helping with the detangling, it will moisturize and make the hair look shiny.^[3]

Step 8

If it is summer or hot, you may want to spray the horse with fly spray as flies can be very **irritant**. They can build up around the face, spread infections and large flies, called horse flies, can bite and cause pain. The flies will most likely annoy you, too. Just spray the horse being careful to avoid the face.

Section IV Handling your horse:

Approaching the horse

When catching a horse, approach from its left shoulder, holding the lead rope in the hand nearest the horse and the halter in the opposite hand. Move slowly but confidently, speaking to

the horse as you approach. Read the horse's intention by watching its body language. If it shows signs of moving away, move more slowly, or move away and head it off before it goes too far in another direction. Be careful not to get into a situation where you could get kicked, which can happen if your horse feels cornered or threatened.

Leading the horse

Hold the lead line with your right hand, 8 to 10 inches away from the horse's head, while holding the end, or bight, of the line with your left hand. If the horse acts up, you can let go with your right hand, but still hold on with your left hand. Always use a lead line so you have this "safety zone" and to prevent getting a hand caught in the halter.

Tying the horse

There are two ways to tie a horse: tying with a single lead and cross-tying. When tying with a single lead, tie to a solid fixture, such as a post or a ring in a solid wall, and use a quick-release knot (Figure 3). Some horses learn how to untie a quick-release knot, so you may have to put the end of the line through the loop.

Always tie with a lead rope and not with reins. When tying to a hitching rail, stagger the horses on both sides so that they cannot fight. Tie horses far enough from the end of the rail so that they cannot move around to the other side.

Tie the horse at or above the level of its withers, and tie it short enough that it cannot lower its head and get a foot over the lead. The horse should be able to stand with its head at a comfortable level. Never tie to wire fences, posts where the knot could slip to the ground, or to anything that may come loose if the horse pulls back. If tying a horse in a stall, do not tie to the stall door. A panicked horse could pull the door off its hinges and drag it.

Do not leave your horse tied up without supervision, especially if it is alone. The horse is a herd animal and may panic if left alone, possibly injuring itself or the person who tries to free it.

Cross-tying can be dangerous if not done properly, so it should be done only where there is secure footing, if possible where there is a wall a few feet behind the horse to keep it from backing up too far. Use cross-ties with safety snaps and set them high in the wall to prevent the horse from getting a leg over if it rears. The cross-ties should be made of material that can be cut quickly, and should be tied with enough slack for the horse to hold its head comfortably. Do not use rubber ties. If the horse pulls back, rubber ties can throw the horse backward if they break or forward when the horse gives. Never leave a horse unattended on cross-ties.

Always untie the horse before removing its halter. When turning it loose, lead it through the gate and turn it around to face the direction from which you entered. It is safest to remove the halter, but if you must turn him out with a halter, use a leather one because it will break more readily than nylon if the horse becomes entangled. After you remove the halter, make the horse stand quietly for several seconds before letting it go completely. This will help prevent

the horse from developing a habit of bolting away and kicking at you in the process. Make sure you have an escape route in case the horse spins around and kicks out.

Section V: Nutrition:

The importance of water

Marcia Hathaway, PhD, University of Minnesota

Horses require a clean, fresh supply of water at all times. If a horse does not get enough water to drink, the results can range from impaction colic to dehydration to death. A 1,000 pound horse, at rest in a cool climate, eating lush pasture needs a minimum of 3 and up to 10 gallons of water to drink each day. If supplemental water isn't provided to horses, the incidence of colic is increased dramatically.

Young horses, pregnant or nursing mares need even more water. Horses can sweat large amounts (2 to 4 gallons of sweat each hour) in order to control their body temperature. A horse that is sweating, whether just from the heat of the summer sun or from working hard, will need more water. With high ambient temperatures, humidity and/or exercise, voluntary water consumption can increase 2 to 4 fold. An exercising 1,000 pound horse in the summer heat could easily need to drink 12 to 16 gallons of water if it is eating fresh forages and much more if it is being fed dry hay. Some water will be supplied by fresh forage, but not with dried hay.

