

# Feeding after colic surgery

Recovering horses require proper nutrition and management to reduce stress

by Amy Gill, Ph.D.

COLIC IS A nonspecific term that refers to any type of abdominal pain or discomfort. Colic can be acute, chronic, or recurrent and is generally caused by distension or obstruction of the gut with fluid, food being ingested, a foreign object, or gas. Other primary causes of colic include intestinal twisting or torsion or heavy parasite infestation.

Colic involving the gastrointestinal tract can occur in several locations. The four main segments affected are:

- Stomach;
- Small intestine;
- Large intestine; and
- Small colon/rectum.

In general, colic involving the stomach is most often associated with the presence of gastric ulcers. Obstruction, strangulation, ileus (motionless intestine), motility alterations, and inflammation are leading causes of colic in the small intestine, cecum, and large and small colon.

Obstructions can occur from feed or sand impaction, foreign bodies, enteroliths (mineralized stones), ascariid (roundworm) impaction, stricture, abscesses, and cancer. Additionally, displacement of the colon can be reason for an obstruction to occur. Because the colon folds back on itself several times and has varying diameters in different segments, impactions and other types of colic can result in this area.

Intestinal strangulation may result from twisting of intestine, entrapment of intestines in abdominal structures, diaphragmatic hernia, or displacement of intestines into the chest, inguinal hernia where intestine is present in the scrotum of stallions or recently

castrated geldings, and umbilical hernias. Older horses also may suffer from colic caused by Lipoma or fatty tumors present in the digestive tract.

Surgical removal of devitalized intestinal tissue may at times be needed to save the life of a horse severely compromised with colic. Colic surgery is categorized as either complicated or uncomplicated based on how much the intestinal tissue is compromised.

Uncomplicated colic generally can be treated systemically using analgesics, fluids, and laxatives and rarely requires surgery. Complicated colic,

however, must be dealt with surgically in most cases, as nonviable bowel does not receive the oxygen and nutrients it needs to function properly.

## Feeding after surgery

Following surgery to remove part of the small or large intestine, specific dietary alterations must be made to aid in full recovery of the horse. Due to the nature of the digestive tract of the horse and the different sites of digestion and absorption of various nutrients, the feeding regimes for small or large intestine surgeries are very different.

## Procedures at one clinic after colic surgery

MATHEA KELLEY, a graduate student at the University of Kentucky and a veterinary technician in equine medicine at Hagyard-Davidson-McGee in Lexington, provided the following information regarding post-operative care of colic surgeries.

Horses are generally muzzled for eight hours after surgery and monitored closely for post-surgical complications. Abdominal ultrasounds are performed to determine if there is movement through the tract, and horses are monitored for the passing of feces. Once this period has passed and the horse has recovered sufficiently, the horse receives small amounts of high-quality feed at frequent intervals.

Each case is evaluated individually but, in general, horses that have undergone small intestinal resection receive only Purina Equine Senior, a complete feed that is offered as a mash. Horses also receive small amounts of high-quality legume hay. If they have any reflux in the stomach

after surgery, feed is withheld until the reflux has ceased. Horses that have had large intestine resections are offered only high-quality hay to begin with and little to no grain for several days.

All horses having undergone surgery are fed at least three times daily, if not more frequently. Individuals that do not respond well to solid feeds are given total parenteral nutrition via nasogastric tube.

Additionally, horses are kept on an intravenous fluid drip for a couple of days after surgery. Temperature, pulse, and respiration are taken several times per day. Blood is monitored for volume and dehydration. Horses receive antibiotics, usually K-Pen or Gentocin, for seven to ten days following surgery.

The horse is slowly introduced to hand walking when he appears capable and continues for several weeks until he can tolerate being turned out in a small paddock. Light exercise can be resumed approximately six weeks after surgery if no complications have arisen.—Amy Gill, Ph.D.

There are no specific dietary changes required for a horse having undergone colic surgery in which no portion of the intestines or the cecum or less than 50% of the jejunum and/or duodenum (first and middle sections of small intestine) were removed.

According to Sarah Ralston, Ph.D., equine nutritionist at Rutgers University, horses recovering from colic surgery should be fed high-quality, highly digestible feeds in small, frequent meals as soon as they are awake from the anesthesia. A good rule is to offer the horse about one-quarter of its normal ration, building up to the normal maintenance ration in a period of several days. Fresh water should be available at all times. Hand walking and grazing on fresh grass for short periods are also desirable for a horse recovering from surgery.

