

Ulcers and Stress in Racehorses: Management Makes a Difference

BY HEATHER SMITH THOMAS

ULCERS ARE COMMON PROBLEMS in Thoroughbreds, due in part to the horse's stomach anatomy and our feeding and management practices. The incidence and severity of ulcers can likely be reduced by conscientious feeding and management.

A number of studies have been done on equine ulcers. Dr. Frank M. Andrews, (professor, and director of the Equine Health Studies program at Louisiana State University) has been working on ulcer research for 28 years—first at University of Tennessee and now at LSU.

Thoroughbreds have the highest incidence of ulcers.

“Some figures are as high as 100%, but usually we talk about 93% of racehorses

having ulcers,” Andrews said. “It is difficult to know why they have more ulcers; we can't just say it's because they are stressed. Many factors influence ulcer formation and persistence, including diet and management. Racehorses have a high level of competition and energy demand, so they are usually fed a highly digestible carbohydrate diet, to meet their energy needs for training and racing.”

Dr. Carissa Wickens, assistant profes-

sor and extension equine specialist with the Department of Animal Sciences at the University of Florida, says this diet generally includes a lot of grain.

“When horses consume a lot of concentrate, this increases gastrin, a peptide hormone that stimulates gastric acid secretion,” she said. “After a large grain meal we see a rise in gastrin—which signals more acid output in the stomach.”

Horses' stomachs constantly secrete acid, not just when eating a meal, so if the stomach becomes empty, acid is still present.

“Most racehorses are housed in stalls with limited turnout, which can be stressful for some horses,” Andrews said. “Some will relax and lie down in a stall, and others don't adapt to confinement as well.”

Most racehorses have been in stalls at some point in their early lives, but it can still be stressful at the racetrack being in a stall 22 to 23 hours of the day, with all the commotion and traffic in the barn.

EXERCISE

“Exercise itself can be a factor,” Andrews said. “Often these horses are exercised early in the morning, before they are fed, so the stomach is relatively empty, and the stomach acid is concentrated in the gastric fluid. This means gastric acid can slosh around in the empty stomach; it can be pushed up (reflux) from the lower part of the stomach into the higher part that is unprotected. We call this ‘acid splash’

“We've had fasted (not fed overnight) horses exercising on a treadmill with



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an endoscope in their stomach, and watched the fluid splashing up onto the non-glandular (squamous) portion of the stomach. The horse has what is called a compound stomach, with two distinctive kinds of tissue lining.”

The large bottom portion has mucus-forming and bicarbonate (buffer) glands that protect the lining from acid, but the non-glandular (squamous) mucosa in the top part of the stomach is an extension of the esophagus and is not protected from stomach acid.

Many ulcers occur in the transitional area, called the margo plicatus, between the two types of lining.

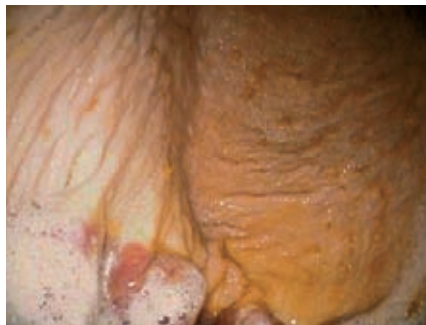
“This area has the thinnest mucosal lining and is vulnerable when exposed to acid splash, so this is where most ulcers occur,” Andrews said.

Wickens says the reason racehorses more than other horses are at higher risk for ulcers is the type and intensity of exercise they perform.

“When they are training or racing, moving at high speed, there is an increase in abdominal pressure,” she said. “As they run, the body is alternately stretched out and bunched up during each stride. All that abdominal pressure and the force of the organs in the abdomen pushing forward (referred to as the visceral piston) tends to collapse the stomach on itself. The acid that generally stays in the bottom, glandular portion of the stomach gets pushed up and splashed against the upper part—the unprotected squamous mucosa.