Horses will drink more when the water offered is clean and between 45° and 64° F. The water trough should be clean, kept out of directed sunlight, and located near a shelter but away from feed sources.

Although it is a common belief that a hot horse should have water withheld until it is cool, there is no scientific basis to support that belief.

Even though there has been a loss of water and the horse is actually dehydrated, the horse may not necessarily be thirsty. This is the basis for the phrase: "You can lead a horse to water but you can't make him drink"! You should, however, encourage your horse to drink in order to prevent further dehydration. Ideally, dehydration should be avoided completely by allowing a horse that is working opportunities to drink every couple of hours. Although it is a common belief that a hot horse should have water withheld until it is cool, there is no scientific basis to support that belief.

Carbohydrates

Carbohydrates will most likely be the largest part of the horse's diet. They can be divided into two groups: **structural** (fiber) and **non-structural** (sugars and starches). Structural carbohydrates are found in the largest amounts in the roughage that the horse eats (e.g., hay, grass) and are able to be digested thanks to the design of the horse's intestinal tract. Following digestion in the stomach and small intestine, the horse's digestive material enters the large intestine (hindgut), which in the horse consists of the cecum and colon. The cecum and colon contain microorganisms that are capable of breaking structural carbohydrates down into an energy source that the horse can absorb. This is why horses get so much nutritional value from grass and hay.

It is important to feed good quality hay that is free of mold and dust and is cut at an appropriate length and stage of maturity. Hay that has too coarse a stem or hay that is too fine can cause digestive problems such as impactions. Hay that is overly mature when it is cut has little nutritional value to the horse due to an increase of a component called lignin, which is completely indigestible for the horse or the microbes in the gut flora.

Horses can easily digest nonstructural carbohydrates, mostly in the small intestine. These sugars and starches are primarily found in grains (e.g., corn, oats, barley) and provide a more concentrated form of energy than structural carbohydrates (thus, the term "concentrates" is often used when referring to grains and grain mixtures). It is important to recognize that the horse's digestive system evolved to process a roughage-based diet; therefore, concentrates should be used only to supplement the forage program and meet nutritional requirements that cannot be met by forage alone. The horse should always be fed a minimum of 1 percent of its body weight in forage (on a dry matter basis); the ideal is 1.5 to 2 percent of its body weight. Feeding less roughage than this can lead to health issues such as colic and ulcers.

There are currently a number of "safe" feeds marketed to the horse industry. These feeds are manufactured with ingredients that are high in digestible fiber and low in sugars and starches. For example, "safe" feeds often use ingredients such as beet pulp and soybean hulls, which have a high composition of digestible fiber, a low starch content and avoid use of ingredients

such as corn, which is high in starch. Often feed tags will give an average starch percentage listed on their guaranteed analysis to allow owners of those horses with special needs (e.g., Cushings, metabolic syndrome, chronic laminitis, ulcers or recurring colic) to select a horse feed with a low starch content.

Protein

Protein, which is necessary for body growth and maintenance, is a nutrient that is poorly understood by many horse owners. Proteins are broken down in the small intestine into amino acids that are recombined to make proteins in the body that make up muscle, hair and hoof. It is important to realize that proteins are composed of amino acids, and the proteins that the body makes have very specific amino acid sequences. The amount of protein that the body can synthesize is limited by the amino acid that basically runs out of supply first. For horses, this is generally lysine. Therefore, on many bags of horse feed where the protein percentage is listed, it might also say "added lysine" and list an additional percentage for the lysine content. This, in essence, improves the protein quality without increasing the total amount of protein in the feed.

