



HEALTH ZONE

Foal Health

Ulcers in Young Horses

BY HEATHER SMITH THOMAS



COURTESY DR. CAROL CLARK

A severe non-glandular ulceration in a foal

Foals

Dr. Carol Clark of Peterson and Smith Equine Hospital in Ocala, Fla., says neonatal foals (in the first two weeks of life) are much less at risk for ulcers, especially the classical gastroduodenal ulcer disease, than older foals.

“During the 1980s and ’90s when neonatal foal care first became really ‘big,’ everyone was thinking that these young foals needed ulcer prevention, using Zantac and other acid-inhibiting medications,” she said. “Since then there have been studies looking at foals that died, finding that only rarely do foals truly have gastroduodenal ulcer disease in the first weeks of life. If a foal does rupture an ulcer (which is rare), it seems to be an ischemic event—like a blood clot or poor perfusion to the lining. This is not something that ulcer medication can prevent.”

Many of the very young foals that are sick are already being treated with multiple drugs, and this is one less thing we need to give them.

“But as those foals get older, or if they have a painful condition early in life that requires pain relief via non-steroidal drugs (for an infected joint, for example), those are the foals I would consider putting on ulcer prevention medication,” Clark said. “If they get sick any time between two weeks of age and a year of age, ulcer prophylaxis is important. A sick foal in the one- to five-month-old period of life could benefit from ulcer prevention.”

“We see gastroduodenal ulcer disease in foals, and it’s different than the older-horse version of ulcers,” she said. “Often in young foals it is glandular versus non-glandular, which is the typical type of ulcer disease we see in adult horses. In foals it may involve the stomach, but in many cases it includes the first part of the small intestine, the duodenum. This can result in strictures and be very serious. Affected foals can suddenly rupture and nobody even knew they were sick—though strictured foals don’t usually rupture. More often they get a chronic form of ulcers with delayed gastric emptying, esophageal reflux, and sometimes secondary liver dysfunction. There are also

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Equine ulcers were first recognized in horses more than 30 years ago. Unbuffered acid, or acid exposure of non-glandular regions of the stomach not normally protected by mucus, can lead to erosion and ulcerations of the lining. Now we know that gastric (stomach) ulcers affect many horses in stressful performance careers, even though some horses do not show obvious signs. Some of the early studies also looked at ulcers in foals. Reports in the *Equine Veterinary Journal* in 1989 and 1996 by Dr. Michael J. Murray and associates stated that gastric ulcers affect up to 93% of racehorses, 60% of horses in other performance careers, and up to 59% of foals.

Subtle symptoms may go unnoticed, or be mistaken for other problems

Further studies showed incidence of ulcers in show horses and pleasure horses was higher than horse owners suspected. Subtle symptoms may go unnoticed, or be mistaken for other problems. The best way to diagnose this condition is to look inside the stomach with an endoscope.

Signs of ulcers in foals are thought to include intermittent colic or diarrhea, rough hair coat, poor growth, or drooling. Discomfort may be shown by grinding the teeth, lying on the back to try to ease abdominal pain, or interrupted nursing. The foal may nurse vigorously and then halt abruptly, due to pain in the stomach.

Dr. W.B. “Burt” Staniar, an associate professor of Equine Nutrition at Penn State University, is currently involved with studies looking at ulcers in horses.

“Most of our work is focused on adult horses fed different types of diets,” he said. “I am also familiar with the research done with young horses in training. We don’t have a lot of data on ulceration in very young foals, however. The problem of ulcers in young foals can be different, with different causes, and occurring in different places in the GI tract.”

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Indications

For treatment and prevention of recurrence of gastric ulcers in horses and foals 4 weeks of age and older.

Dosage Regimen

For treatment of gastric ulcers, *GastroGard* Paste should be administered orally once-a-day for 4 weeks at the recommended dosage of 1.8 mg omeprazole/lb body weight (4 mg/kg). For the prevention of recurrence of gastric ulcers, continue treatment for at least an additional 4 weeks by administering *GastroGard* Paste at the recommended daily maintenance dose of 0.9 mg/lb (2 mg/kg).