“The squamous mucosa and margo plicatus (demarcation between top and bottom part of the stomach) is unprotected, resulting in gastric lesions/irritation in that squamous area on the lesser curvature or right along the margo plicatus,” she continued. “The combination of exercising at fast speeds and diet can readily lead to ulcers.”

“There are very few species that have this arrangement in their stomach,” Andrews added. “This design is likely meant for an animal that grazes more or less all day. Some people think the top portion of this stomach is for storage of food when



Top: a normal stomach of a racehorse; above, a racehorse with nonglandular ulcers

PROVIDED BY HEATHER SMITH THOMAS

the horse is looking for the next area of grass. The horse could fill the stomach with a big ball of forage, and then if he runs out of grazing, this food would stay in the stomach and slowly be digested over time while the horse is searching for more grass.

“The horse was built to graze and continually eat, but as a prey animal can run fast to get away from mountain lions and other predators, and then go back to grazing,” he continued. “The horse in nature rarely has an empty stomach. We can’t definitively say humans have caused ulcers in horses, but improving our feeding and management practices can make a huge difference in minimizing gastric ulcers.

“We’ve looked at horses running on a treadmill, with a big ball of food in the stomach, and in that situation there is no acid splash. Thus, it’s probably best to feed some forage before exercise to minimize acid splash. It should not be grain, but some hay prior to the morning workout can be beneficial. A lot of trainers and owners don’t want the horse trying to run on a full stomach, especially on race day,

but some forage in the stomach is helpful to buffer the stomach acid.”

FEEDING STRATEGIES

Wickens says many trainers try to break the large amount of grain into at least three meals during the day, so the horse isn’t consuming so much at once. Many of these horses are fed early morning, mid-day, and early evening.

“When horses are going out early morning for their workout, trainers don’t want them running right after a grain meal,” she said. “Ideally they could be getting a flake or two of higher-quality hay at meal time and also have a little forage in front of them. There is art as well as science involved in spreading feedings out appropriately, or feeding very early and waiting an hour or more before they go out on the track.”

It helps if the stomach is not completely empty during exercise.

“If the horse has been consuming forage, there is some forage material still in the stomach to create a protective mat that can help prevent acid splash while galloping,” she explained.

Some trainers are feeding a little more fat and a little less grain, to try to minimize risk for ulcers, but racehorses still need a certain amount of concentrate to supply glucose for quick energy.

“They are racing at top speed for a few minutes (anaerobic work) and need that burst of energy,” Wickens said. “They need both forms of energy (fat and carbohydrates). For speed work they need the starch and sugars (non-structural carbohydrates) provided in grain to replenish glycogen stores. There is a fine line, but if you are feeding a large amount of grain, it might be good to increase the fat percentage slightly and reduce some of that starch, for gastrointestinal health.”

It takes a balance between fat and carbohydrates, and forage.

“Either for behavioral reasons or for gut health and function, many trainers are trying to give their horses more opportunities to consume forages throughout the day,” she said. “I recently spent some time shadowing the track veteri-

narian during his pre-race checks at Tampa Bay Downs, walking through the shedrows. It was interesting and good to see multiple trainers and several barns where they hang a slow-feed hay net in front of each stall for the horses to eat.

“It’s usually cool season grass hay (like timothy) in the net. When I was on faculty at University of Delaware, I often had a chance to visit Delaware Park, where I observed many trainers providing hay throughout the day via hay nets. I don’t know of anyone who has conducted a specific research study examining the effects of free access to hay in racehorses, looking at gastrointestinal health and behavior—with a baseline of what the horses are like before being moved to the track, and as they transition to track life—comparing horses with and without hay nets or forage in front of them. “However, based on the gastrointestinal physiology of the horse, and feeding behavior, we know that keeping some forage in the stomach helps buffer gastric acid and reduces the risk of developing unwanted oral behaviors such as cribbing.”

