



Excellent health care and nutrition has led to overfeeding and obesity in horses.

Endocrinopathic Laminitis

Use this AAEP Convention presentation to help horse owners whose animals have endocrinopathic laminitis.

By Nancy S. Loving, DVM

There are many problems that veterinarians face, not the least of which are obese horses and laminitis. In this presentation from Teresa Burns, DVM, PhD, DACVIM, she offers advice on nutritional management and therapeutics in

horses at risk for or affected by endocrinopathic laminitis.

(Editor's note: This is one of four articles from the 2017 AAEP Convention brought to you by Boehringer Ingelheim Animal Health.)

Availability of excellent health care and nutrition has led to a tendency by

horse owners to overfeed their horses. Obesity and insulin dysregulation (ID) often result from an abundance of calories, particularly when intake exceeds the amount of exercise the horse receives. Burns pointed out in her talk that 30% of horses affected with pituitary pars intermedia dysfunction



There are nutritional means to prevent and manage endocrinopathic laminitis in horses and ponies.

(PPID) experience insulin dysregulation, whereas 100% of horses with equine metabolic syndrome have ID.

She described three different forms of carbohydrates found in plants:

- Simple sugars
- Polymeric storage molecules, such as starch and fructans, also called non-structural carbohydrates (NSC)
- Structural carbohydrates, which have no adverse effects on glycemia and

therefore should be maximized in the diet

Fructan is the major storage carbohydrate of temperate grasses. It is particularly abundant in pastures in stress conditions, such as bright, cold days.

Feeding appropriately relies on keeping NSC to less than 10% of all dry matter fed. Alfalfa hay has an NSC of about 11.3%, which is comparable to what is found in grass hay, which ranges from

10-15% NSC. None of the commercial concentrate feeds have an NSC below 10%, but horses are usually only fed a limited amount, so the total intake is dose dependent.

One nutritional objective to prevent and manage endocrinopathic laminitis is to decrease the intake of rapidly fermentable carbohydrates. This is accomplished through multiple strategies.

Use concentrate feeds that contain



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A nose. That's all you need to see your number on top. To pay off on all those early morning workouts. The late nights planning strategy. You don't do this to place or show. So ask yourself, does your horse have the stomach to win?

Time for a gut check. TheStomachToWin.com

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(omeprazole) by Merial



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IMPORTANT SAFETY INFORMATION:
CAUTION: Safety of GASTROGARD in pregnant or lactating mares has not been determined.



THE RIDE TO WIN

Caution

Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

Storage Conditions

Store at 68°F–77°F (20–25°C). Excursions between 59°F–86°F (15–30°C) are permitted.

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, redosing 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.

Warning

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 diagnosed 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 4, 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 10 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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no cereals or grains. Most commercial feeds are high in NSC. For example, sweet feed is 45-50% NSC, oats are 45-55%, corn is 67-75%, and barley is 60-65%. The post-prandial hyperglycemia that results makes it difficult to achieve weight loss. Some commercially available, low-sugar/low-starch feeds might have NSC of 15%, so it is best to read labels prior to recommending it as a feed.

Restrict access to pasture. In certain seasonal conditions, NSC in pasture grass can be as high as 40%; for example, in high-light, low-temperature (65-70 degree Fahrenheit) conditions of autumn. If any pasture access is allowed, it is best to turn horses out to graze in the early morning when the plants, having used up yesterday's energy, have the least concentration of sugars. Other techniques rely on strip grazing and also the use of a grazing muzzle to limit pasture intake while still allowing turnout.

Testing of the diet for NSC gives the greatest guarantee of what a horse is being fed when trying to achieve weight loss. Feeds tested at 10-12% NSC can be fed at 1-2% of a horse's ideal body weight. If there is no weight loss progress in 4-6 weeks, then decrease the amount fed.

Soaking hay for 3-6 hours and pouring off the supernatant can reduce sugar content by about 20%. One study reduced NSC by 27% when grass was soaked for 16 hours, but there were losses of other nutrients as well, such as electrolytes.

In cases where nutrition fails to achieve an appropriate body condition score and the client has fully complied with the nutritional plan, then it might be necessary to implement pharmacological therapy, said Burns. The goals with medication are to increase insulin sensitivity, to mitigate the effects of hyperinsulinemia, and to encourage

weight loss. In some cases, medicine can be used short term while management changes take place; in more refractory cases, medication can be used for longer terms. Examples of drugs that can help with controlling ID for horses affected with EMS:

Levothyroxine, which increases metabolism and stimulates lipolysis in adipose tissue. Because this drug makes a horse more hungry than normal, it is important to restrict forage access. This medication is used only for 3-6 months, then is tapered off over 2-4 weeks.

Metformin (biguanide) While its mechanism of action is not definitively known, it is thought to activate AMPK (AMP-activated protein kinase) to increase insulin sensitivity. It might also work locally in the gastrointestinal tract to limit NSC uptake. However, there is some dispute over its oral bioavailability in horses, which can be as low as 4-7%. With that in mind, the recommended dose is 30 mg/kg twice daily, prior to a meal.

A variety of supplements and nutraceuticals (chromium, magnesium, cinnamon) have been proposed to manage EMS, but there is no evidence as to efficacy in their use.

For horses with PPID, in addition to similar nutritional management strategies for EMS, pergolide is the drug of choice. It is a dopaminergic agonist that is given daily to modulate the secretory activity of the pars intermedia. In some refractory cases, it may be necessary to administer cyproheptadine concurrently with pergolide. The half-life of pergolide is 18-24 hours so if an owner stops giving it, then ACTH blood concentration increases significantly within five days. Forty-one percent of owners noted improvement in their horses after two months on pergolide. Over half the PPID horses treated with pergolide are still alive at five years. **EM**