

GUT FEELINGS

Recent focus on equine digestive health aims to get horses as healthy on the inside as they look on the outside

BY KAREN BRIGGS

A dressage horse in motion embodies elegance, power, and grace. At least that's what we strive for. But it can be difficult for a horse to be spectacular on the outside if he feels lousy on the inside—and that's the harsh reality for many performance horses, according to research findings.

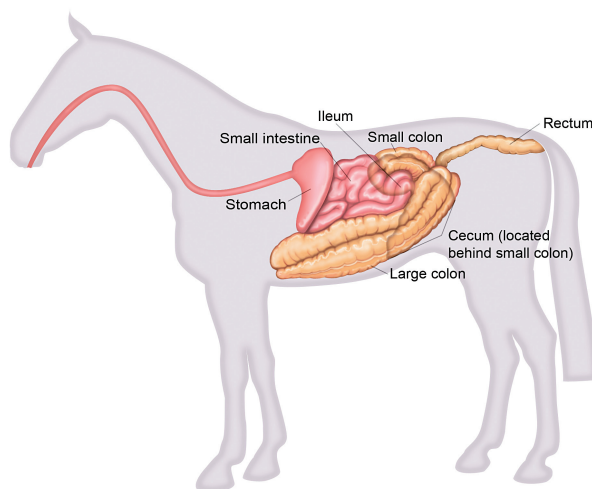
Millions of years of evolution prepared the horse for a nomadic, grazing lifestyle, but it didn't equip his digestive system to cope with the trappings of domesticity. When a horse is confined to a stall for many hours a day, eating concentrated rations at infrequent intervals, his gastrointestinal tract may balk. Gastric ulcers and the digestive upsets we call colic may result; and the further a horse's lifestyle from what nature intended—say, with little to no turnout and lots of traveling and showing—the higher his level of risk.

Human dancers may suffer for their art, but horses shouldn't have to. How can we address the digestive health of our beloved dance partners, prevent the grouchiness and performance issues that gastric ulcers can cause, and head potentially dangerous colics off at the pass?

Let's start with a brief tour of the equine digestive system, because understanding how it functions is the first step in helping to keep it happy.

Touring the Tummy

To start, let's go on a brief trip through the gastrointestinal tract. From the mouth, where grinding teeth and swishing saliva start to break up food particles; to the stomach, where everything gets further liquefied, the feed your horse ingests is pushed on to the small intestine, a convoluted tube suspended from the loin region by a fan-shaped membrane called the mesentery. The small intestine is the primary site for protein digestion and the absorption of amino acids. Grains are primarily processed here by enzymes, which break down complex sugars and starches to simpler forms that are absorbed through the gut walls. Fats are also digested and absorbed here, as are the fat-soluble vitamins A, D,



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AND MILES TO GO: *The equine gastrointestinal tract consists of a complex system of organs and is easily upset*

E, and K; calcium; some phosphorus; and the B vitamins.

The last portion of the small intestine, the ileum, leads to the hindgut, which comprises the cecum, the large (aka ascending) colon, the small colon, the rectum, and the anus. Here, digestion is largely microbial rather than enzymatic. Tough plant fibers pass through the stomach and small intestine unaffected by enzymes, but when they hit the “fermentation vat” of the cecum, they're broken down within about five hours. Trillions of symbiotic bacteria, often called gut microflora, unravel plant fibers into simpler compounds called volatile fatty acids (VFAs), which can be absorbed through the gut wall. These bacteria are an essential part of the digestive process, and keeping their populations healthy and happy is crucial.

From the cecum, the digesta moves on to the large colon, where fermentation continues. Finally, the leftovers move to the small colon, which reclaims excess moisture from the remaining material. By the time the digesta leaves the small

colon, it has become solid again and has been molded into fecal balls. Some 36 to 72 hours after it began its journey, the waste material from a horse's meal is expelled as manure.

