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How Proper Pasture and Grazing Management Can Reduce Your Hay Needs: Part 2: Grazing Management

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Pasture is a valuable nutritional resource for horses. Full realization of pasture's nutritional value can only be achieved when horse owners and managers understand the types and quantities of nutrients supplied by pasture, and apply sound grazing management principles. In this two-part article series, nutritional aspects of horse pasture (Part I) and grazing management strategies (Part II) will be discussed. By appreciating the nutritional value of horse pasture and managing grazing horses properly, horse owners can optimize horse health and decrease feeding costs.

Pasture's full nutritional value can only be realized by implementation of sound grazing management principles. These principles are aimed at providing a nutritious feed source in a manner that sustains pasture productivity. The most important principle of grazing management is knowing when to start and stop grazing within a given pasture. Grazing should start when pasture grass reaches a minimum height of 6 to 8 inches and stop when the average plant height is 3 to 4 inches for cool season grass (e.g., tall fescue, orchardgrass) or 2 to 3 inches for warm season grasses (e.g., bermuda grass, crab grass). Failure to follow this rule results in depletion of the plant's carbohydrate reserves. Carbohydrate reserves are necessary for plant re-growth. Repeated depletion of the plant's carbohydrate reserves can eventually kill the plant. When desirable forage plants die off, weeds invade and the pasture's nutritional value is diminished; additionally, the proportion of pasture consisting of bare ground increases leading to soil erosion.

Figure 1. Rotational grazing behind 1/4 inch electric poly-tape (single strand to the left of the ponies). A small portion of pasture is sectioned off using 1/4 inch poly tape to create a "grazing-cell". When the grass is grazed to 3 to 4 inches the horses are moved to a new cell, which allows the forage in the previously grazed cell to re-grow. These two ponies grazed this 0.4 acre pasture from late April to December with no supplemental feed. Note the uniformity of the pasture plant height and absence of "roughs" and "lawns". Photo Credit Dr. Paul Siciliano.

How Proper Pasture & Grazing Management Can Reduce Your Hay Needs, continued.

Therefore, pasture grass height should be evaluated on a daily basis and when the average grass height is reduced to 3 to 4 inches for cool season grasses, or 2 to 3 inches for warm season grasses, the horses should be moved to another pasture. If additional pasture is not available then horses can be moved to a dry-lot. A dry-lot is a fenced area providing 600 to 1000 sq.ft./horse and containing no vegetative cover. Dry lots should be carefully designed using several layers of compacted aggregate of varying size to promote drainage and prevent accumulation of surface water and mud. Two excellent articles from the University of Kentucky and Maryland outlining the specifications for dry-lot surfaces can be found at:

http://www2.ca.uky.edu/agc/pubs/id/id164/id164.pdf
http://mda.maryland.gov/resource_conservation/Documents/mud07.pdf

Rotational grazing is another important management tool that promotes efficient pasture use and aids in preventing overgrazing. In a rotational grazing system an entire pasture is sub-divided into smaller "grazing cells". The area of the grazing cell is sized to contain enough forage for 1 to 7 days of grazing. For example: Using the values in Table 1, two 1000 lb horses require 0.4 ac for seven days of grazing, which is equivalent to an area of 135 ft x 135 ft (i.e., one 1000 lb horse requires 96 ft x 96 ft or 9,216 square ft; therefore two horses require 2 x 9,216 = 18,432 square ft.) The square root of 18,432 is ~135; therefore a square grazing cell having sides equal to 135 ft provides 18,432 square feet. Grazing cells are generally constructed of 1/4 inch "poly-tape" temporary fence (see Figure 1). Efficiency of pasture utilization is improved by shortening the number of days a horse spends in a grazing cell; however, the shorter the time frame in a single grazing cell, the more labor required to move the horses. By confining the horses to grazing cells, as opposed to allowing them access to the entire pasture, they graze forage more uniformly, as opposed to continuous grazing systems where horses graze some sections very short (termed "lawns"); while leaving other areas un-grazed (termed "roughs"). The lawns are eventually over-grazed and invaded by weeds and are often sights of erosion; whereas, the roughs go un-grazed as they are often latrine areas containing very mature plants that are undesirable for the horse. Horses should not remain in a grazing cell for longer than 5 to 7 days, as "roughs" and "lawns" will generally develop. Rotational grazing improves the efficiency of pasture nutrient use by horses while enhancing sustainability of this valuable resource.

