

DIETARY MANAGEMENT OF DIARRHEA IN DOGS AND CATS

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Dietary management is a vital component of successful treatment of many Gastrointestinal (GI) diseases that cause diarrhea. Some conditions can be managed with diet alone, while others require concurrent medical management. In these cases, dietary management may facilitate the use of lower medication dosages, reducing the potential for side-effects. This seminar will provide an overview of “GI” diets and will briefly review the principles of dietary management of selected diarrheal disorders of the dog and cat.

“GI” diets

The traditional GI diet should be highly digestible, low in fat, low in fiber, and contain high quality nutrients. Some diets are lactose and gluten free, although the necessity of omitting these substances has not been proven. Decreasing fat content often reduces palatability, so many of the commercially available GI diets contain low-moderate fat levels compared to maintenance diets. Although many home-made recipes are available, most veterinarians utilize commercially available diets “GI” diets for client practicality and ease and consistency of treatment. Each of the major prescription pet food companies markets a “GI” diet. These diets adhere to the nutritional profile discussed above and are more similar to each other than different. Each company has components of their diet that they feel make it superior to their competitors, however published results proving benefits of these diets or direct comparisons between these diets in spontaneous canine and feline diseases are lacking.

Hills markets dry and canned i/d which can be fed to puppies and kittens and adult dogs and cats. The diet contains a low level of soy fiber, which has properties of both insoluble and soluble fibers. Nestle Purina markets EN in both dry and canned formulations for dogs and as a pouch for cats. In the canine diet approximately 30% of the fat is supplied as medium chain triglycerides, which are easier to assimilate than long chain triglycerides and are absorbed directly into the portal system. EN can also be fed to puppies. The feline product contains added soluble fiber. Both diets contain a ratio of omega-3 and omega-6 fatty acids which may be beneficial in managing inflammation. The lam’s product is low-residue, available as a dry formulation for puppies, and dry and canned for adult dogs and cats. These products contain beet pulp fiber, which is insoluble, but highly fermentable. They also contain fructooligosaccharides, which are metabolized by enteric bacteria and promote a healthy gut flora. They also are enhanced with omega-3 fatty acids. Waltham diets are marketed by their recent merger partner Royal Canin. Their low fat diet is available as a dry and canned product which is suitable for puppies and adult dogs. It contains the lowest level of fat of any of the prescription products. Innovative Veterinary Diets markets canine sensitive for adult dogs in a dry and canned formulation and a dry formulation for adult cats. The canine diet contains fructooligosaccharides and is supplemented with amylase, lipase, and protease. The feline product has enhanced levels of omega-3 fatty acids.

Acute Vomiting and/or Diarrhea

There are many causes of acute vomiting/diarrhea. Most cases are mild and self-limiting and can be easily managed. Dietary indiscretion is a very common cause of acute vomiting and/or diarrhea. For most vomiting cases, withholding food and water (NPO) and maintaining hydration with subcutaneous fluids is important. The animal should be held NPO until vomiting does not occur for 12-24 hours. Initially water should be offered in small amounts. If vomiting does not occur a "GI" diet or a homemade equivalent should be fed in small frequent meals. If vomiting does not occur the amount fed is gradually increased to meet maintenance requirements. The "GI" diet should be fed for 3-5 days after vomiting ceases and the animal's original diet slowly reintroduced over 3-5 days. Causes of dietary indiscretion should be corrected.

In cases of diarrhea, holding animals NPO is somewhat controversial. I usually withhold food for 12 hours and then initiate feeding a "GI" as described for acute vomiting. Digestibility of the diet is extremely important when treating diarrhea as malabsorbed nutrients can lead to worsening of diarrhea due to osmotic forces and potentially bacterial overgrowth. In addition, low fat content is important because malabsorbed fats can be acted on by intraluminal bacteria and form hydroxy fatty acids, which can worsen diarrhea by decreasing mucosal absorption, increasing secretion, altering mucosal permeability, and altering intestinal motility.

Lymphangiectasia

Dilation of small intestinal lymphatics and rupture into the lumen leads to protein losing enteropathy and low serum proteins in dogs. Cases may be idiopathic, or secondary to chronic inflammatory conditions of the small intestine. The aim of dietary management is to decrease lymphatic flow by supplying a very low fat diet. Reduced fat diets used for weight control, such as Hills r/d, Purina OM, Iams reduced calorie dry, or Royal Canin calorie control dry can be effective. Caloric supplementation with medium chain triglyceride oil (MCT) may be necessary. Medium chain triglycerides are absorbed into the venous system, not via lymphatics, and do not stimulate lymphatic flow. Ultra-low fat home made diets consisting of low fat cottage cheese, rice and potatoes can be very effective.

Plasmacytic lymphocytic enterocolitis – Inflammatory bowel disease

Inflammatory bowel disease is a common idiopathic condition in dogs and cats that causes vomiting and/or diarrhea of small and/or large bowel origin. Diagnosis requires histologic demonstration of intestinal inflammation in the absence of known causes of intestinal disease. Increased mucosal permeability leads to penetration of the mucosa by food antigens and initiation of hypersensitivity, that worsens the inflammatory process. It is also possible that dietary hypersensitivity may play a role in the initiation of mucosal damage.