There are advantages to improving protein quality without increasing the total protein amount. It is a commonly held misconception in the horse industry that higher protein is associated with higher energy. In reality, proteins are the most difficult energy source for the horse to digest and convert to usable energy. Protein requirements for growth and maintenance vary depending on age and workload. In general, growing horses need a higher percentage of protein than mature horses. A growing horse generally needs between 12 and 18 percent crude protein in its diet for proper growth and development. Horses need more protein when tissue is being laid down for growth (i.e. young horses in rapid growth phases, gestating mares in their last trimester, and lactating mares that need to produce large quantities of milk). Mature horses will most likely do fine on a lower protein percentage (8 to 12 percent), depending on their workload. Horses that are in intense training need more protein than the maintenance horse because they are developing muscle tissue; however, most will still do well on a 12 percent protein feed. Feeding horses higher levels of protein than they need simply means that the horse breaks down the excess protein and excretes it

as urea in its urine, which is rapidly converted to ammonia. This is not desirable since excess ammonia can lead to respiratory problems in stabled horses.

It is important to recognize that forage is also a source of protein. Select hay that will help meet the horse's protein requirement. Hays can be categorized as either grass hays (e.g., bermudagrass, timothy) or legume hays (e.g., alfalfa, peanut, clover). In general, legume hays are higher in protein than grass hays. Good quality legume hay can have roughly 18 to 22 percent crude protein, while good quality grass hay can have 10 to 16 percent crude protein. Again, quality and growth stage at harvest determine how digestible the hay is and influence how much protein the horse receives from it.

Fats

Feeding high-fat diets is a relatively new trend in the horse industry. It has been demonstrated that horses can tolerate a fairly high level of fat in their diet. Fat is an excellent and easily digestible source of energy. Commercial feeds that are not supplemented with additional fats contain approximately 2 to 4 percent fat. Many commercial feeds are now supplemented with fat in the form of some type of stabilized oil. These feeds can contain anywhere from 6 to 12 percent fat. Since adding fat to a feed increases its energy density and the horse will require less feed, it is important to be sure that all other nutrients (i.e., protein, vitamins, minerals) are also high enough to meet your horse's requirements. While commercial feeds will be nutritionally balanced, if you are increasing the fat in your horse's diet by simply pouring some type of oil or fat supplement on the feed, it is important to be sure that you are meeting his other nutrient requirements and not just his energy requirement.

Vitamins

Vitamins are critically important organic compounds. They must be present in the body to enable important reactions to take place that allow the animal to live. Vitamins are divided into two categories: the water-soluble group consists of the B-complex vitamins (e.g., B₁, B₂) and the fat-soluble group is comprised of vitamins A, E, D and K. Some vitamins also have

associated names (for example, B₁ is also known as thiamine). It is important to recognize that the horse synthesizes many of the vitamins it needs and therefore does not typically need dietary supplementation of all vitamins. This would include vitamin C, B-vitamins and vitamin K; therefore, you will often not see these vitamins included on commercial horse feed tags. It is important to check your feed and be sure that all of your horse's vitamin requirements are being met since vitamin deficiencies can lead to various health problems. However, it is also important to realize that extreme excesses in these vitamins are not desirable either, particularly regarding fat-soluble vitamins. Excess water-soluble vitamins are generally excreted in the urine; however, fat-soluble vitamins are stored readily in the animal's fat tissue and therefore can build up to high levels if fed in excessive amounts. Since excessively high levels of vitamins can lead to toxicity, it is important to use good judgment when feeding nutritional supplements that are high in particular vitamins. In most cases, a good forage program combined with a well-formulated concentrate will provide adequate vitamins to meet your horse's requirements.

Minerals

Minerals are critical inorganic materials that must be present in adequate amounts for the body to function properly. Minerals are another item that can be found in supplements on feed and tack store shelves. It is important to understand that mineral needs will change depending on your horse's age and status (i.e., if the horse is working, gestating or lactating). Most commercial feed companies balance their feed to meet the mineral requirements of different classifications of horses. Forage will also provide minerals. In some cases, additional supplementation of some minerals may provide desirable results. For example, biotin, zinc and copper supplemented above requirements have been shown to improve hoof strength. However, care should be taken because excessive amounts of minerals may also cause toxicities, lead to serious health conditions or interfere with absorption of other minerals.