When horses are moved from a pasture/grazing cell, the area should be clipped to maintain uniformity and prevent roughs and lawns. Additionally, manure piles should be scattered by harrowing or with a pitchfork in the case of small pastures (e.g., a few acres or less). This practice also promotes more uniform grazing. Scattering manure piles should be done on a relatively sunny and dry day to reduce the spread of parasite eggs.

Table 1. Grazing cell dimensions providing approximately 7 days of grazing for a single horse of varying body weight.[a]

Horse BW, lbs	Grazing Cell Size: Acre per horse	Grazing Cell Size: Length (ft) x Width (ft) per horse
250	0.05	48 x 48
500	0.11	68 x 68
750	0.16	83 x83
1000	0.21	96 x 96
1250	0.26	107 x 107
1500	0.32	117 x 117

[a]Assumptions: 3% of bodyweight in dry matter (DM) forage is eaten, trampled or otherwise made unfit for consumption; pasture contains 2000 lbs DM/ac; one half of the total forage is grazed (i.e., grazing begins at a forage height of 6 to 8 inches and ends at a height of 3 to 4 inches.

Restricted grazing is another management practice that can be used in conjunction with rotational grazing. Horses having relatively low caloric requirements (e.g., mature idle horses, horses ridden lightly 3 to 4 times per week, mares in the first 4 months of gestation, breeding stallions in the off-breeding season) can consume their daily caloric requirement in a period of 8 to 10 hours of grazing. Grazing for a period longer than 8 to 10 hours results in excess caloric consumption and potential negative health consequences (e.g., obesity and increased laminitis risk) and the potential for damaging pasture by overgrazing. Restricted grazing is accomplished by either placing horses in a dry-lot for part of the day or by use of a grazing muzzle aimed at preventing pasture intake. Results from recent research conducted at NCSU demonstrated that allowing pasture access for 8 to 10 hours per day followed by 14 to 16 hours per day of pasture restriction (accomplished by use of grazing muzzle) did not negatively affect digestive health of the horses. However, attention should be paid to the time of day when horses begin grazing in a restricted grazing regime. Results from studies conducted at NCSU suggest that turning horses out to pasture at mid-morning might be

How Proper Pasture & Grazing Management Can Reduce Your Hay Needs, continued.

beneficial in reducing non-structural carbohydrate (NSC) intake. Excess consumption of pasture NSC has been implicated in pasture associated laminitis. Non-structural carbohydrates increase in a linear fashion during the daylight hours and can remain elevated over the nighttime and then decline to lows during the mid-morning in cool season grasses. Non-structural carbohydrates are also influenced by season of the year. They accumulate in cool-season grasses (e.g., tall fescue, orchardgrass) during the spring and fall of the year. Therefore, restricted grazing of cool-season grass pasture during the spring and fall may be useful in decreasing laminitis risk. If a horse or pony is prone to laminitis, pasture access is not recommended.

Tall fescue is a common cool-season grass found in North Carolina. In addition to its ability to accumulate NSC during the spring and fall of the year, it can also contain an endophyte that produces a mycotoxin that has negative effects on pregnant mares at parturition. The negative effects on the mare and foal include: prolonged gestation length, thickened placentas, early placental separation, agalactia (mare does not produce milk), still birth. These problems are alleviated by removing pregnant mares from tall fescue pasture or hay 30 to 60 days prior to the predicted foaling date. Despite potential short-comings, tall fescue is still a valuable nutrient source for horses and can be a valuable component to equine pastures grazed by horses other than pregnant mares in the last 3 months of gestation. Additionally, there are varieties of tall fescue that contain "non-toxic" endophytes (e.g., Max-Q, Pennington Seed, Madison, GA) that prevent the problems associated with endophyte-infected tall fescue.

Finally, an agronomist or trained extension personnel should be consulted regarding pasture fertilization and weed control. It is important to note that good grazing management practices are some of the best weed control strategies. The following serve as a summary of key points:

1. Start grazing when forage height is at least 6 to 8 inches and stop when it's reduced to 3 to 4 inches.
2. Practice rotational grazing.
3. Incorporate restricted grazing for horses w/ minimal caloric requirements (e.g., mature idle horses, light exercise etc...).
4. When using restricted grazing, begin grazing in the morning to minimize non-structural carbohydrate intake and potential laminitis risk – especially in spring and fall.
5. Tall fescue is an important and valuable forage in North Carolina, but should be avoided by pregnant mares in the last three months of gestation.
6. Follow good agronomic practices (e.g., weed control and fertilization).

