

Gastroenterology 101

From the mouth to Uranus, the gastrointestinal tract (GI) is composed of the mouth, esophagus, stomach (4 compartments), Small Intestines (SI), Large Intestine/ Cecum (LI), and the Rectum/Anus. Even though the gastrointestinal tract is within the body cavity, it is still considered to be the outside of the body. To get “inside the body,” feed has to be broken down into small amino acids, sugars, and fats and be absorbed through the intestinal wall into the blood stream (amino acids and sugars) or lymphatics (Fats/ Lipids). The gastrointestinal tract begins at the mouth and ends at the anus. Let’s follow a bite of food through the GI tract to understand this magnificent voyage.

When food is taken into the mouth, digestive enzymes have already begun. Amylase in the mouth begins to break down starches to make the feed easier to swallow. It also acts as a buffer (basic) to help the feed bolus enter the esophagus and into the acidic environment of the reticulum and rumen. The persistent rumination (regurgitation and swallowing) helps to breakdown feed particles and the saliva adds bicarbonate to the rumen to prevent the rumen from being too acidic. The **reticulum** helps to digest (breakdown) feed into smaller particles for the bacteria, yeast, and other microorganisms in the **rumen** to allow more efficient fermentation to produce volatile fatty acids (VFAs). The benefit of being a ruminant is that the VFAs can be absorbed thru the rumen wall into the blood stream and metabolized. Ruminal “bugs” also produce B vitamins as well. Proteins and sugars can “bypass” the rumen as well as microbial fluids which travel to **the omasum**. The omasum’s function is to absorb fluids. The microbes, proteins, and sugars then enter the true stomach, the **abomasum**. The abomasum is more acidic than the other compartments of the stomach and aids in further breakdown of protein and sugars into smaller particles. As the “ feed product” enters the small intestine, the pancreas secrete amylase and lipase to further breakdown fats and starches to their smallest particle size to be absorbed in the first 1/3 of the small intestine (duodenum). In the duodenum, amino acids (from protein), sugars, and fat particles are absorbed across the villi of the small intestine and enter the blood stream (now inside the body). To provide for maximum efficiency of the small intestine, we have to obviously increase the surface area of absorption. Villi and microvilli are naturally occurring finger-like projections which allow absorption. Increasing the health and numbers of villi and microvilli will provide more efficient and maximum absorption. Whatever is not absorbed continues down the GI tract and ferments to help support the microflora of the tract.

Feed is not sterile and so as it travels through the GI tract, acids and enzymes help to break down the bad bacteria. The GI tract also attempts to outnumber the bad bacteria with good bacteria to neutralize them and prevent them from attaching to the intestinal wall to create problems. The body also produces antibodies against foreign bacteria. Approximately 75% of the body’s immune system comes from the GI tract. As fermentation of the remaining feed passes through the tract, beneficial bacterial continue to produce B vitamins which will be absorbed in the later third of the small intestinal tract (ileum) with the help of a hormone called “intrinsic factor.” The cecum continues to ferment feed and produces more B vitamins which are not absorbed at this level but help support the microfloral environment. As the feed eventually enters the colon, 75% of the colon’s job is to remove (absorb) fluid, thus producing dry pelleted feces and maintain hydration of the deer. B vitamins in the colon help support the microflora of the colon as well.

“In a bubble,” the gastrointestinal tract is a highly functional orchestrated event and is 100% efficient. However, in the real world, there are many stressors that will affect the routine of the GI tract. When the GI tract is not in harmony, compounding problems will lead to a severe train wreck. A healthy gut is a happy gut. Understanding the normal physiology of the GI tract is critical. Knowing where things can go wrong and how to prevent/ treat them quickly will allow for the return of normal harmony of the GI tract creating an opportunity to return to 100% production efficiency (health wise and digestive/absorption wise).

One of the most overlooked stressors to the GI tract is ulcers. Since the lining of the intestinal tract is similar to the skin, let’s work through an example on how to deal with ulcers. A cut to your skin is typically treated by cleaning the wound, applying Neosporin and then a Band-Aid. The Band-Aid acts to protect the freshly healing tissue under it. As with the skin trauma, ulcers can be treated similarly. An antibiotic, Excede, can be used systemically to treat from the blood side with a subcutaneous injection and the Ban-Aid is replaced with Sucralfate (serves as a liquid Band-Aid). Sucralfate cannot be used in combination with antacids. Sucralfate binds to the proteins in the intestinal wall that are exposed from the ulcers. Antacids will prevent this binding of Sucralfate to the ulcers. How do we know if an animal has ulcers? Endoscopy is highly unlikely due to expense and the length of the GI tract. Therefore, a full blood chemistry profile will help to determine blood protein and albumin concentrations. A typical animal with GI ulcers presents with many clinical signs depending on the location of the ulcers. Ulcers in the mouth obviously show signs of excessive salivation, difficulty swallowing, and grinding of the teeth (pain). Animals that are eating fine but lose weight and have distended abdomens likely have duodenal ulcers (first 1/3 of small intestine). The protein they ingest is not absorbed due to inflammation of the intestinal wall and protein from the blood can “leak” into the abdomen causing a fluid drain to the abdomen. Recognizing these signs early will prevent digestive/absorptive inefficiency as well as death. There are many stressors that can prevent normal activity and efficiency of the GI tract. Understanding the complex function of the GI tract and its supporting organs is an ongoing battle we deal with on an individual and group basis. We will follow up in the next few articles on GI health and management in the months to come. If you have any questions, please call on us. Remember, each case can be an individual case and now understanding the complexity of the GI tract, there is not a one shot treatment option for all sick deer.

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