STRATEGIES TO RELIEVE BOREDOM AND STRESS

“The other thing I’ve seen, in addition to or in place of a hay net (and maybe having both is better) is that some trainers hang a jolly ball or some other toy at the front of the stall,” Wickens said. “Most stalls have solid walls so horses cannot see or touch the horse in the next stall. This might be necessary for safety and biosecurity, but makes for a long time during the day that horses are isolated from other horses. They can stick their head out the top of the stall door so they can see across the shed row and maybe see the horse next to them. Thus, hanging a jolly ball or some other enrichment device for the horse to play with can give these horses something more to do. This is another strategy to give them something to do orally.

“Many trainers recognize the benefit of having that hay net or toy or both, but management of horses in the track environment is highly variable. I think this warrants further attention within the racing industry. It’s good to see more trainers using these additional strategies, to alleviate behavioral problems (such as cribbing) and also for gastric health,” she said.

Anything that can relieve boredom and stress can be beneficial.

Stress is always a factor with confinement and minimal opportunities for grazing or turnout. This is another area that many trainers are starting to address.

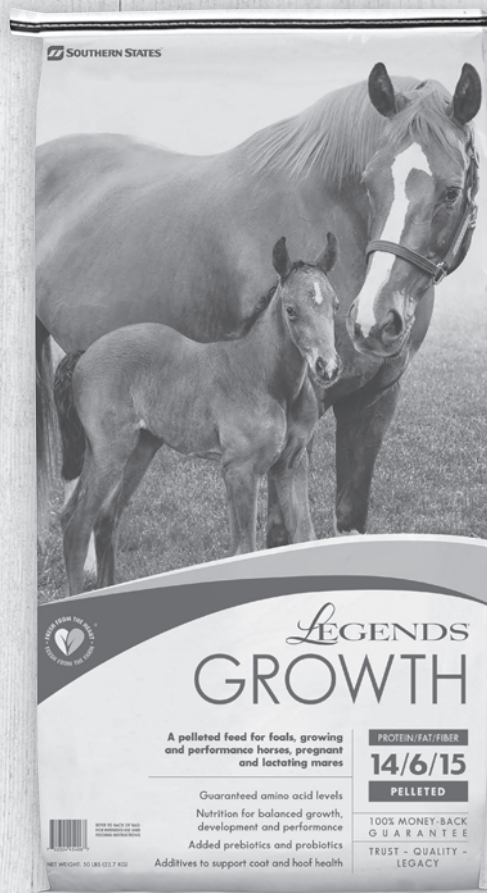
“At Tampa Bay Downs I observed grooms hand-walking their horses and letting them graze a little in between the barns,” she said. “There’s a little grass in the area around the hot walkers.”

With the track environment, it’s very hard to provide safe turnout opportunities as trainers don’t want the risk of horses injuring themselves running around in a turnout pen.

“But a couple of tracks I’ve been to I’ve seen that trainers are trying to get the horses out of the stalls a little more, maybe turning them out in a round pen,” Wickens said. “The horses are confined enough that they can’t get too rambunctious, but have

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more chance to move around and expand their visual horizons. Allowing horses some time out of their stall and giving them the chance to munch on grass might be helpful in alleviating some of the stressors that come with living in confinement and a competitive lifestyle.”

STRESS

Stress is difficult to measure in horses, but many people believe stress can be a factor in stomach ulcers since most racehorses are confined in stalls, undergo intense exercise, and are transported long distances.

“In some studies people have been trying to link behavioral issues (stereotypical behavior such as cribbing, stall walking, weaving, etc.) with ulcers,” said Andrews. “Most of those studies are not conclusive.

“We still don’t know what came first, the chicken or the egg. Do horses exhibit stereotypic behavior because they have ulcers or do they get ulcers because of the stereotypic behavior?”

“In the trials we’ve done, we have found approximately 50% of horses that crib have stomach ulcers, and those ulcers don’t disappear after successful cribbing surgery,” he said. “Also there doesn’t seem to be a strong correlation between stereotypic behavior and ulcers. With many of the horses in our GastroGard trials, the client would say, ‘That horse has ulcers; it is stall weaving and stressed out every time another horse comes around.’ Yet we’d scope that horse and not find ulcers.”