American Pharoah or Michael Phelps…who wins the gold medal?

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It's that wonderful time in competitive sports when nations across the world send their best athletes to compete in a wide variety of events. For a couple of weeks we are all perusing the news and social media to see who won the gold in events we never knew existed. There is sudden interest in sports such as table tennis, artistic gymnastics, and canoe slalom. Most of us; however, are probably most interested in the equestrian events. We cheer on our favorite horse and rider pairs. As equestrians ourselves, we often say that both horse and rider deserve the medal, that one would not be able to perform as well without the other. But what if the horse competed against the rider, instead of with them? Who would win the individual gold medal then?

Who wins the gold medal, continued.

The first event to naturally compare horses and humans would be running. In fact, horses and humans have competed against each other in various races at different distances. You might think that the horse would always win, but event organizers can manipulate the situation so that the human will cross the finish line first. But let's look at some numbers before we discuss face-to-face races. The average speed of a galloping horse is between 25 and 30 mph, but the fastest recorded speed over a short distance is a whopping 55 mph! So what about humans? While a human's average speed while sprinting is 15 mph, Usain Bolt, considered to be the "Fastest Man in the World", holds a world record for the 100 meter sprint with an average speed of 23 mph. However, he reached top speed of approximately 28 mph during the sprint!

Photo Credit by Ryan Brooks.

When comparing mid-range distances, horses rise to the top once again. The fastest time over a mile, on dirt, was set by Dr. Fager in 1968. His time was 1:32 1/5. An even faster time (1:31.23) was set on a turf course in 2010 by Mandurah. Now let's look at humans. The fastest time over a mile is a mere 3:43.13, more than double that of the horse. Let's keep in mind that the horses carry added weight of tack and a rider (Dr. Fager carried 134 when he set his record!), and must deal with the rider balancing themselves, thus shifting the weight on the horse's back.

There is considerable variation in speeds during longer distances, with the marathon (26.2 miles) runner averaging about 8.8 mph. The record for a marathon was set during the 2008 Olympics, with an average speed of 12.4 mph! However, horses can maintain speeds of about 16 mph for approximately 60 miles.

It would appear that horses would win the gold medal at just about any distance, when competing against a human. But that is not always the case. Humans, if given a sufficient head start, could beat a horse in a foot race. But let's level the playing field, and put both horse and human at the same starting line. What would happen then? Humans hold the advantage with acceleration rate, as it takes a lot for the horse to get approximately 1,000 pounds moving swiftly on four legs. In distances shorter than about 40 yards a horse would be at a significant disadvantage, and a human would be able to cross the finish line first.

A second event in our horse vs human Olympics is the high jump. Who would win the gold in this event? It looks like the horse might get the gold by just half an inch! The unofficial highest jump made by a horse was 8 feet 3 inches, but the official recorded height was set in 1949 by a horse named Huaso. He cleared 8' 1". The record for the highest jump by a human was set in 1993 at 8' 0.45". The record heights set by horses and humans are remarkably similar. However, once again the horse is at a disadvantage by carrying tack and a shifting rider, and is unable to twist and contort their bodies to get over the bar like a human can.

The final event that makes for an easy comparison is the long jump. The results for this event might surprise you as did the results of the high jump comparison. The long jump record for a horse was set by a horse named "Something" in 1975. Something jumped 28 feet. The human record is held by Mike Powell, set in 1991, at 29' 4.25". Mike Powell also holds the record for a non-legal jump (due to wind aiding the jump) at 29' 5.75". So it appears the humans finally get to take home the gold.

In summary, if we were to hold a horse versus human Olympics, the horse would invariably come out on top. To keep viewer interest the International Olympic Committee would have to manipulate the events so that the human would have an advantage. But how can the horses run so fast, and so far? Putting speed and jumping distance aside, what if we were to look at horse versus human exercise physiology…would we find a difference? Stay tuned for a future article comparing horse and human exercise physiology. Spoiler alert…horses are highly tuned athletic machines with physiology that would make any human Olympian jealous!

