

A Gut Feeling



The Good, the Bad, and the Misunderstood of Digestive Health

by Deva Khalsa, VMD

It all starts in the mouth and ends, well, at the opposite end. Digestion is one of the main running systems for the body. Brain function, heart health, hair and nail growth, even energy levels depend on digestion's products. Without the digestive process of ingesting food, extracting nutrients, and eliminating waste, the body could not self-sustain its numerous other processes for life. So what is it about the digestive system that is so miraculous? Input to output, food to feces, digestion's start and finish are clear-cut, but the mysterious middle is often the most misunderstood. The stomach is neither the only nor the main stop during digestion. Digestion includes a complicated, miraculous system of organs to complete every detail of its journey.

Digestion begins in the mouth. The sight and smell of food prime the salivary glands to produce saliva, a watery fluid that moistens food and mouth tissues.

When food enters the mouth and is chewed, the digestive enzymes in saliva—*amylase* (which begins the breakdown of carbohydrates) and *lysozyme* (which fights bacteria)—coat the food before it slides down the esophagus in a wavelike motion and settles in the stomach.

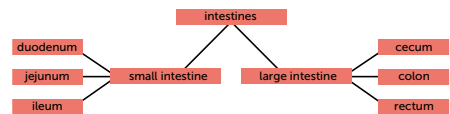
Food traveling from the esophagus is stored in the stomach while protein-digesting enzymes (*proteases*) are secreted. Protein-digesting enzymes mix with hydrochloric acid to break down food, and mucus is discharged to lubricate the food and protect the stomach wall, which is largely composed of protein. Hormones and nerves, along with food quantity and composition, determine the amount of enzymes, acid, and mucus released in the stomach. The resulting milk-like, semifluid mixture is known as *chyme*. Strong waves in the stomach and the loosening of the *pyloric sphincter*—a muscular ring that acts as a regulating valve—push the chyme out of the stomach. Next stop: the small intestine.

Type of food ingested, frequency of exercise, and amount of water consumed determine the rate of digestion. The average dog, regardless of size, will likely digest wet food within four to six hours; dry food may take longer (eight to ten hours). Eliminating too often or too little may indicate a digestive problem.

A dog's mouth plays a slightly smaller role in digestion than a human's mouth, since the canine's hinged jaws are designed to rip off large chunks of food. The larynx (the voice box) in humans is positioned lower in the throat than in animals. For humans, the lower position of the larynx allows our linguistic capabilities (a wider range of sounds than animals) but also puts us at a greater risk for choking.

enzyme: a specialized category of organic substances that act as catalysts to regulate the speed of the many chemical reactions. (Memory tool: Enzyme means quicker time.)

The intestines—that confusing tangle of squiggly tissues and organs—house all the action and consist of two main parts, the small intestine and the large intestine. The small intestine breaks down food into its simplest form. The body absorbs the nutrients through the intestinal wall and into the bloodstream. Villi—fingerlike projections lining the small intestine—maximize the amount of nutrient absorption along the entire passage of the small intestine. The hepatic portal system passes the materials to the liver for metabolizing.



The main part of digestion begins in the small intestine. In a medium-sized dog, the small intestine "road" can be as long as 20 feet and is divided into subparts: the duodenum, the jejunum, and the ileum. (In some dogs, the "square footage" can equal a small room.) The liver and pancreas, located just outside of the small intestine, assist by releasing digestive juices into tubes that mix with the food.

The remaining matter passes into the large intestine—a collaboration of the cecum, colon, and rectum. The cecum collects the undigested food matter entering from the small intestine, absorbing the remaining fluids and salts and mixing mucus with the contents for lubrication. Muscle under the cecum lining churns and kneads the material, sending it into the colon. As water and electrolyte remnants enter, the colon absorbs them, and muscles in the colon walls squeeze the forming stool along. Friendly bacteria—billions of cultures—blanket the colon's contents. Although some bacteria cause disease, many kinds of bacteria live in the body and prevent disease. A healthy, balanced community of bacteria is extremely important for a dog's digestive health. Some of these microorganisms protect dogs from disease-causing bacteria. Intestinal bacteria also provide dogs with needed nutrients, such as vitamin K (which the body itself cannot make) and B vitamins. Communities of healthy bacteria (known also as intestinal flora, beneficial bacteria, acidophilus, probiotics, and "the good guys") manufacture B vitamins to help prevent digestive inflammation and upset, and they also help the body restore and maintain a healthy pH, which fights off dangerous pathogenic bacteria in the intestine. Additionally, they help break down food material and prevent gas.