Directions For Use

- *GastroGard* Paste for horses is recommended for use in horses and foals 4 weeks of age and older. The contents of one syringe will dose a 1250 lb (568 kg) horse at the rate of 1.8 mg omeprazole/lb body weight (4 mg/kg). For treatment of gastric ulcers, each weight marking on the syringe plunger will deliver sufficient omeprazole to treat 250 lb (114 kg) body weight. For prevention of recurrence of gastric ulcers, each weight marking will deliver sufficient omeprazole to dose 500 lb (227 kg) body weight.
- To deliver *GastroGard* Paste at the treatment dose rate of 1.8 mg omeprazole/lb body weight (4 mg/kg), set the syringe plunger to the appropriate weight marking according to the horse's weight in pounds.
- To deliver *GastroGard* Paste at the dose rate of 0.9 mg/lb (2 mg/kg) to prevent recurrence of ulcers, set the syringe plunger to the weight marking corresponding to half of the horse's weight in pounds.
- To set the syringe plunger, unlock the knurled ring by rotating it 1/4 turn. Slide the knurled ring along the plunger shaft so that the side nearest the barrel is at the appropriate notch. Rotate the plunger ring 1/4 turn to lock it in place and ensure it is locked. Make sure the horse's mouth contains no feed. Remove the cover from the tip of the syringe, and insert the syringe into the horse's mouth at the interdental space. Depress the plunger until stopped by the knurled ring. The dose should be deposited on the back of the tongue or deep into the cheek pouch. Care should be taken to ensure that the horse consumes the complete dose. Treated animals should be observed briefly after administration to ensure that part of the dose is not lost or rejected. If any of the dose is lost, re-dosing is recommended.
- If, after dosing, the syringe is not completely empty, it may be reused on following days until emptied. Replace the cap after each use.

Warnings

Do not use in horses intended for human consumption. Keep this and all drugs out of the reach of children. In case of ingestion, contact a physician. Physicians may contact a poison control center for advice concerning accidental ingestion.

Adverse Reactions

In efficacy trials, when the drug was administered at 1.8 mg omeprazole/lb (4 mg/kg) body weight daily for 28 days and 0.9 mg omeprazole/lb (2 mg/kg) body weight daily for 30 additional days, no adverse reactions were observed.

Precautions

The safety of *GastroGard* Paste has not been determined in pregnant or lactating mares.

Efficacy

- **Dose Confirmation:** *GastroGard*® (omeprazole) Paste, administered to provide omeprazole at 1.8 mg/lb (4 mg/kg) daily for 28 days, effectively healed or reduced the severity of gastric ulcers in 92% of omeprazole-treated horses. In comparison, 32% of controls exhibited healed or less severe ulcers. Horses enrolled in this study were healthy animals confirmed to have gastric ulcers by gastroscopy. Subsequent daily administration of *GastroGard* Paste to provide omeprazole at 0.9 mg/lb (2 mg/kg) for 30 days prevented recurrence of gastric ulcers in 84% of treated horses, whereas ulcers recurred or became more severe in horses removed from omeprazole treatment.
- **Clinical Field Trials:** *GastroGard* Paste administered at 1.8 mg/lb (4 mg/kg) daily for 28 days healed or reduced the severity of gastric ulcers in 99% of omeprazole-treated horses. In comparison, 32.4% of control horses had healed ulcers or ulcers which were reduced in severity. These trials included horses of various breeds and under different management conditions, and included horses in race or show training, pleasure horses, and foals as young as one month. Horses enrolled in the efficacy trials were healthy animals confirmed to have gastric ulcers by gastroscopy. In these field trials, horses readily accepted *GastroGard* Paste. There were no drug related adverse reactions. In the clinical trials, *GastroGard* Paste was used concomitantly with other therapies, which included: anthelmintics, antibiotics, non-steroidal and steroidal anti-inflammatory agents, diuretics, tranquilizers and vaccines.
- **Diagnostic and Management Considerations:** The following clinical signs may be associated with gastric ulceration in adult horses: inappetence or decreased appetite, recurrent colic, intermittent loose stools or chronic diarrhea, poor hair coat, poor body condition, or poor performance. Clinical signs in foals may include: bruxism (grinding of teeth), excessive salivation, colic, cranial abdominal tenderness, anorexia, diarrhea, sternal recumbency or weakness. A more accurate diagnosis of gastric ulceration in horses and foals may be made if ulcers are visualized directly by endoscopic examination of the gastric mucosa. Gastric ulcers may recur in horses if therapy to prevent recurrence is not administered after the initial treatment is completed. Use *GastroGard* Paste at 0.9 mg omeprazole/lb body weight (2 mg/kg) for control of gastric ulcers following treatment. The safety of administration of *GastroGard* Paste for longer than 91 days has not been determined. Maximal acid suppression occurs after three to five days of treatment with omeprazole.