It depends on the horse.

“It’s a very individual thing,” Andrews said. “Stress and related behavior might be a factor with one horse but not another. Some people think they can tell a horse has ulcers if it has poor performance. We recently scoped 28 horses at a local racetrack, and the horse with the worst ulcers had won a stakes race the week before.”

It’s hard to make a true correlation, though ulcer severity has been linked to poor performance.

Ulcers are coming and going most of

the time in certain horses. The ulcers develop and then heal on their own and later develop again.

“It’s been said every horse at some point in its life will have an ulcer,” Andrews said. “I think it’s the nature of the horse, and the way the stomach has two different linings.”

With many horses we might never know they’ve had ulcers, but in scoping them you might see evidence of ulcers.

“Some will have ulcers and in a month or two may not have any,” Andrews said. “If I am scoping a horse for some other reason and find ulcers, however, I usually treat them. I don’t ever assume an ulcer won’t cause any problems because we don’t know. We don’t know whether the ulcers are forming or healing, so we typically go ahead and treat them.”

Ulcers can become a serious health issue for some horses.

“Some people say it’s just a grade 2/4 ulcer so they are not going to treat that one,” Andrews said. “In my mind, however, you are doing the horse a disservice by not treating. I can understand owner reluctance to treat, because of the cost of medication. Most clients will endure the cost, but there are a few that can’t afford it, and in those cases we might try supplements, antacids or coating agents.”

For a racehorse that is expected to perform at his best, you don’t want something like ulcers contributing to poor performance. We don’t know how much an ulcer might affect racing performance, but if the horse is uncomfortable, he’s probably not going to run at his best.

“When we scope a horse and the trainer says the horse can’t have a problem because it just won a stakes race, I might have to tell them that these ulcers are bad and the next time the horse races he might not run as well, unless he’s treated,” he said. “It can be difficult to convince some owners and trainers, but once they see how bad the stomach is, they usually decide to treat.”

Stress is difficult to determine or quantify in horses.

“The hyper, nervous horse is probably stressed, but I am actually more worried

about the horse that just stands quietly in the back of the stall, with intermittent appetite,” Andrews said. “That horse might have more serious ulcers than horses that are weaving, cribbing, or stall walking and being nervously active. The dull horse might be worse off; this type of behavior is abnormal. If a horse isn’t interested in people walking by or in other horses, this should be a warning sign. Yet this is not always 100% predictive of a problem either. We might think the horse has an ulcer, but it might not. This is why we recommend scoping, if possible, and not just assume the horse is OK or has ulcers.

“Some researchers have looked at cortisol levels (taking blood samples) to try to determine if a horse is stressed but haven’t found anything that definitively points to whether this horse is stressed,” he continued. “Stress is a catch-all term, and people say that if a horse is stressed, it will have ulcers, but in my experience it is difficult to tell. You can ask a person if he or she is stressed, but you can’t really ask a horse.

“Diet, exercise, and travel can be stressors. Change in diet can be a factor. Some horses live at pasture and their owners take them to a weekend show—load them in a trailer, throw in some hay and travel six to eight hours. The horse is in a new environment, eating dry hay, with a new water source, and it all adds up to stress. He has traveled and gone from high-moisture forage at pasture to a dry hay diet—which sucks water from the GI tract. The horse might be dehydrated.”

Some racehorses also suffer this kind of stress when traveling to races.