Keeping your Sport Horse Fit During the Summer

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Photo credit by Jessica Gladney.

Fitness is arguably the most important part of keeping a sport horse sound of mind and body. Research proves that a properly conditioned horse lowers the risk of a soft tissue or musculoskeletal injury [2]. Both strength and cardiovascular conditioning is essential in maintaining a sport horse. Living in the South, however, makes maintaining that fitness quite a bit harder during the summer months. The ground quickly becomes too hard and temperatures reach the mid-eighties by ten-o-clock in the morning. Adding other forms of fitness training besides gallop sets helps prevent unnecessary stress when the weather is hot and the ground is hard. Here are some helpful tips to help condition your horse during the summer:

Controlling Ride Times- Pick a time during the week when you know you can ride without too much heat. Using the heat stress index (HSI) is a great guideline for controlling your ride times. Horses possess a natural ability to regulate their body temperature while exercising. This regulatory ability decreases as the temperature and humidity increases, which makes selecting a period of time for gallop sets when the HSI is less than 130 vital in preventing heat stress. Using alternative forms of conditioning when exercising above an HSI of 140-170 is a great way to help keep a horse fit without risking its health.

Heat Stress Index (HSI)
Temperature in Fahrenheit + Humidity = (HSI)
= <130, no problem
= 140-170, use caution
= 180 or higher, too hot to ride

Alternative Forms of Fitness- Adding in other forms of fitness training besides gallop sets helps prevent unnecessary stress when the ground is hard and the Heat Stress Index is higher. A fit horse is a happy horse and adding in other forms of conditioning helps keep your horse from becoming bored with its exercise routine.

- **Trot Sets-** Trot sets are more than a great addition to your gallop sets; they provide an excellent cardiovascular alternative to galloping on hard ground. Trotting is much less stressful on your horses' legs than galloping during the summer months when the ground resembles concrete more than dirt. You can also move this into an arena where the footing is softer. One way to ease the boredom of trotting for twenty minutes to forty minutes at a time is to ride with a friend. Sitting in two-point during your trot sets is also a great leg workout for you.

- **Hill Work-** Walking hills is a great strength training exercise for horses. Walking uphill requires the horse to push from behind while down hill demands that the horse work on balance. This is a great addition to the warm-up of a schooling or conditioning ride.

- **Trail Rides-** Fitness is fun. Getting your horse out of the ring and on the trails is a great way to combine cardio and strength conditioning. Trails combine hill work, trot sets, and galloping over different terrain. Hopefully, some of the trails are also in the woods where shade helps keep you and your horse cool.

- **Swimming and Hydrotherapy-** If you have a hydrotherapy pool, then you are set. Swimming a horse is a great way to condition without putting strain on the musculoskeletal system. Riding your horse in water is also a great way for you and your horse to cool down during a hot summer day. A word of caution for those who love to take their horse swimming in the pond, stagnant water is a breeding ground for geese, snakes, and bad bacteria. Horses that have an open cut can contract a flesh-eating bacterial infection from swimming in ponds.

Cooling Down Your Horse

Hosing off- Spraying the horse with water is not enough when cooling out on a hot day. When hosing, try to aim for the major muscles and arteries. Aiming for the neck, girth area, buttocks, and between the hind legs helps to cool the blood faster than continuously spraying one particular area. Studies show that using a sweat scraper is also essential for cooling off a horse quickly and efficiently. Hosing with one hand and scraping the water off with a sweat scraper in the other hand is recommended until the horse's skin is no longer warm to the touch.

Keeping your sport horse fit during the summer, continued.

Checking vitals- Checking a horse's vitals signs during the cool down period is a good way to see if your horse is improving and make sure that your horse is cooling down properly. Knowing your horse's normal vitals is an excellent way to keep track of any major changes while conditioning your horse. Temperature is monitored via a thermometer placed in the rectum. Another way to check for temperature is to place your hand on the horse's hide. A hot horse is hot to the touch. The heart rate is monitored via a stethoscope placed at the girth area on the left side of the horse or by checking an artery that runs under the jaw on the left side just before the head turns into the throat. Gently press with two fingers just like you would when checking your own pulse. It is essential to monitor your horse's heart rate during the cool down period if your horse suffers from heart murmur. Watch the horse's nostrils or rib cage in order to check the respiration rate. When you are looking at the rib cage, you can measure the respiration by counting when the ribs extend outward. One full breath is the horse's rib cage extends outward and then moves inward to its normal resting position. The same principle applies to watching the horse's nostrils. The nostrils flare and contract with each breath that the horse takes. By checking vitals, you reduce the risk of the horse heating back up after you release them.