Safety

- *GastroGard* Paste was well tolerated in the following controlled efficacy and safety studies.
- In field trials involving 139 horses, including foals as young as one month of age, no adverse reactions attributable to omeprazole treatment were noted.
- In a placebo controlled adult horse safety study, horses received 20 mg/kg/day omeprazole (5x the recommended dose) for 30 days. No treatment related adverse effects were observed.
- In a placebo controlled tolerance study, adult horses were treated with *GastroGard* Paste at a dosage of 40 mg/kg/day (10x the recommended dose) for 21 days. No treatment related adverse effects were observed.
- A placebo controlled foal safety study evaluated the safety of omeprazole at doses of 1, 12 or 20 mg/kg (1, 3 or 5x) once daily for 91 days. Foals ranged in age from 66 to 110 days at study initiation. Gamma glutamyltransferase (GGT) levels were significantly elevated in horses treated at exaggerated doses of 20 mg/kg (5x the recommended dose). Mean stomach to body weight ratio was higher for foals in the 3x and 5x groups than for controls; however, no abnormalities of the stomach were evident on histological examination.

Reproductive Safety

In a male reproductive safety study, 10 stallions received *GastroGard* Paste at 12 mg/kg/day (3x the recommended dose) for 70 days. No treatment related adverse effects on semen quality or breeding behavior were observed. A safety study in breeding mares has not been conducted.

For More Information

Please call 1-888-637-4251

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HEALTH ZONE

Ulcers in Young Horses

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a few affected foals that just blow out an ulcer in their stomach, with no warning.

"These cases may occur sporadically or sometimes in outbreaks on a farm," Clark continued. "We don't see this as much as we used to. Sometimes it is associated with rotavirus. It sometimes comes in waves, and we've looked for infectious causes, but we can't necessarily say that we know what those causes are."

"The only experience I have with foals and ulcers is in hospitals, when they are sick and under stress," Staniar said.

"There is a fair amount of literature on ulceration in neonates in the hospital. Usually those foals are sick for some reason and are having ulcers because of the stress and the sickness. Often those ulcers are in the glandular lower regions of the stomach (which is not usually the case in adult horse ulcers), perhaps because those young foals are struggling with the mucous production that protects that part of the stomach."

Healthy foals don't seem to have many problem with ulcers, but there hasn't been a lot of work done to confirm this.

"In order to know for sure that an animal has ulcers, you have to check the stomach with an endoscope," Clark said.

"I don't know of any work that has been done looking at the occurrence of ulcers in foals that are not at a hospital. Ulcers just don't seem to be a very big problem in normal, healthy foals."

"We can do a lot more ulcer prevention in sales prep youngsters and horses in training than we can do for very young

foals," he said. "If you have a sick foal that is more than two weeks of age, you probably should have it on ulcer prevention, but beyond that there is not a lot we can do. If they are sick, we can try to keep them from getting ulcers during that time. We can't really do much in the way of diet manipulations. Until they are weaned, they are on a milk diet, which is great, but once they go into the real world and start learning their job, then their normal management is changed a lot. That's when ulcers tend to happen in young adults, and it's our goal to try to improve that situation."

Yearlings and Young Horses in Training

"The biggest difference between foals less than six months of age and the older horses—or the weanling/yearling or young adult horses—is that young adult horses don't generally get the glandular disease we see in young foals," Clark said. "As we look at yearling age and going into training (into the early 2-year-old year), these youngsters are much more at risk for non-glandular disease."

The biggest risks are for young horses transitioning into training, often ones that are transported from the farm to a training facility.

"This is another big change in their life—not only a diet transition but also a lifestyle and environment transition," said Staniar. "We believe stress causes ulcers, and stress is certainly a part of what impacts the body's ability to maintain ho-

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¹ULCERGARD product label.