Following surgical removal of a section of the large intestine, horses are generally fasted for 12 to 24 hours. This is done to rest and prevent any distention of the bowel and will aid in the healing of the reconnected bowel. However, after the initial recovery period, it is important to quickly reintroduce solid feed to prevent atrophy of the remaining intestinal tissue. Prolonged fasting for more than 72 hours also can result in compromised healing of the wound and increased susceptibility to infection and diarrhea.

For 30 days after surgery, horses are capable of eating small amounts of high-quality feeds, and the recovering horse will need extra protein (12% or greater) and phosphorus (0.4% minimum) with low amounts of structural fiber (less than 28%) in the daily ration, said Ralston. These dietary alterations are necessary due

## Management techniques to reduce the incidence of colic

- Provide excellent dental care to ensure proper grinding of feed.
- Supply fresh water and white salt at all times to ensure proper hydration.
- Feed a variety of good-quality forages and allow as much access to fresh pasture grass/grazing as possible. For stabled horses, strive to allow 30 minutes of grazing twice a day.
- Use high-fat soluble fiber concentrates to minimize digestive upset that can be caused by high-starch diets. Limit grain feeding to no more than 0.4% of body-weight per feeding (four pounds per feeding for a 1,000-pound horse).
- Weigh concentrates instead of using volume measurements such as coffee cans, scoops, or quarts for accuracy.
- Feed each horse as an individual based on level of exercise, age, reproductive status, breed, and current body condition.
- When changing hay or feed sources, make changes gradually over a ten-day period, slowly introducing new feeds to allow bacterial populations in the gut to adapt.
- Deworm horses as needed, using fecal examinations to determine if deworming is necessary, or on a regular basis for stabled horses or those in pastures with high populations of horses.
- Use only prescribed amount of anti-inflammatory drugs to control pain and swelling.

to the gut's decreased ability to digest and absorb these nutrients for several weeks after surgery.

Water must be available in ample amounts at all times as horses with large intestine resection have a higher requirement for water as a result of reduced surface area for water absorption. Horses requiring higher caloric density in the ration can be

## A trip through the digestive tract

THE EQUINE digestive tract is a long “tube” that begins at the mouth and ends at the rectum and is approximately 80 to 90 feet in length. The gastrointestinal tract of the average 1,000-pound horse has a capacity of about 40 to 50 gallons.

Movement of digesta (food being digested) through the system is rapid, with liquid exiting the stomach in about 30 minutes and entering the cecum within two hours. Feed dry matter passes slower, with only 25% gone from the stomach within 30 minutes, but nearly 98% has passed to the small intestine by 12 hours following ingestion, and this can be accelerated when low-fiber diets are fed.

Although some protein digestion and partial breakdown of carbohydrates and fats occur in the stomach due to the presence of hydrochloric acid, little digestion occurs here and most particulate matter passes to the small intestine. Much of the fat, protein, about 50% to 70% of soluble carbohydrate (starch), and most vitamins and minerals are digested and absorbed in the small intestine.

From the small intestine, digesta passes into the cecum and small colon where crude fiber and any remaining soluble carbohydrate are fermented by bacteria and the resulting products, called volatile fatty acids, are absorbed

and used by the horse for energy and other metabolic processes. Lactic acid is produced when soluble carbohydrate is fermented; if large amounts are produced, as in the case of grain overload, gas colic can result. Some microbial protein is also produced here and is digested and absorbed in the cecum and colon.

When the diet consists primarily of grasses and other forages, few problems occur in the colon because digesta flows at a constant rate. The rate of feed movement through the colon is relatively slow.

However, horses engaged in maximal exercise receive concentrates and dense forage that are generally fed infrequently and in large amounts, which may cause the rate of passage through the gut to be irregular. Cultivated and heavily fertilized forages—super high-quality alfalfa, orchard, timothy, and Bermuda grass—fed in conjunction with concentrates that contain a large percentage of starch are difficult for the horse, particularly a stabled horse, to digest.

Regardless, these types of feed-stuffs are required to provide adequate nutrition to the performance horse, making strict feeding and stable management that much more important to aid in the prevention of colic.

—Amy Gill, Ph.D.

Grain should be withheld completely and only high-quality legume hay should be fed. If additional supplementation is needed to meet nutritional requirements or promote weight gain, feeds containing soluble fibers such as beet pulp, soybean hulls, and rice bran may be added to the diet. Complete feeds, which contain high levels of fiber and can be fed as the sole ration, work well in this scenario.

The small intestine is a primary site for digestion of starch, protein, vitamins, and most minerals except phosphorus, which is absorbed in the large intestine. Horses that have

fed alfalfa hay or an alfalfa/grass mix, with small grain meals, if needed.