If your horse does not receive a commercial concentrate or eats very little of it, it may be important to supplement additional vitamins/minerals to his forage diet by feeding a product called a ration balancer. Ration balancers are manufactured by many feed companies and are designed to be fed at a low level (approximately 1 pound per day) that contains the needed

vitamins, minerals and protein. It is also possible to meet vitamin and mineral requirements by providing a free-choice loose salt-vitamin-mineral mix. Horses are inefficient lickers, so loose mixtures tend to work better than salt blocks. Also, mineral blocks are generally less than 5 percent mineral and more than 95 percent salt, so they do little to provide for the horse's vitamin/mineral requirements. A loose vitamin/mineral premix or a ration balancer is a good option for horses maintained on pasture and adapted to eating all-forage diets. If providing a loose mixture, a general rule of thumb is to expect horses to consume 1.5 to 3 oz. per day.

One common mineral ratio you will see when looking at a bag of feed is the calcium:phosphorus ratio. It is important to check that both commercial feeds and vitamin/mineral premixes have a calcium:phosphorus ratio between 1:1 and 2:1. If the phosphorus levels are high in relation to calcium, calcium will be pulled from the bone into the blood stream to balance the calcium:phosphorus ratio. This is not typically a problem for grazing animals since phosphorus is fairly low in grasses, but grains are very high in phosphorus and commercial feeds are generally supplemented with some form of calcium. Feeding single grains, such as oats, can cause an inverse calcium:phosphorus ratio if calcium is not supplemented in some form. Another important mineral consideration is your horse's sweat loss. Horses that are in moderate to intense work and are sweating heavily lose electrolytes in their sweat. For these horses, it may be necessary to supplement both salt and additional electrolytes (such as potassium). A balanced electrolyte mix can be added to the horse's grain mixture as needed.

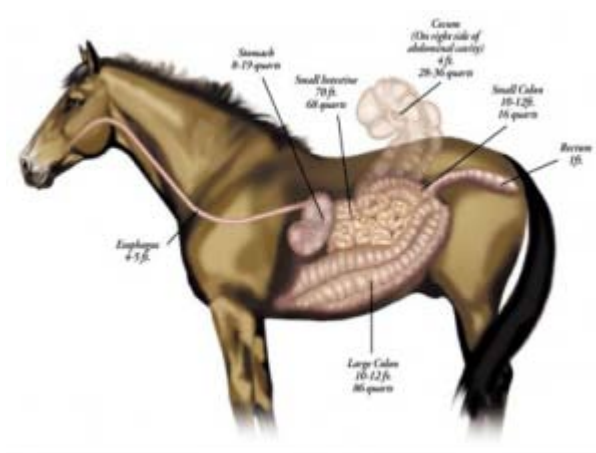


Figure 1. The equine digestive tract. Courtesy Dr. Reynolds

Why should it matter if we are in the 21st - See more at:

<http://www.equestriansearch.com/article/eqdigestio3120#sthash.N4UrVk2E.dpuf> Why should it

matter if we are in the 21st century or any other century as far as equine nutrition is concerned? Actually, the science of equine nutrition is very different today than it was only a short time ago. As we learn more about how horses digest and utilize nutrients from feeds, and as more feeds become available, our feed choices broaden and change. We have recently learned that digestibility of a feed is almost as important as its nutrient content. We also now have many newly available feeds, like beet pulp, soybean hulls and rice bran, which come from the human food manufacturing industry. Following is a discussion of current equine nutrition topics, starting with the equine digestive tract.

