

The Horse's Digestive System

Basics on the structure and function of the equine digestive tract

Overview

The equine digestive tract is large, complex, functions like a factory, yet is exceedingly delicate. Digestive tract dysfunction is an important concern for horse owners and veterinarians, and life-threatening problems can secondarily develop, including sepsis (the presence of bacteria or bacterial toxins in the blood) and laminitis.

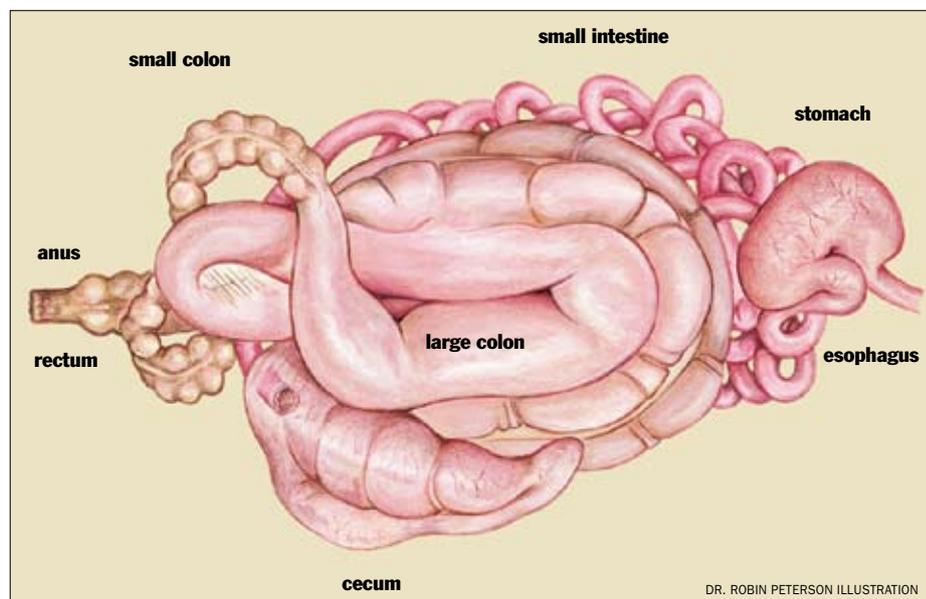
Structure of the Digestive System

The equine digestive system includes structures involved in the reception, reduction, digestion, absorption, and elimination of food. It begins with the lips and oral cavity, including the teeth, tongue, and accessory structures such as salivary glands, the oropharynx, hard and soft palates, and the larynx. The esophagus extends from just dorsal to (above) the larynx to the stomach—a distance of approximately 50 to 60 inches. The stomach is relatively small and rapidly empties food into the small intestines (the duodenum, jejunum, and ileum). The entire small intestine is approximately 70 feet long and only 4 inches in diameter. The liver and pancreas both have ducts that enter the small intestine to deliver bile and digestive enzymes, respectively. The ileum enters the cecum, which is approximately four feet long, one foot in diameter, and has a capacity of 10 gallons. The remainder of the large intestine has an approximate length of 12 feet and a diameter of 10 inches. The digestive tract ends with the rectum and anus.

To sum up, the route of the GI tract is the stomach, duodenum, jejunum, ileum, cecum, right ventral colon, left ventral colon, left dorsal colon, right dorsal colon, transverse colon, descending colon, and rectum.

Function of the Digestive System

From stem to stern, the digestive system is essentially a muscular tube that propels food in the oral to anal direction, breaking



down food particles and absorbing nutrients along the way. Horses are grazing animals and hindgut fermenters. As a result, the stomach is small and the large intestines are large. Digestion begins in the oral cavity when the food is masticated (chewed) and mixed with enzyme-containing saliva. Once swallowed, the food is further, albeit briefly, broken down in the stomach by the action of stomach acid before being propelled into the small intestines. In the small intestine, the liver and pancreas secrete bile and digestive enzymes to further break down the food particles into their basic components: carbohydrates, fats, and proteins. These compounds are absorbed from the small intestines along with vitamins and minerals.

The remaining ingesta—the fibrous or starchy components of forage—are passed into the large colon, where they are broken down by microbes (bacteria and protozoa). The resultant breakdown products (volatile fatty acids and lactic acid) are used by the horse, as well as nutrients such as B vitamins produced by the resident microbes.

When Things Go Wrong

Considering the length and complexity of the digestive tract, it is not surprising that anatomic and functional dysfunctions can have a profound impact on the horse. Some of the more common problems include oral problems, choke, gastric ulcers, and intestinal problems (including colic and diarrhea).

Infectious agents can also wreak havoc on a horse's digestive system. This can be as mild and relatively easily managed as intestinal parasite infestations (e.g., roundworms, bots, tapeworms, and small and large strongyles) to the development of profuse, watery, and fatal diarrhea caused by such bacterial species as *Salmonella* or *Clostridium*.

What Can Go Wrong?

Colic This horse-sized “belly ache” is a major concern for horse owners and vets. Intestinal problems can occur anywhere along the length of the intestinal tract. If the problem occurs in the large intestines, a rectal examination might be able to help

diagnose the cause of the colic and guide treatment options. For example, horses with a simple displacement of the large intestine or a mild impaction could be managed medically. In contrast, horses with a twist in the intestine generally require emergency surgery.

Gastric ulcers Recent studies have shown that within just three days of a stress condition, a horse can develop gastric ulcers. One researcher noted that for gastric ulcers to develop there needs to be exposure to hydrochloric acid (digestive juices of the stomach), volatile fatty acids (VFAs, fermentation byproducts of sugar sources found in hay or grain), and bile acids (reflux from the small intestine). Researchers have found with just three to four hours of exposure to these substances, tissue resistance in the stomach lining dramatically decreases. If acid exposure continues, the tissue begins to slough, with severe damage within 12 hours. Incidence of gastric ulcers ranges from 10% to more than 90%, depending on the horse, its environment, and its activities.

Colonic ulcers These arise in the hindgut of the GI tract and can cause digestive and

health problems. Buffering the equine hindgut could counteract adverse effects from rapidly fermentable pasture fructans and/or grain. Ulcers of any kind can become eroded to the degree that they cause bleeding into the GI tract and reduce the amount of nutrients the horse can absorb.

Available Diagnostics

Due to the large size of the horse and the small size of the veterinarian and his equipment, diagnosing a problem in the intestinal tract can be challenging. Endoscopy, 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. X rays are sometimes useful.

Other diagnostic tools used to diagnose digestive system dysfunction include 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.), ultrasound of the intestines to detect displacement, torsion, or thickening of the walls, abdominocentesis (analysis of the fluid in the

FAST FACTS

- The equine digestive tract is large, complex, delicate, and functions like a factory.
- The digestive system includes all structures involved in the reception, reduction, digestion, absorption, and elimination of food.
- The digestive system is essentially a muscular tube that propels food in the oral to anal direction, breaking down food particles and absorbing nutrients along the way.
- Some of the more common problems that can occur in the digestive system include choke, colic, gastric ulcers, colonic ulcers, and diarrhea.
- Life-threatening complications such as sepsis and laminitis can develop secondary to intestinal dysfunction.

abdominal cavity to assess inflammation or infection), fluoroscopy, and radiographs (e.g., for horses suspected of sand colic).

Treatment and Prognosis

Treatment and prognosis are highly variable because of the wide variety of problems that can occur along the digestive tract. This means treatment and prognosis are generally determined on a case-by-case basis. ◀

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