The Horse’s Digestive System

Overview

From stem to stern, a horse’s digestive tract is uniquely adapted to eating on the go. Most notably, horses’ stomachs are quite small whereas their large intestines (colon) are voluminous and are the main site of fermentation—the process of breaking down “structural carbohydrates” in the diet such as cellulose.

Structure and Function of the Digestive System

Similar to the digestive systems of other mammals, a horse’s digestive tract receives food, reduces it into small particles to digest and absorb nutrients, and eliminates feedstuffs that are not digestible. The first several parts of a horse’s digestive system are quite similar to humans, beginning with the lips, teeth, tongue, salivary glands, etc. The food then passes into the oropharynx (oral part of the pharynx) and esophagus. After a 50-60 inch voyage down the esophagus, the food reaches the simple stomach. Being perpetual grazers rather than gorgers, horses have small stomachs. The capacity of a horse’s stomach is only 8-12 liters (a human stomach has a capacity of 2-4 liters), and food moves quickly from the stomach and down the 70 feet of small intestines before reaching the large intestines.

Another unique feature of the horse’s digestive tract that helps him eat and run is the extremely strong muscular sphincter at the junction of the esophagus and stomach that precludes a horse from vomiting. Horses also can’t vomit because the stomach is too small to touch the body wall.

True digestion occurs in the stomach and small intestines. The liver and pancreas both have ducts that enter the small intestine to deliver bile and digestive enzymes, respectively, to help break down food. Once the food is broken down into its components (e.g., amino acids, simple sugars), these microscopic nutrients are absorbed in the small intestines along with vitamins and minerals. Unlike many other mammals, horses do not have a gallbladder.

The remainder of the ingesta at this point is primarily structural carbohydrates—the fibrous components of forage such as cellulose. These carbohydrates pass from the last part of the small intestines called the ileum into the first part of the enormous large colon called the cecum. The cecum is an 18-inch to two-foot blind sac that functions as a fermentation vat, and in some ways is similar to a cow’s rumen. The fermenting material then passes from the cecum to the large colon (comprised of the right and left ventral colons, and left/right dorsal colons) to the transverse and descending colons. It takes about two to three days for food to pass through this last and largest part of the equine digestive tract.

Fermentation is achieved by a population of microbes (bacteria and protozoa) that live in the cecum and colon and that can break down the structural carbohydrates into volatile fatty acids and lactic acid. These products of fermentation are absorbed through the large intestine into the bloodstream to fuel a large number of metabolic processes. Nutrients such as B vitamins produced by the resident microbes are also absorbed as well as water. In fact, the large intestine is an important source of water and electrolytes for horses when faced with water deprivation. Horses can absorb water from the large intestines to help stave off dehydration.

When Things Go Wrong

Even though the horse’s digestive system has a number of features uniquely suited to an equine lifestyle (graze-run cycles), it is not perfect. Considering the length and complexity of the digestive tract, it is not surprising that horses are susceptible to both structural and functional dysfunction, which can have a profound impact on the horse. For example, the strong sphincter between the esophagus and stomach ensures food continues in the “right direction” even if a horse needs to make a sudden dash away from predators. However, this also means that should a horse ingest a toxic or noxious food item, he is not able to simply vomit and expel it from his body.
Other important problems associated with the equine digestive tract include dental-related issues, choke, gastric and colonic ulcers, colic, and diarrhea. Parasites such as roundworms, bots, tapeworms, and large and small strongyles can all be problematic for horses, and bacterial infections such as Salmonella or Clostridium can cause potentially fatal cases of diarrhea. In horses, a gastrointestinal disturbance can quickly progress from a simple “upset” to a life-threatening emergency. Always seek the advice of your veterinarian if any signs of colic or diarrhea develop.

Diagnosing Gastrointestinal Problems
Due to the large size of the horse, particularly in comparison to the size of the human veterinarian and his or her equipment, diagnosing a problem in the intestinal tract can be challenging. Gastrointestinal endoscopy (“stomach scope”), passing a nasogastric tube, and performing a rectal examination are important diagnostic techniques, but they can only assess a fraction of the entire digestive system. A complete physical examination, routine blood work (complete blood count and blood biochemistry), blood gas levels, fecal tests (e.g., to diagnose diarrhea causes such as Clostridium spp), ultrasounds of the intestines to detect displacement, torsion, or thickening of the walls, abdominocentesis (analysis of the fluid in the abdominal cavity to look for signs of inflammation or infection), laparoscopy, and radiographs (used primarily for foals or for horses suspected of sand colic) are also important tools when evaluating horses with colic or diarrhea. Kits that test for fecal blood are also available. These tests can help diagnose such conditions as colonic ulcers, but are not very reliable.

Treatment, Prognosis, Prevention
Because of the wide variety of problems that can occur at any point along a horse’s digestive tract, treatment and prognosis need to be determined on a case-by-case basis. Prevention, when possible, is certainly one of the best ways to keep your horse’s digestive system healthy. Ensure your horse has a properly balanced ration and always make dietary changes very slowly to allow the microbes time to adapt to the new diet. Some evidence supporting nutritional supplements for gastrointestinal health exists. Pre- and probiotics as well as digestive enzymes, fats (e.g., polar lipids), and amino acids (glutamine, threonine) are advocated for promoting a healthy digestive system. Like all nutritional supplements, select those for dietary health wisely, preferably with your veterinarian’s or nutritionist’s advice.

Key References
2. The Ohio State University. Horse nutrition. http://ohioline.osu.edu/b762/b762_5.html
5. Oke, S. Will the worms win? (part 1). www.TheHorse.com/13969

Further reading and free horse health e-newsletter: www.TheHorse.com/Digestion

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