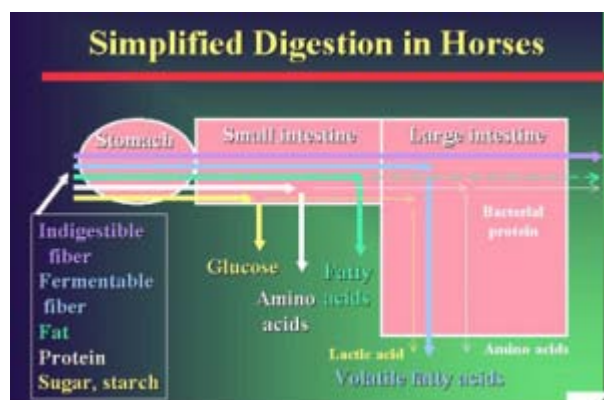


Figure 2 - Simplified digestion. Courtesy Dr. Reynolds

The Equine Digestive Tract

No matter what your horse looks like on the outside, and no matter what job you ask him to do, he has one thing in common with all horses--his digestive tract. Everything he eats must be processed through that tract in order to be used by his body for energy, growth, reproduction and maintenance of health (See Figure 1).

Horses are grazing animals with digestive tracts best suited for eating forages for 15-20 hours

per day. They have relatively small stomachs, which hold only about as much as a 5-quart ice-cream pail. The actual physical capacity of the stomach is larger, but the equine stomach begins to empty when it is only two-thirds full. This is a safety mechanism to prevent lethal stomach rupture, since horses cannot vomit. Feed proceeds from the stomach through the small intestine, a 70-foot-long, tubular-shaped organ, where most of the starch, sugar, fat, vitamins and minerals and about half of the protein from the feed should be digested and absorbed into the bloodstream. The remaining nutrients and the plant fibers continue on to the hindgut (See Figure 2 -- Simplified Digestion in Horses).

Horses have huge fermentation vats in the hindgut that hold 23-30 gallons of fibrous material while billions of bacteria and other organisms work to digest it. Fiber-digesting bacteria produce volatile fatty acids (vfa), or very short-chain fats, that are used by bacteria and horses for energy. In fact, horses on total forage diets receive 70% of their energy from these vfas. Some of the remaining protein and some minerals, especially phosphorus, are absorbed from the large intestine, along with water, which is recycled within the body. Bacteria in a healthy horse's hindgut also produce B-vitamins that can be used by the horse.

The equine digestive system is very efficient if horses are fed mainly grass or hay. But, if we feed more than a few pounds of grain in meals, the system doesn't work very well. Grains are very high in starch (50-75%) compared to grasses and hays (<10%), which the digestive tract is designed to process. Often, the excess grain starch can't be digested in the beginning of the tract by the horse's enzymes for several reasons:

- ☐ He just doesn't have enough enzymes,
- ☐ The starch is too compact to be broken down,
- ☐ There isn't enough time, because most feed goes from the mouth through the foregut and into the hindgut in less than 6 hours. Starch entering the hindgut is used, by starch-digesting bacteria, to produce lactic acid. The addition of lactic acid, to the hindgut, results in a lowering of hindgut pH. Many of the beneficial, fiber-digesting bacteria cannot tolerate the more acidic conditions, so they die and release toxins into the hindgut. The presence of these toxins often results in colic and founder. This cascade of events begins with high-grain (starch) rations and ends with colic and founder. Research results show that feeding 5 pounds or less of



Figure 3 - The digestive tract at a glance. Courtesy Dr. Reynolds

grain-based feeds daily greatly reduces the risk of colic and founder in horses. We know that horses doing only light work do very well on high-forage rations, and don't need much grain. But, many horses need more energy than forage alone can provide. Since grain starch in the hindgut is such a problem, how do we choose an energy source? Do all grains contribute equally to this problem, or are some better than others?

The Digestive Tract at a Glance Foregut - Stomach and Small Intestine - 1-6 hours - Horse Enzymes digest sugar, starch, fat and protein. Hindgut - Cecum and Colon - 18-36 hours - Bacterial Enzymes digest plant fibers.

- See more at: <http://www.equine-search.com/article/eqdigestio3120#sthash.N4UrVk2E.dpuf>