

FLATULENCE

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Many dog owners at some point find themselves dealing with flatulence in their dog. Although usually not injurious, it can be an unpleasant and embarrassing problem. Chronic flatulence may in time become a health concern since it can lead to intestinal cell damage and a reduction in the gut's resistance to bacterial toxins. Occasionally, flatulence is a secondary symptom of a more serious underlying disease process. Chronic flatulence should therefore be managed.

Flatulence is defined as the excessive accumulation of gas in the digestive tract. There are two types: gastric and intestinal. Gastric flatulence is gas accumulation in the stomach, whereas intestinal flatulence involves gas in the intestines.

Every time a dog eats, air enters his stomach. Some air comes from inside the kibble and some originates from the frothy component of saliva but by far the majority of stomach gas comes from air swallowed by the dog as he gulps his food. The amount of gas accumulated will vary according to the eating habits of the individual dog but can exceed a half-litre per meal. Certain breeds of dogs, specifically those with shorter muzzles like the Boxer, seem to be particularly prone to gastric flatulence. Aggressive or competitive eating behaviours may exacerbate the problem.

Most dogs expel excess stomach gas simply by belching or, in extreme cases, by vomiting. While this outcome may not be appreciated by the owner, it does safely resolve the problem. For animals such as horse that cannot vomit, stomach gas accumulation can be fatal. Although usually not dangerous in dogs, excessive stomach gas can cause gastric distention which may increase the risk of gastric torsion. As well, swallowed air is thought to contribute significantly to intestinal gas. It is therefore advisable to try to control aerophagia ("air eating").

For dogs who chronically gulp too much air while eating, the most effective strategy is to slow the rate of eating. This can be accomplished by placing several large rocks in the dog's bowl, thereby forcing the dog to pick his kibble out from around the rocks. (Note: these rocks should be large enough that there is no risk of the dog gulping them down by mistake). Softening the food with water slows some hasty eaters, and feeding smaller meals more frequently may also help. Choosing a dog food with a particularly large kibble size may encourage chewing - smaller kibbles are generally easier to gulp. Finally, feed the dog alone in a quiet place where there is no need for competitive eating behaviour.

Intestinal flatulence is generally more objectionable than gastric flatulence. Stomach gas is primarily air, and the principal constituents of air (nitrogen and oxygen) are odorless. As much as 99% of intestinal gases are also odorless, consisting of nitrogen, oxygen, carbon dioxide, hydrogen and methane. However the remaining 1% consists of hydrogen sulfide, ammonia, indole, skatole and a variety of volatile amines. These gases are odoriferous and objectionable.

Intestinal gas is produced by all dogs during the normal digestion of food. When the acidic contents of the stomach encounter the alkaline enzymes of the small intestines, reactions occur which result in the production of water and carbon dioxide gas. Most of this gas is absorbed by the cells of the digestive tract and passed into the blood. It then travels to the lungs and is expelled in the dog's breath. The gas produced in the small intestine during normal digestion therefore does not typically contribute to flatulence. Odoriferous flatulence originates in the large intestine.

In normal digestion, the pancreas and the cells lining the small intestines produce enzymes that break down nutrients allowing their absorption into the dog's body. Protein,

digestible carbohydrates and fats are all broken down and absorbed into the dog's body in the small intestines. Non-digestible material such as dietary fibre on the other hand, passes through the small intestine and enters the large intestine. The large populations of bacteria that naturally reside in the large intestine use this in-coming material as substrate for fermentation. The degree of fermentation and the type of gases produced depend on the type and quantity of undigested material entering the large intestine.

Bacterial fermentation of fibre produces short chain fatty acids: acetic acid, propionic acid and butyric acid. These short chain fatty acids lower the pH inside the colon which inhibits the growth of certain types of harmful bacteria, particularly the clostridium species. These fatty acids are also used by cells of the colon as a source of nutrition and energy. So while dietary fibre does contribute to flatulence by providing a fermentation substrate for bacteria, it also provides several health benefits to the dog. The key is to provide adequate levels of dietary fibre for health but not excessive levels that may contribute to flatulence.

There are some foods which tend to increase the production of odoriferous gases. Beans (including soybeans) and peas contain large amounts of three non-digestible oligosaccharides: raffinose, stachyose and verbascose. The consequences of humans consuming large quantities of beans are well known. A similar situation occurs in dogs that consume large quantities of soybean meal.

As well, many dogs are lactose intolerant and for these dogs, eating treats containing cheese, ice cream or milk can cause flatulence.

Eating spoiled foods or garbage often results in a short bout of flatulence. Being fed a poor quality diet may lead to more chronic problem. Poor quality protein may not be completely digested and absorbed in the small

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intestine. Bacterial fermentation of undigested protein leads to the production of indole, skatole and volatile amines. Sulfur-containing amino acids in the protein are hydrolyzed to hydrogen sulfide gas. (Hydrogen sulfide is the gas that gives rotten eggs their distinctive odor.) As well, the nitrogen in the protein may be converted into ammonia gas. The bacterial fermentation of protein therefore yields some of the most odoriferous intestinal gases.

The best way to minimize intestinal flatulence is to enhance the digestion and absorption of nutrients in the small intestine so that they are not available for fermentation in the colon. The first step is to rule out any underlying medical conditions which may be interfering with nutrient digestion and absorption in the small intestines.

A veterinary examination should seek to rule out pancreatic disease which can impair the dog's ability to produce the digestive enzymes required for nutrient digestion. Other possible diseases to consider include malabsorption syndrome, gastroenteritis (inflammation of the digestive tract) and parasitic infestation all of which will affect the absorptive capacity of the small intestine. An underlying disease condition should be particularly suspected if flatulence is accompanied by loss of body weight or a loss of healthy body condition.

If there is no underlying medical condition, there are several things a dog owner can do to minimize the occurrence of flatulence.

First, since swallowed air is a major contributor of intestinal gas, all of the suggestions listed earlier for managing aerophagia should be followed.

Second, owners should try to enhance their dog's ability to completely digest the food he consumes. Owners should feed a very high quality, highly digestible diet and avoid ingredients such as soybean meal, beans, peas and milk products. Restricting a dog's fat intake may be helpful in some cases. Fat is a difficult nutrient for a dog to digest and absorb, so feeding a low fat diet may improve the dog's ability to digest and absorb all

nutrients in his diet. As well, providing a moderately restricted intake of very high quality protein will help to reduce the amount of non-digested protein reaching the large intestine. Owners should avoid feeding diets that contain high levels of fermentable or non-fermentable fibre and they should also avoid vitamin-mineral supplements since these may enhance intestinal microbial activity. Feeding smaller meals more frequently will greatly enhance the dog's ability to digest and absorb the nutrients in his food.

A final strategy is to feed products which alter the kinds of bacteria residing in the dog's colon. Prebiotics and probiotics will be the subject of next month's column.