Temperature, Pulse, and Respiration (TPR): Normal Ranges for Adult Horse at Rest
Temperature: 99-101°F
Pulse: 28-44 BPM
Respiration: 8-16 BPM

Icing- After your horse's vitals are back within normal range, icing a horse's legs for twenty minutes helps prevent inflammation and injury to the horse's legs. Whether you use ice wraps or place your horse's legs in a bucket of water and ice depends on what your horse tolerates and prefers.

Dehydration, Heat Stress, and Anhidrosis

Make sure to monitor for any signs of dehydration, heat stress, or anhidrosis while riding and cooling down. Dehydration is monitored via the skin pinch test. Tent the skin on the horse's neck with your thumb and index finger, then release the skin. If the horse's skin immediately snaps back into place, the horse is not dehydrated. The longer the skin stays tented, the more the horse is dehydrated. To prevent dehydration, make sure your horse has access to fresh cool water after exercise. Heat stress occurs when a horse loses the ability to control its body temperature [1]. Anhidrosis is an inability to sweat. Symptoms include a lack of sweating or delayed sweating during exercise and cooling out. Extra precautions and care are required when conditioning a horse if it suffers from anhidrosis.

Heat Stress Symptoms
Elevated respiration rate
Elevated heart rate
Temperature above 105°F
Changes in sweating pattern
Lethargy

Supplements and Electrolytes

Electrolytes- During the summer, it is essential to replace the nutrients that a horse loses while sweating. Studies show that horses can sweat 10-12 liters per hour and that a dehydrated horse has a significantly reduced ability to regulate his or her body temperature [3]. There are many different brands of electrolytes available at local feed stores or through online companies. Electrolytes can be given as a paste or supplemented in the feed. It is generally not recommended to place electrolytes in the horse's drinking water as that may actually discourage drinking.

One AC-The main active ingredient in One AC is L-tyrosine. The idea is that L-tyrosine is a key ingredient in activating a horse's sweat glands when a horse suffers from anhidrosis. One AC is fed daily via oral supplementation.

Beer-Many people in the horse industry swear by the use of dark beer in order to make a horse sweat. Dark stouts are recommended most often at the dosage of one beer per day.

Most importantly, you have to find a program that works best for you and your horse. One size does not fit all and a combination of different types of conditioning is essential for creating a well-rounded fitness program. Remember to have fun and be safe!

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Recurrent Airway Obstruction (RAO) in Horses

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Recurrent Airway Obstruction (RAO) formerly known as chronic obstructive pulmonary disease (COPD) or Heaves a disease of the equine lung. RAO is a chronic, non-infectious airway condition in horses that is a result of an allergic reaction to inhaled particles such as mold or dust found in feed or bedding. Horses also suffer from another similar respiratory disease, summer pasture-associated obstructive pulmonary disease or SPAOD, which is also caused by the inhalation of allergens present specifically during the summer months. Once these allergens are inhaled, a reaction causes the small airways within the horse's lung to constrict. As a result of the allergic reaction, lung tissue becomes inflamed and thickened, and excess mucus production occurs. RAO usually occurs in horses 6 years or older. Symptoms of heaves include:

- Coughing
- Exercise Intolerance
- Increased Respiratory Rate
- Nasal Discharge
- Wheezing
- Weight loss
- Flaring of the nostrils
- Presence of a "Heave line"- enlarged abdominal muscles resulting from the horse "heaving" or pushing the last bit of air out of the lungs at the end of exhalation

As the disease progresses it becomes more difficult for the horse to exhale, leaving the lungs overinflated. If this condition is left untreated, irreversible damage may occur to the lung resulting in permanent loss of lung function.

While one specific cause of Heaves has yet to be determined, it is thought that this disease is the result of a hypersensitivity/ allergic reaction to inhalants found in the barn (hay, straw, bedding, barn dust, etc.). Heaves primarily affects horses who are stalled for a long period of time, increasing the exposure to allergens. The two primary agents suspected in causing the hypersensitivity are mold, *Aspergillus fumigatus* and *Micropolyspora faeni* found in hay. The pasture associated allergens have yet to be narrowed down, but it is likely a combination of pollens.