Tens of millions of bacteria reside in the canine (and human) intestine. Their Latin names, which appear on bottles in health food stores, include *Lactobacillus acidophilus*, *Lactobacillus bulgaricus*, *Lactobacillus bifidus*, *Streptococcus faecium*, *Bifidobacterium bifidum*, *Lactobacillus casei* and *Lactobacillus salivarius*. These bacteria help with bad breath, gas, diarrhea, indigestion, colitis, and even constipation. Bad breath in dogs can come from the mouth or from digestive issues. (Often times, bad breath is due to poor digestion rather than rotten teeth.) These good-guy bacteria (probiotics)

From a Dog's Mouth

The story starts in my mouth when I chew my food with my teeth. I use my teeth to grind up my food and mix it with my saliva. Saliva is a watery fluid that moistens my food, as well as the tissues of my mouth, and comes from my salivary glands. My saliva contains *amylase*, a digestive enzyme that starts to break down the carbohydrates in food before it moves down into my stomach. My saliva also contains an enzyme, called *lysozyme*, which fights bacteria. I have a lot more starch-digesting enzymes than my wolf cousins.

Food slides down my esophagus into my stomach. My stomach has lots of folds and ridges that assist with the job it has to do. My digestive juices mix with the food, and this works to further break food down into smaller parcels. I can absorb water in my stomach but not food. The food is then sent into my intestines.

My small intestine works to absorb my food. Did you know the small intestine "road" is about 20 feet long in a medium-sized dog like me? In fact, the road is so long, its name changes. At first, it is called the duodenum, then jejunum, and finally the ileum. My liver and pancreas are located just outside my small intestine and help with food digestion. They release digestive juices into tubes that mix with the food. They give my small intestine these juices early on, because just about all of the food is absorbed from the small intestine. My small intestine ends at my large intestine, which then becomes my colon. My large intestine has the important job of reabsorbing leftover water.



I have special "little friends" who also help me stay healthy. They are tenants in my intestine and are called friendly bacteria. They fight the bad bacteria and keep them at bay. Many of them die in the process of helping me to digest food and stay clean and healthy. Believe it or not, the bulk of my poop is made up of dead bacteria along with some undigested food.

assist digestion in the gut. Given on a routine basis, probiotics help maintain and protect a dog's health and build his immune system. Feeding green foods with chlorophyll also alleviates digestive-based bad-breath problems.

When treating infection, doctors sometimes prescribe **antibiotics** to destroy the unhealthy microorganisms. However, antibiotics cannot differentiate between the good-guy and bad-guy bacteria, therefore harming the entire intestinal bacteria population. To prevent a dangerous bacterial imbalance, dogs should be given beneficial bacteria especially during and after an antibiotic round to replace the healthy microflora and microfauna. Oral administration in food will counter the adverse effects of the antibiotics on a dog's intestinal flora.

Health food stores sell probiotic products in many formulations: liquid, powder, and capsule. Dogs can take the same dosage as humans, as probiotics simply reseed the intestine with the "good guys." Plain yogurt made from a natural culture, usually found in health food stores, contains these beneficial bacteria. Unfortunately, many name-brand yogurts available at the supermarket do not contain the necessary beneficial bacteria. Supermarkets do, however, carry kefir, a drink made from fermented cow's milk that contains multiple good bacteria. Dogs can consume anywhere from one tablespoon to the whole container, depending on owner preference, which can be easily added to any meal.

Probiotics multiply in the gut when accompanied by **prebiotics**—foods that the good-guy bacteria thrive on (dandelion and kale, for example). Together, the bacteria aid the intestine with digestion, leaving undigested food material to ferment. Many bacteria die during the process. (Feces are a combination of dead bacteria and undigested food residue.) Muscles along the colon walls push the leftover material into the rectum for final evacuation through the anus.

With more than 500 functions and a thousand-plus tasks in constant performance, the liver, appearing as a large reddish-brown mass divided into several lobes, never stops working. As the largest internal organ in the dog's body, the liver—to put it very simply—metabolizes proteins, fats, and carbohydrates; stores vitamins and minerals; digests food; and detoxifies the body.

After the intestine breaks down and absorbs food, the nutrients leave the digestive tract, bound for the organs in order to feed cells. However, the nutrients must first pass through the liver for inspection. The liver filters incoming material, removing any poisons or wastes from the digested nutrients. This is essential for life. Without the removal of toxins and harmful materials, the body would die. The liver even monitors medication (sedatives, anesthetic agents, antibiotics, etc.) and hormones produced by the body's glands as they pass through it, removing and metabolizing—"cleaning up"—elements as needed to maintain the body's homeostatic limits.