“At racetracks there are horses that stay at the track, but also some that race-and-go,” he explained. “Those horses live somewhere else, maybe locally, and show up at the track the morning of the race. That horse might have traveled a few hours and is dropped off in the race-and-go area, where it is saddled and raced later that afternoon or the next day. Then the horse is loaded back up and taken home that evening or the next morning. For some horses this could be more

CREATIVE WAYS TO HANDLE HORSES DURING RACE TRAINING

“Fair Hill Training Center in Maryland has multiple barns, and many trainers keep their horses there for at least part of the year,” said Dr. Carissa Wickens, assistant professor, and extension equine specialist with the Department of Animal Sciences at the University of Florida. “The atmosphere is quiet and relaxed. The training center is situated on 350 acres of rolling hills with trees.

“Many of the exercise riders take horses out for more than just the breezing and track workouts. They take these horses in groups, out and around the countryside. They also do a lot of controlled turnout. They are not putting horses into big paddocks or out with other horses, but into high-walled round pens. The walls are not solid; the horses can see what’s going on around them. The horse gets to be outdoors, with more time outside the stall.

“There are several training centers around the country, including here in Florida, that allow for more of that kind of setting and environment,” she said. “I talked with the trainers, exercise riders,

and grooms at Fair Hill, and they mentioned what a great environment it was for the horses, especially horses that are on rehab. It is much quieter than at the track, and very low stress, which seems to help as well.

“Some trainers don’t have this option,” Wickens continued. “Even at the track there are some horses that during the race meet (depending on how far away they are coming from) are at the track for a long time. Other trainers ship in for the day or for a couple days for the races and then go back to their home stable. Both scenarios present challenges. It’s hard to say whether horses that ship in and acclimate and stay a while, have a routine, and get used to the place, or the horses just come in for a day or two are at greater or lesser risk for developing ulcers and/or undesirable behaviors. It would be interesting to gain a better understanding of how this might impact health and performance.”

By Heather Smith Thomas

stressful than staying at the track.”

Travel and change of environment can be a big stress for many horses.

“If they are traveling more than eight hours, this can also lead to respiratory disease, especially when their heads are tied up in the trailer,” Andrews said. “At one time we were working with a company that was looking at an ulcer model. We shipped horses for 12 hours and scoped them two days later—and those horses had a high incidence of ulceration. We know travel, especially long travel, can induce ulcers. We have many clients who treat horses with GastroGard or UlcerGard, starting a couple of days before traveling and a couple of days after traveling to reduce or prevent ulcer formation.”

Even though there might be a hay bag in the trailer, some horses don’t like to eat when traveling, and many don’t drink while traveling.

“They get to the track and the water tastes different, and they don’t drink,” he said. “When the horse is dehydrated, there is less fluid in the stomach, but it is more acidic. And if the horse isn’t eating very well, the stomach might also be relatively empty when the horse is training and exercising. There might also be stress from interacting with strange horses or stress from illness such as respiratory disease. There are many stresses horses go through.”

Pain can also cause stress, if a horse is sore or lame from arthritis, has foot problems, etc.

“Any kind of pain, such as muscle soreness or injury, is a stress,” Andrews said. “If you take the horse to a different track and it’s firmer than what he’s trained on, he might get muscle sore or tweak a leg or joint.”

Pain medication, especially on race day, is not allowed.

“This is controversial because we want the horse to be comfortable,” he said. “A human with sore muscles from overexertion would probably be taking ibuprofen, but the horse can’t

have that benefit. The horse might be sore from a workout on a firm track if he’s not used to it—or any track surface that’s different.”



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ULCER TREATMENT AND PREVENTION

"If the horse has ulcers, the owner or trainer might try a week or two of GastroGard to see if the horse improves," Andrews said. "We have often recommended this when people are unable to have their horse scoped. We might suggest a trial treatment of anti-ulcer medication. The same is true with people; the doctor might suggest a couple of weeks' treatment, and if you don't feel better after that length of time will send you to a gastroenterologist to be scoped."

Sometimes antibiotics are used, or certain supplements or probiotics to try to aid stomach health. Initial treatment with pharmacological agents is customary to suppress hydrochloric acid, but changes in nutrition and management are necessary to maintain healing and help prevent recurrence of ulcers. Many dietary supplements are marketed for maintaining stomach health, and some have data to back their claims.