While there is no definitive cure for heaves, change in management techniques to reduce or eliminate the allergens from the affected horse's environment often reduces or even resolves the clinical symptoms. If the horse is experiencing hypersensitivity to factors in its stall such as bedding, it is recommended to move the horse out to pasture with fresh grass as its primary source of roughage. If the source of the allergens are pasture related, moving the horse into a stall with low dust producing bedding such as peat moss, shredded paper, or cardboard might be beneficial. Feeding a "dust-free" diet may also be necessary. This may require soaking all hay in water prior to feeding, feeding a completely pelletized feed such as a complete feed, hay pellet, hay cube, or fermented hay products may also help reduce the presence of allergens.

Medical treatments may also be required to alleviate the difficulty in breathing. Anti-inflammatory medicines, such as corticosteroids and bronchodilators are traditionally used orally or injected. Recently aerosolized medicines have been prescribed after the development of the Aeromask (a tight fitting mask placed over the horse's nose that works much like an inhaler in humans). While the aerosolized treatments are somewhat cost prohibitive, they are very effective and have less risk of adverse side effects.

Unfortunately once a horse has been diagnosed with Heaves, it will have the disease for life. The long-term course of the disease depends upon management, improvement of air-quality, and reduced exposure to allergens. Despite the lack of a permanent cure for this disease, complete or near complete recovery from the clinical symptoms can be achieved with appropriate environment management and medical treatment. If you think your horse is suffering from recurrent airway obstruction or summer pasture-associated obstructive pulmonary disease contact your veterinarian immediately.

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Flood Injury in Horses

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Natural disasters have the unique ability to take many by surprise. While it is difficult to prepare for every scenario, horse owners who planned prior to the event will typically experience less stress thereby reducing the overall health risk. Recent flooding events have affected horses across the southeast region making it even more important to understand the necessity of preparation.

Disease Prevention:

- During disaster response, animals will be stressed and are likely to have contact with other horses and livestock after rescue which can lead to transfer of disease.
- Prior to the storm season, horses should be vaccinated with current strains for Equine Herpes I & IV, Equine Influenza I & II, encephalitides (EEE, WEE, WNV), rabies, and tetanus.
- Providing food and fresh water to animals that are sheltered is a priority. Adult horses need 5-15 gallons of water per head per day; enough emergency hay should be available for at least 7 days.

Response:

- Do your part to evacuate ahead of a flooding situation and make sure your horses can be haltered and are amenable to being led. This helps prevent injury during restraint and transportation.
- Make sure your horse can be identified during an emergency in case evacuation is necessary. This can be done by painting contact information on the horse. Microchip and or brand identification can also be helpful for the rescue team when trying to locate owners.
- Equine emergency field response, during an event, should be carried out by an experienced team (including veterinarians, first responders, and trained handlers) due to safety concerns for both humans and horses.

Triage and Medical Treatment:

- For horses stranded in a flood, stress is a major contributor to flood related equine medical problems and commonly include those discussed below.
- Injured horses should be examined by a veterinarian in the field and stabilized prior to transport. It is important to move the patient to an area for initial triage and assessment as soon as possible.
- Equine flood victims should be decontaminated by bathing with detergent soaps (such as Dawn dish soap, etc.) and require thorough cleansing to clean toxins, debris, or microorganisms from skin and to identify additional sites of trauma.
  Debris and mud should be picked out of all 4 hooves and feet should be cleaned.

Handling and Restraint:

- Chemical restraint (injectable medication) is often indicated to calm the horse and safely manage the rescue and medical evaluation and treatment of flood-stranded horses. This restraint can minimize further injury to the horse and prevent human injury as well. Medication administration should be under direct veterinary supervision as some medications are contraindicated with certain conditions.