²McClure SR, Carithers DS, Gross SJ, Murray MJ. Gastric ulcer development in horses in a simulated show or training environment. JAVMA 2005;227(5):775-777.



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Safety of GASTROGARD in pregnant or lactating mares has not been determined.



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meostasis, so it probably increases the risk of ulcers, but stress by itself may not cause ulcers. It's just one factor."

Clark added, "Many of these youngsters are also being treated with NSAIDs (nonsteroidal anti-inflammatory drugs) for various reasons. This puts them at risk for glandular disease, not only in the stomach but also in the hindgut. We see a lot of youngsters—especially those being prepped for Thoroughbred sales—that get too many NSAIDs and possibly even steroids.

"I see almost as much indication of hindgut problems in these young horses as gastric ulcers. Colonic ulcers are harder to see, but what we do see is low protein levels because of loss from the gut. Due to ulcerative colitis, often in the right dorsal colon, these horses are low on protein. It may not be profound—not be enough to need plasma—but it's an indication that the horse is not handling the NSAIDs very well."

This can vary a lot with the individual horse.

"Some horses can be given NSAIDs long-term and not show any drop in protein while other individuals are very sensitive to these drugs—and the hindgut is just as sensitive as the stomach," Clark continued. "Sometimes those horses have intermittent diarrhea—which is rarely a symptom of gastric ulcer disease but can be a symptom of hindgut ulcer disease. Diarrhea is not a symptom of gastric ulcers in adult horses but can be a symptom of gastric ulcer disease in a young foal. Anything that causes abnormalities in the small intestine can cause intermittent diarrhea in the foal."

Young horses getting ready for sales or being pushed in training should probably be maintained on some sort of ulcer prevention. There are also other things that can reduce risk for ulcers, such as limiting NSAID use and conscientious feeding strategies.

"A big component of the nutritional side of ulcers is the fact that the anatomy and physiology of the horse's stomach is well adapted to a high forage diet," Staniar said. "Horses have been eating forage for millions of years. One of the things the high-forage diet offers is physically effective fiber. This is not the same as chemical fiber, like you'll find listed on a feed tag (like crude fiber content). Physically effective fiber is actual fiber that causes the horse to chew.

"This kind of fiber also impacts the way feed behaves inside the stomach and moves through the rest of the tract," he explained. "When a horse is eating forage and long-stem fiber, this works well to prevent ulcers. Horses chew a lot when eating forage, and produce a lot of saliva—and saliva is a buffering agent in the stomach to neutralize acid. The chewed-up fiber also helps the stomach; it creates layers of different particle sizes and probably helps to buffer the pH, particularly along the margo plicatus. This is the line in the stomach that divides the two very distinct areas, separating the glandular portion from the non-glandular.

"Most ulcers in horses occur along that line and above it," Staniar said. "The stomach lining above that line is a stratified squamous epithelium with a layered-cell protection, kind of like our esophagus. Below that line, the stomach is protected by a mucous coating, produced by a very different type of (glandular) lining. This coating helps protect the stomach from the acid being secreted (that aids in digestion). In a horse that is eating enough forage, that line sits above or right at the mat of forage that tends to float on top of the stomach contents. Below that mat are the smaller particles such as grain, and fluid and a lot of the acids that break things down," he explained.

"In a horse transitioning into training, this situation may change," he said. "This young horse has usually been moved off the farm where it grew up, out of the paddock with its buddies, and is now at the training barn where it is fed only a few flakes of hay and getting a lot more grain. Now the stomach may go empty for periods of time and may also have less of the long fiber in it.

"In addition, we know that when the horse runs, the stomach is affected. Its stomach sits just underneath the diaphragm, so it tends to get squeezed during exertion. If there isn't enough substance in the stomach to prevent this squeezing, it pushes a lot of the material that was lower in the stomach (including the acid) into the upper regions of the stomach where it is not protected.

"If there was a way to make sure horses had a little more fiber in their stomachs when they are running, this could make a big difference," he said. "I realize we can't feed a lot of hay just before exercise because that would negatively impact the horse's performance. But having some fiber in there, meaning the horse has chewed and produced saliva, would be very helpful. We have ways to keep hay in front of horses all the time and limit intake, so they can have access to fiber through the day. The hay nets with smaller holes work nicely, allowing horses to nibble continually, yet they can't eat a lot at once. This means they are chewing and producing saliva.