Digestive Upsets: Acidosis and Ulcers

The horse's digestive system seems robust enough at first glance. So why is it so easily upset?

The answer lies in how we humans have taken the original feral horse—who was designed to be a wandering, grazing herbivore, covering vast distances and nibbling gritty grasses as he went—and turned him into our modern performance animal, who spends much of his time in a stall and whose rationed foodstuffs generally include substantial quantities of grain. Selective breeding has helped to produce today's gleaming, big-moving sport horse, but his digestive system hasn't caught up to his relatively new domesticated way of life.

Ray J. Geor, BVSc, MVSc, PhD, DACVIM, a noted nutritional researcher at Virginia Tech University in Blacksburg, explains: "We tend to feed horses the way we feed ourselves, not the way they want to be fed. By that I mean we prefer to serve two or three 'meals' a day and essentially starve them the rest of the time." There is good evidence, he says, that high grain intakes, especially when coupled with low forage intake, lead to the development of disturbances to hindgut function.

Horses aren't really designed to process large doses of carbohydrates, Geor emphasizes. When a thousand-pound horse is served a grain meal of more than about seven pounds, his small intestine may not be able to completely process all of the carbohydrates before involuntary muscle contractions move the meal on to the large intestine. And that's when problems can arise.

The equine large intestine is not designed to process carbohydrates. If carbohydrates reach the fermentation vat of the cecum, their breakdown produces not only VFAs but also gas and lactic acid. An increase in lactic acid lowers the hindgut pH level, thereby making the environment hostile for the beneficial gut microflora—a condition called hindgut acidosis. The microflora begin to die off and in the process may release endotoxins (poisons). Other undesirable bacteria rapidly proliferate to take their place, and the unwanted interlopers damage the intestinal mucosa. Between these effects and the lactic acid itself, the stage may be set for colic as well as laminitis.

What puts horses at risk is the combination of lots of grain fed infrequently—so the old horseman's rule about

feeding small amounts more often still holds true under the scrutiny of modern science. But as John Hall, president of Freedom Health LLC (makers of the digestive supplement product Succeed), observes, "We tend to manage our horses according to our convenience. Look at all the show horses living in ten-by-ten stalls, with zero turnout, being fed two huge meals a day. Like it or not, that's how the majority of show horses are managed and will continue to be managed."

Besides colic, hindgut acidosis can manifest itself as loss of appetite, changes in temperament, or vices such as cribbing or stall-walking, according to Geor. Horses also drop weight as their ability to absorb nutrients from their food is compromised. If these symptoms sound familiar, it's because they're also indicative of the other major digestive concern for performance horses: gastric ulcers.

Multiple studies indicate that the incidence of ulcers approaches 90 percent in racehorses and performance horses, and researchers believe that feeding and management practices are largely to blame. The upper, inner portion of the stomach's lining is made up of a non-acid-secreting cell layer that is vulnerable to the hydrochloric acid secreted by the cells in the lower two-thirds of the stomach. When the equine stomach has food in it most of the time, as nature intended, the food tends to absorb the acid, thereby keeping this upper layer from an unwanted acid bath. But horses that are fed infrequently have empty stomachs much of the time, and so acids splash around and eat into the delicate mucosa, resulting in areas of gastric ulceration, which can be very painful. Stress—from showing, shipping, dietary changes, or environmental factors—can intensify the effects; and the less forage a horse consumes, the more active the stomach acids.

Your Guide to a Healthy Gut

Experts agree that emulating the horse's natural lifestyle as closely as possible is the best way of heading off gastrointestinal problems. Here are ten simple strategies:

1. **Allow free-choice access to pasture, hay, or both.** Your horse will be able graze continually, the way nature intended. The more consistently his stomach is filled and his gut is stimulated, the better his GI tract will function.
2. **Turn him out.** Horses that are allowed to move at liberty have a documented lower risk of colic and ulcers than those kept in stalls, Hall says. Group turnout is better for minimizing stress because horses are herd animals by nature and are unhappy when they're alone. If you must turn your horse out solo, make sure that he has other horses in sight.