There are strict regulations regarding race day medications.

Wickens says trainers should work closely with their veterinarian and track officials to assure compliance with medication rules.

"In their home environment or when they first come to the track and are not yet racing (transitioning from the home stable to the track), there are medications that can be used as a preventative," she said. "This might include feeding an antacid product or using UlcerGard or GastroGard if the horses are not scheduled to race yet."

This can be helpful, especially for young horses if this is their first time coming to the track. They have to make a significant transition because most of them have had a more natural life at pasture—with their dams when they were foals, and in a group of yearlings.

"Coming into the competitive training environment, experiencing the stress of transport and transition to stall confinement, can be hard on them, Wickens said. "There is not only more risk for gastric ulcers but also for development of stereotypic behavior—which is sometimes linked with ulcers."

STEREOTYPIES AND ULCERS

"Providing some form of enrichment in the stall can help relieve boredom and stress (such as a jolly ball at the front of the stall to play with)," Wickens said. "We encourage trainers to think about any other things they could do to help horses at the track—such as hand-walking, hand-grazing, round-pen turnout, or ways to give them more visual horizons.

"Thoroughbreds tend to be reactive—which is a good thing because racehorses have to be very athletic and highly responsive," she continued. "Genetically, however, it might set them up to being not as able to cope with confinement and more sensitive to changes in their management and environment. They might be more predisposed to ulcers from the stress of being confined, and then you combine this tendency with the competitive lifestyle and high concentrate meals, relative social isolation, etc. This might be the perfect storm for developing stereotypies."

This can be an individual thing, however.

"At the track many horses perform repetitive actions such as cribbing, weaving, stall-walking; yet, other horses never develop these behaviors," Wickens said. "It might be due to that perfect combination of genetics (heritability) and environment. This is the part we still don't completely understand.

"There is strong evidence to support the theory that stereotypies might be linked to ulcers, however. When we think about when some of these horses start to develop these behaviors, it often shows up as an aberrant behavior when they go through that transition to the track. They might have a good lifestyle during their first year and a half (out on pasture rather than confined). The most critical time point is the transition into race training, and into that off-the-farm at-the-track environment."


This is when some horses start stereotypic behavior such as cribbing and weaving.

Some of Wickens' PhD work at Auburn University with Dr. Cindy McCall focused on whether there is a gastrointestinal link with cribbing.

"My work there was with adult horses with a long history of cribbing," she said. "We tested the hypothesis that cribbers (compared to normal non-stereotypic horses) have greater number and/or severity of gastric ulcers. When we video-endoscoped those horses, we did not find a significant difference between the cribbers and non-cribbers in the condition of their stomachs.

"We also did blood collection pre and post-feeding of a grain meal, looking at the gastric hormone gastrin, which is a stimulator of hydrochloric acid (HCL)," Wickens continued. "When the horse has a meal with stomach stretch and protein in the diet, this stimulates production of gastrin, which in turn stimulates the parietal cells to produce HCL, making the stomach more acidic. In our cribbing horses there was a tendency toward a heightened gastrin response after feeding grain, compared to the non-cribbing horses.

"When horses consume a grain meal, we observed a heightened gastrin response compared to when they are eating forage. After consuming grain there is a rise in serum gastrin concentrations, which relays a message to the stomach to secrete HCL. This is a natural process in response to the meal, but grain tends to cause more of that response, compared to forage. These horses are getting several pounds of grain at each feeding to meet their energy requirements for racing.

"Since my work (in 2008-09), another paper came out in 2012 from another research group that was looking at additional gastrointestinal hormones in cribbing horses," she said. "In particular they were looking at ghrelin and leptin, which are both tied to satiety (the feeling of being full and satisfied after eating). There were some differences between stereotypic and control horses, but then the researchers repeated that study in 2013, and in the second group of horses they didn't see significant differences. So this is another area that needs further investigation." 

Heather Smith Thomas is a freelance writer based in Idaho.