Integument and Musculoskeletal Injury:

- Limb, head, neck, and trunk lacerations and abrasions are commonly seen in equine flood victims. If a horse is exhibiting lameness, a detailed exam to localize and prevent further exacerbation will be necessary.
- If a fracture is suspected, stabilization prior to transport will likely be necessary. This requires padded bandages and splinting material (PVC pipe cut in half, 2x4 boards, broom stick handles). Veterinarians should be contacted for directions on how to appropriately splint fractures.
- Flood affected horses may develop dermatitis (skin infection) and cellulitis (limb swelling) due to breeches in the skin's barrier capabilities from standing in contaminated water for long periods of time. This can lead to more serious complications such as septic arthritis and lameness if not treated appropriately. Horses with cellulitis will have swelling and heat in affected areas, and show signs of pain and lameness. Fungal infections can also occur after

Flood injury in horses, continued.

being exposed to flood water; this may present as ulcerative and oozing lesions with a potentially foul odor.

- Horses that are recumbent (down) for long periods of time can develop myositis (severe muscle inflammation/ cramping) that can be life-threatening. This condition should be treated by a veterinarian.

Hoof Problems:

- After standing in mud or water for extended periods of time, horses may suffer from thrush, soft soles, and sloughing of the frog which may predispose them to other hoof problems such as laminitis.

Ophthalmic (eye) Injuries:

- Traumatic corneal ulceration and uveitis (inflammation within in the eye) are common medical emergencies seen in equine flood victims due to flying storm debris and damaged stable and pasture environments. After rescue and transport, equine eyes should be irrigated with sterile eyewash solution followed by a close detailed eye exam by the veterinarian. Squinting and excessive tearing and swelling around the eye is suggestive of these conditions.

Gastrointestinal Dysfunction:

- Horses that are stressed from being stranded, injured, or unattended during a flood situation or have ingested contaminated water may develop colitis (severe diarrhea) or other forms of colic or systemic toxemia (sepsis).
- Common signs include lethargy, inappetance, colic, fever, and some may develop mild to severe diarrhea.

Neurologic Disease:

- Equine flood victims are at increased risk of developing head and neck injuries and are more susceptible to infectious diseases such as viral encephalitides or clostridial infections (tetanus and botulism).
- During patient triage, immediate action including prevention of further progression of neurological abnormalities and emergency treatment should be implemented. If vaccination status is unknown, tetanus toxoid booster is indicated in addition to tetanus antitoxin may be beneficial.

Respiratory Disease:

- Aspiration of water into the lungs of horses exposed to floodwaters may cause acute pulmonary edema and pneumonia which is usually life-threatening.
- Horses that have been stuck in deep mud or flood waters and struggle for long periods of time can develop upper respiratory tract inflammation resulting in swelling and obstruction of airflow.
- After evacuation and rescue, horses may commingle and become infected with respiratory diseases from other horses. The best way to prevent this is providing herd immunity optimization prior to storm season.

Photo Credit by Dr. Renee Porrier

Horses affected by flood waters face a variety of issues varying in degrees of seriousness. While exposure to all disaster situations cannot be prevented, it is important for horse owners to have a plan in place that includes all pets and livestock to increase survival rate and minimize loss.

Perennial Peanut Field Day

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The Perennial Peanut Producers Association and the University of Florida teamed up to host a meeting and tour of ongoing perennial peanut research at the UF/IFAS North Florida Research and Education Center near Quincy, Florida on Saturday, July 23rd . Classroom presentations included:

- **Integrating Perennial Peanut into Grass Pastures**
  by Dr. Jose Dubeux, Forage Extension Specialist, NFREC

- **The potential for sub-tropical Alfalfa and how it fits with perennial peanut operations**
  by Dr. Joe Bouton, Emeritus Professor, Dep. Crop & Soil Sciences, UGA and Owner-Manager, Bouton Consulting Group. LLC.

- **Using ornamental perennial peanuts in landscaping**
  by Dr. Gary Knox, Horticultural Extension Specialist, NFREC

Classroom sessions were followed by field tours, and concluded with a walking tour of the variety trials at NFREC.

This event also served as an opportunity to kick off a producer/buyer/hay store survey that will be conducted throughout the fall and spring. The purpose of the survey is to examine the perennial peanut and/or alfalfa buying and production practices in Florida and south Georgia. Information gathered from this survey is hoped to direct future efforts in improving quality, availability, and value of legume hays. With input from producers, brokers and customers, the end goal is to improve both supply and demand.

Photo credit:

http://nwdistrict.ifas.ufl.edu/phag/files/2016/07/Perennial-Peanut-Flower.png