3. Reduce the grain in his diet. If you need to keep your horse's energy level up, try substituting fats for at least some of the carbohydrates, or simply increase the amount of fiber while reducing the carbs (ask your veterinarian for meal-planning guidance). Pasture forage and hay can be supplemented with soaked beet pulp, chopped hay (chaff), haylage, hay cubes, or roughage chunks.

4. Choose the right grain. You'll probably still feed some grain, so which one should you choose? Oats, about 50 percent of which is fibrous hull, are a safer and less carbohydrate-rich option than hull-less grains, such as corn or barley. However, corn and barley can be rendered more digestible through cracking, steaming, rolling, or extruding.

5. Slow him down. The more slowly your horse eats, the more thoroughly he chews (for more complete digestion and nutrient absorption) and the more saliva (which can help buffer against stomach acids) can get mixed in. Try adding some beet pulp or chaff, placing a couple of smooth rocks in his feed tub, or spreading his feed thinly in a large, shallow pan on the ground to make him work for every grain.

6. Make any feed changes gradually. Studies have indicated that approximately one-third of colic cases have a history of a recent dietary change—and changing hay can be as hazardous as changing grain. To allow the gut microflora to adapt to the new feed, introduce it over a period of one to two weeks.

7. Feed small meals, often. Four meals are better than three, and three are better than two. The aim is to keep small amounts of feed moving through your horse's system 24/7, or as close to it as possible.

8. Avoid excessive use of oral electrolytes. In a presentation on gastrointestinal disease at the 2007 American Association of Equine Practitioners (AAEP) annual convention, Geor and Pat A. Harris, MA, PhD, VetMB, Diplomate, ECVCN, cited a study whose results linked frequent administration of electrolyte solutions (a common practice in endurance competition) with an increased incidence of equine gastric ulcers.

9. Consider alfalfa. In a study conducted at Texas A&M University using cannulated horses (research animals with surgically inserted portals to their stomachs) recently indicated that horses fed alfalfa hay had a lower incidence of gastric ulceration than those fed grass hay. The reason isn't fully understood but may be associated with alfalfa's higher calcium content, which can act as a buffer.

10. Be mindful of pasture forage. Fructans are simple sugars that accumulate in pasture grasses under certain conditions. If your horse pigs out in the pasture and ingests large doses of fructans, the sugars may induce a rapid de-

crease in cecal pH, thereby leading to acidosis. Fructans tend to be highest in lush spring grass but can also accumulate in stressed pasture (such as during drought conditions or after late-fall frosts), especially in the afternoons. If your horse is laminitis- or colic-prone, experts suggest limiting his turnout time to the nighttime and early- to mid-morning hours to avoid fructan overload.

"Management and diet selection are the two most important factors in colic prevention," says Geor. "It all comes back to 'everything in moderation.'"

Says Freedom Health's John Hall: "Many horse people interpret their horse's symptoms as a training problem when in reality it's a digestive-tract problem. Even things like a reluctance to collect and extend, or to bend to the right, can be an indication of gut pain. The horse will only work correctly when his gut is comfortable."

When Nature Needs a Helping Hand

Because grain is not likely to disappear from the equine diet any time soon, and because horse owners (especially those who keep their animals at boarding facilities) may have a limited ability to effect sweeping management changes, equine-health researchers are continually searching for ways to assist horses' digestion and to help ward off colic and ulcers. Here are some of the strategies they've devised.

Prebiotics and probiotics. The use of live cultures to aid digestion is all the rage now for humans, as you probably know if you've seen the proliferation of yogurt ads. Probiotics are living organisms that, when ingested in appropriate numbers, can exert positive effects on the digestive process. Prebiotics are nondigestible food ingredients that stimulate the health of the gut microflora. Both are intended to encourage healthy populations of gut microflora, which in turn aid digestion and nutrient absorption and prevent the proliferation of bacteria that can cause disease.