In order to transport bile into the gallbladder, the liver houses a branchlike plumbing system of small ducts, known as the biliary tree. The gallbladder uses the bile to help the body digest and emulsify fats. (Some mammals, such as whales, do not have a gallbladder.)

As a storage system, the liver amasses reserves for many of the body's proteins and chemicals, including fat-soluble vitamins (vitamins A, D, E, and K), stockpiling in case crisis arises and the supply is needed. The liver executes its tasks through the medium of blood. At any given moment 15 percent of the body's blood can be found inside the liver. Every blood vessel exiting the gastrointestinal tract travels immediately to the liver. Cutting a cross section would reveal a "soaked sponge" appearance, exposing the way blood—coursing through the liver's miles of blood vessels—contacts every liver cell.

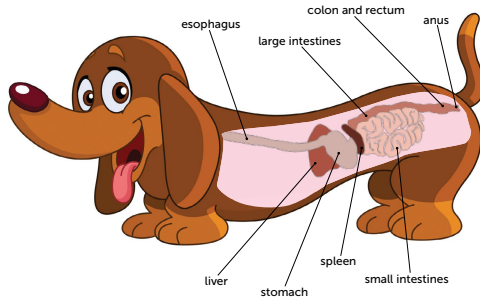
anti-: (prefix) opposed to or against.
pro-: (prefix) for or in favor of; supporting.
biotic: relating to living things.

Canine Everyday Essentials, a supplement available through Deserving Pets, contains nutrients from whole foods, super foods, vitamins, minerals, prebiotics, and probiotics. **deservingpets.com**

The root **hepa-** comes from the Greek **hepar** or **hepat-** meaning "liver." The adjective **hepatic** relates to the liver and its functions. **Hepatitis** (-itis meaning "inflammation") refers to inflammation of the liver.

In today's toxic world, the liver can become overloaded. Repeated insults from toxins and manmade poisons without relief can damage the liver cells, causing **hepatitis** or fibrosis of the liver (which may be irreversible). However, with careful maintenance, the liver can miraculously repair and regenerate its own cells that have been destroyed by short-term insult or injury. Vitamins and healthy food, especially green foods containing chlorophyll, arm the liver with the nutrients it needs to thrive. Green and brightly colored vegetables ease the liver's burden and help it dump toxins much faster.

Digestion's journey is nothing short of miraculous. From input to output, the body works continually to improve and protect health. And a few simple habits of good nutrition and supplementation can keep the road smooth for the adventures to come. 🐾



5 must-have items for healthy digestive tracts:

1 Green vegetables that have chlorophyll help stabilize the gut. Chlorophyll detoxifies the body, supports the liver, cleans the digestive tract, helps with bad breath, and feeds the good bacteria in the gut. Dogs eat grass (which is far from a food source) when they crave chlorophyll.



2 Probiotics in the form of kefir or purchased probiotics reinstate the good bacteria into the digestive system. They do not need to be given every day, especially if you feed your dog green vegetables. Several times a month is fine.

3 Sweet Potatoes have special compounds in them that soothe inflammation in the gut and are great for acute cases of diarrhea. Of course, they should be baked first.



4 Canned pumpkin is excellent for digestive health. Constipation is rare in dogs and diarrhea is much more common, but pumpkin can help with both.



5 Slippery elm is great to give dogs with digestive problems. A small amount of powdered slippery elm bark mixed in water forms a jellylike substance and can be fed to your pooch to help stop diarrhea. Mix the slippery elm powder with water. Depending on the severity of the problem and the size of the dog, give a dosage between 1 teaspoon and 2 tablespoons three times a day.

A licensed doctor of veterinary medicine with over thirty years in practice and a member of the American Veterinary Medical Association, American Holistic Veterinary Medical Association, and International Veterinary Acupuncture Society, **Dr. Deva Khalsa** has studied homeopathy for nearly three decades. Dr. Khalsa uses her extensive knowledge and experience to encourage and empower owners in a holistic approach to pet care. In addition to publishing several books on animal care and health, Dr. Khalsa lectures internationally and contributes regularly to several animal-centered magazines. A second edition of *Dr. Khalsa's Natural Dog* will be available in the spring. For more information, including online pet health videos, visit doctordeva.com.