"The only way that a horse produces saliva is by chewing," said Staniar. "If you can make horses chew more by giving them a little more fiber, it would help. We know we shouldn't feed horses a big meal (hay or grain) just before they run, but if they had a

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limit-feed hay net, they could at least get a little fiber in the morning before they run, and we might be able to reduce the risk of ulcers. The stomach wouldn't be quite as empty, and they would also have enough saliva to help buffer the acid that was present in the stomach. Ultimately the pH would be lower, and if the stomach contents did splash into that upper region, it might not be quite as damaging."

Clark added: "Horses need something in their stomach. If they do have to go without feed, we should limit those times to less than four-hour periods. Sometimes people feed hay at 8 p.m., and no one goes out to the barn to feed again until 5 or 6 a.m. in the morning. The hay fed at night is all eaten by 10 p.m. and the horse goes for a long time without eating. Some of the new slow-feed hay nets can stretch out the mealtime. You can give the same amount of hay, but it takes the horse longer to eat it, and there will be feed in his stomach longer," she explained.

Feeding lower-starch food is also helpful, to prevent ulcers. Feeding fat can make up the needed calories.

"Sport horse people picked up on this more quickly, feeding a low-carb/high-fat concentrate," Clark said. "Many Thoroughbred people still want to feed a high-carbohydrate/high-grain diet. This inherently puts the horse at greater risk for colic and gastric ulcers. The GI tract is not designed to handle a high-starch diet. The small intestine becomes overwhelmed; it cannot extract that much carbohydrate quickly enough, and some of it goes on into the hindgut—with potential problems.

"Part of ulcer prevention can include feeding a lower carbohydrate diet," she continued. "It can be high in fat, so it still provides calories, but we try to limit the starches. High-carbohydrate feeds increase volatile fatty acids in the stomach, which can be irritating to the non-glandular mucosa."

Alfalfa hay, being high in calcium and protein, is beneficial as a buffering agent in the stomach.

"Alfalfa is like 'Tums' to counteract the acid," Clark said. "If a horse is prone to ulcers or if you are trying to prevent ulcers, provide at least 50% of the horse's hay ration as alfalfa."

Good alfalfa hay also contains high levels of most vitamins and minerals needed by the horse, as well as protein and energy, which helps when you are trying to provide adequate nutrients for

USE OF OMEPRAZOLE

Owners and trainers need to be proactive in making the transition into training as easy as possible and not just rely on preventative medications such as omeprazole.

"It's important to know that not all formulations of omeprazole are equally effective," said Dr. Carol Clark of Peterson and Smith Equine Hospital in Ocala, Fla. "Compounded omeprazole (though it is cheaper) is generally not as effective as Gastroguard. The buffering mechanism is a proprietary technique that is not easy to accomplish. The company that created Gastroguard worked very hard to make sure it happens, and this is what makes the drug more active and effective. At best, you get only 25% efficacy from compounded or generic forms. If you are using the whole tube, you will get some benefit for prevention because we only need a quarter dose for prevention. If you are trying to treat ulcers, however, generic products won't work very well."

"Another important thing about using omeprazole is timing, especially when giving the low dose for prevention," she continued. "That quarter dose won't suppress acid for very long, but it does work long enough to assist in prevention. We want to time it so it's given on an empty stomach, such as before a grain meal, and so it's on board and active before the horse starts exercise.

"We know that during exercise, the stomach is compressed by the abdominal contents," Clark said. "Stomach juices are pushed upward and come in contact with the upper non-glandular part of the stomach that doesn't have acid protection. If the stomach contents are acidic, this is more harmful, so we want to give the Gastroguard or Ulcergard two to four hours before a training workout. You pay a lot for the product, and properly timed use can greatly enhance the benefit."

By Heather Smith Thomas

a hard-working horse.

"Most trainers use omeprazole (see sidebar) to try to prevent ulcers, but it's expensive," Staniar. "I'd like to do more research to study this, to see how much of a difference a little fiber might make and how much would it truly reduce the

risk of horses getting ulcers. Many people who have horses in training are using omeprazole as preventative therapy, but perhaps a little more fiber might be just as helpful. I want to try this, and see how much fiber it might take to be effective," said Staniar. **BH**

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