Most horses aren't keen on dairy products, so equine probiotics usually take the form of top-dressed granules, powders, or pastes. Live yeast culture is one of the most common; other formulations contain *lactobacillus* or other such bacteria. Unfortunately for horse owners, a study at the University of Guelph showed that most probiotic products intended for horses contained too little of any live culture to make a difference, not to mention that research has yet to determine whether these cultures can survive the stomach acids to populate the equine hindgut.

"There is a mitigating effect on drops in hindgut pH when horses are fed live yeast along with a high-grain diet," says Geor. However, "the mechanism has not been estab-

lished, and we still don't know whether the product actually works to populate the gut or whether the yeast is in fact dead by the time it reaches the hindgut and acts as a prebiotic, feeding the existing microflora."

A more elaborate digestive supplement, which incorporates irradiated yeast culture as well as several other ingredients, is Freedom Health's Succeed, which has been embraced by some big-name dressage competitors, such as Olympian Steffen Peters and his wife, FEI-level competitor Shannon Peters. The product, says Hall, "is a 'functional feed' designed to help the horse rebalance his bacterial flora." In addition to yeast, Succeed contains oat oil, a source of polar lipids, which, Hall claims, help to heal damaged intestinal mucosa and to aid in nutrient absorption; soluble oat flour, which contributes beta-glucan, a substance that slows the transit of digesta through the gut; and amino acids, which aid digestion. The combined effect of these ingredients, Hall says, is that Succeed can help normalize the digestive tract of show horses and others that don't enjoy a back-to-nature lifestyle.

Protected sodium bicarbonate. Another interesting approach to reducing hindgut acidosis is currently being explored by Kentucky Equine Research, a Versailles, KY,-based feed company. KER founder and president Joe Pagan, PhD, gave a presentation at the 2007 AAEP annual convention regarding the use of a protected sodium bicarbonate (PSB) formulation, which is essentially baking soda combined with hydrogenated vegetable oil to protect it from being destroyed by stomach acids.

Sodium bicarbonate is often used to combat rumen acidosis in cattle. In Pagan's study, horses fed PSB with their grain showed no decrease in fecal pH after feeding (compared to a control group, which had a drop in pH six hours after feeding). The PSB supplement also reduced concentrations of fecal lactic acid. More work is needed, however, to evaluate how PSB might affect the health and integrity of the horse's intestinal walls.

Ulcer treatment and prevention. A drug called

omeprazole (brand name Gastrogard) is the most widely used treatment for horses with acute gastric ulcers, according to the AAEP. Its manufacturer, Merial, has received approval to market a lower dosage of the same drug as an ulcer preventative (under the name Ulcergard). In either dosage amount, omeprazole works to suppress the production of stomach acids, thus reducing the incidence of ulceration—but the jury's still out as to whether it's a good idea to suppress those acids long-term.

Hall, for one, gives the concept a thumbs-down. "Suppressing gastric acid is problematic because that acid is the horse's first defense against invading bacteria," he says.

Geor agrees. "Stomach acid is there for a reason, and its acidity might kill off ingested pathogens, such as salmonella," he says. "To my knowledge, no one has yet addressed the effects of long-term administration of omeprazole."

Go au Naturel— if You Can

The take-home message is perhaps this: before you put all your faith in a supplement or drug to solve your horse's digestive woes, try making some basic management changes. Experts agree that, in general, the healthiest horse is the one that lives as natural a lifestyle as possible. That may be at odds with what's convenient for us, and it can be downright challenging for frequent competitors, but it's an effort that can literally transform your horse from the outside in. If feeding and turnout adjustments don't do the trick, or if such changes simply aren't possible given your horsekeeping constraints or show schedule, then talk to your veterinarian about next steps. ▲

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