Horses that have had fairly large sections of both the left and right colon removed may need to remain on this dietary regime for the remainder of their lives. However, those that have had only portions of the left colon and/or cecum removed generally regain the ability to absorb nutrients and may gradually be returned to a normal maintenance ration.

### Withhold grain

Horses that have undergone small intestinal surgery require a completely different feeding protocol.

## Racehorses' routines go against natural feeding

THE HORSE is a non-ruminating grazing herbivore that feeds primarily on forages. The diet of free-ranging and feral horses consists of fibrous grasses, twigs, leaves, dirt, herbage, brush, and other forages that, in general, are of varying quality.

Feral horses and domestic pastured horses spend a large portion of daily activities grazing, usually in bouts of two to three hours for a total of 12 to 16 hours per day. Normally during these grazing bouts, horses maintain a constant forward movement, taking a few bites and chewing while walking forward before taking another bite. Free-ranging and pastured horses exist and thrive in this manner because the equine digestive tract is designed to process small quantities of fibrous feeds on a continuous basis.

The existence of the racehorse, however, is quite different. The higher nutrient demands placed on a Thoroughbred requires that concentrated grain rations be supplemented to the diet to provide sufficient nutrient intake. Being kept in stalls at the race-track with limited access to pasture prevents racehorses from grazing on a

lost part of the ileum are less efficient at absorbing fat and will need to have supplemental fat-soluble vitamins added to their diet.

The large intestine is capable of compensating to some extent for the lack of absorption of protein, carbohydrates, and B vitamins, which are produced by microbes. Calcium absorption also may be compromised in the horse that has undergone small intestine resection since calcium is absorbed primarily here. If bleeding occurs after surgery, Ralston suggested adding vitamin K to the diet, as this vitamin plays a role in promoting blood clotting. Nutrena manufactures a product called Life Design Senior that contains 14% protein and 16% alfalfa-based fiber and is fully fortified with a high level of calcium, phosphorus, and other required vitamins and minerals. It con-

sists of pelleted and extruded meals and the inability to move about freely present a racehorse with an unnatural environment in which to live.

This type of environment appears to affect the horse in an adverse way. Many horses that are stabled on a continuous basis develop aberrant behaviors such as cribbing, wood chewing, pacing, and pawing as a way of dealing with the stress of confinement while in training.

Aside from the psychological effects, the natural feeding pattern of the horse can be largely affected by confinement to a stall. Many racing stables maintain feeding schedules that are designed to be convenient for caretakers but are set at intervals unnatural for the horse. Most racehorses eat more than four pounds per feeding, especially if they are fed only twice a day. Often, several hours after being fed, the stabled horse has eaten all the feed offered, leading to long periods of time where access to feed is denied.

This type of feeding schedule involving infrequent, large grain and hay meals often leads to gastric ulcers and other digestive upsets.

Some horses may need to eat feed that has been soaked in warm water or made into a gruel to allow the feed to move easily through the digestive tract. Concentrated liquid diets can also be used to feed the recovering horse. Ensure, a product designed for human nutritional support, works well in this situation. For an adult horse, 16 liters of Ensure would be required to meet the nutrient requirements of a 1,000-pound horse, an amount large enough to be daunting to administer to a horse even via stomach tube.

Extremely debilitated individuals may need to be fed intravenously until they have recovered sufficiently to eat on their own. Ralston suggested

Additionally, some horses in training become extremely stressed, refusing to eat even when feed is available at all times. Disruption of feeding as a consequence of episodic feeding regimens has a detrimental effect on horses and on the microbial populations responsible for processing the fiber in the horse's digestive tract. The physiological and biochemical events that follow a large grain meal includes fluctuations in hormones associated with metabolism and water balance, and can lead to a vast array of metabolic disorders such as laminitis and colic.

Certain management practices also are associated with higher incidences of disorders such as colic, including sudden changes in the type of hay and concentrates being fed, dramatic changes in feeding schedules, lack of turnout, and insufficient water availability. While there are numerous reasons horses colic, understanding the equine digestive tract and the management techniques that can help to reduce the incidence of colic and other metabolic disorders is paramount to the well-being of all horses in training.

—Amy Gill, Ph.D.

using solutions containing intravenous amino acid and lipid solution as opposed to the traditional 5% dextrose solutions.

Horses that have undergone surgical resection of the bowel require intensive rehabilitative care, and particular attention must be made to reduce stress in their environment and provide proper nutrition. Prognosis for the long-term health and usefulness of the horse is excellent provided extreme caution and attention to detail are executed following surgery. ☺



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