Because of the potential role of dietary antigens as either a primary or secondary factor in the pathogenesis of IBD, hypoallergenic diets have been recommended as the initial treatment. A hypoallergenic diet must contain protein and carbohydrate sources novel to the patient. A thorough dietary history should be obtained to determine which ingredients the animal has not been previously exposed to. Many hypoallergenic diets are commercially available and utilize lamb, egg, rabbit, venison, duck, fish, or kangaroo as a protein source (Table 1). A homemade diet can also be formulated using these protein

sources, or others such as cottage cheese or tofu with rice or potatoes as a carbohydrate source. Homemade diets can be deficient in vitamins and minerals. They can be safely fed for trial periods, but must be completely balanced for long term use. Vitamin and mineral supplements must be carefully selected because many contain extracts and flavorings.

The hypoallergenic diet should be fed for four weeks and must be the only nutrient source that the dog or cat receives. Other household pet's food, table scraps, treats, and flavored vitamin, heartworm, and flea products must be avoided. Free roaming animals must be strictly supervised to avoid the potential for dietary indiscretion. If the clinical signs resolve when the hypoallergenic diet is fed, the animal should be challenged with its original diet. Clinical signs should rapidly return if dietary hypersensitivity is a component of IBD.

Although hypersensitivity can occur to any dietary constituent, common offending allergens include beef, cows milk, eggs, fish, wheat, soybeans, oats, or corn. There is some clinical evidence the animal can subsequently develop hypersensitivity to other antigens. Some have advocated rotating diets to prevent this from occurring. In addition, use of a "sacrificial" hypoallergenic diet along with anti-inflammatory medications, until the mucosal barrier is repaired, and then switching to a different hypoallergenic diet has been suggested. Poorly digestible novel proteins may induce hypersensitivity in patients with increased mucosal permeability because protein digestion usually renders it non-allergenic. Cooked eggs and cottage cheese are assimilated more readily than many meats and may be more hypoallergenic to intestinal mucosa than meat-based diets.

Recently, hydrolyzed protein diets have been developed in which protein size has been reduced and are no longer antigenic. Hills z/d ultra (dogs) and z/d low allergen (cats) contains hydrolyzed chicken liver and muscle. Purina HA (dogs) and royal Canin Hypoallergenic HP (dogs and cats) contain hydrolyzed soy protein. These products are available as dry formulations only. The diets meet many of the criteria for "GI" diets also, as they are relatively low in fat, low in fiber, and highly digestible.

A recent study in cats with chronic GI signs emphasizes the importance of hypoallergenic diets in the treatment of IBD. Out of 55 cats with idiopathic IBD treated with an elimination diet, based on dietary history, 16 were confirmed to have dietary sensitivity and 11 others responded to the hypoallergenic diet. These 11 cats did not have their clinical signs return when challenged with their original diet. The most common offending substances were beef, wheat, corn, gluten.

Probiotics

Probiotics are live bacteria that confer a health benefit to the host. Common bacteria include lactobacilli, bifidobacteria, and enterococci. In humans a daily dose is often 5-10 million. To be effective viability must be maintained throughout production, storage, distribution, passage through the upper GI tract into the colon. Many commercially available products do not survive transit into the colon and are not as effective as "advertised". The bacteria should be able to be cultured from the feces during treatment, but will usually disappear once oral administration ends. The bacteria must be nonpathogenic and not transmit antibiotic resistance.

Probiotic bacteria have been reported to have many beneficial effects on the host including conditioning the immune system, synthesizing B vitamins, producing digestive enzymes, producing antibacterial factors, competing with pathogens for adhesion sites and nutrients, enhancing epithelial repair, increasing mucus production, decreasing luminal pH, and protecting tight junctions. However, all probiotics do not do all of the above. In humans some probiotics have been shown to be beneficial in acute infectious diarrhea, prevention of antibiotic associated diarrhea, pouchitis, cow's milk allergy, IBD, and irritable bowel syndrome. Currently there is accumulating but weak evidence demonstrating benefits of probiotics in dogs and cats with diarrhea.

Chronic Idiopathic large bowel diarrhea

I routinely add soluble fiber to a highly digestible diet in dogs with chronic idiopathic large bowel diarrhea, even if irritable bowel syndrome has been diagnosed. In cases of fiber-responsive large bowel diarrhea (FRLBD), chronic intermittent or continuous large bowel diarrhea is usually accompanied by hematochezia, excess fecal mucus, and tenesmus. Abdominal pain and vomiting can occur in some dogs. Nervousness, abnormal personality factors, and stressors have been identified in approximately 40% of cases. However, in some of these cases, a temporal relationship to the diarrhea could not be established.

Soluble fiber, psyllium hydrophilic mucilloid (Metamucil[®], Procter & Gamble), added to a highly digestible diet (i/d[®] Hills), has resulted in excellent or very good results in approximately 80% of dogs with chronic idiopathic large bowel diarrhea. In the authors' cases, the median amount of Metamucil[®] added to the diet was two TBSP / day which was approximately 1.3 g psyllium / kg / day. I have not been able to identify any clinical findings that help to predict whether a dog will respond to fiber supplementation. In some dogs, the amount of fiber added to the diet can be reduced or withdrawn entirely, while in others the highly digestible diet can be replaced with a grocery store brand of food after the diarrhea resolves.

Dietary fiber is a collective term for a wide variety of plant polysaccharides and lignins that are resistant to mammalian digestive enzymes. There are many types of dietary fiber, each with diverse chemical, physical, and physiologic properties. Water soluble fibers include pectin, gums, mucilages, and some hemicelluloses. They are found in the parenchymatous portions of fruit and vegetables, and in the seeds of leguminous plants. Water insoluble fibers includes cellulose, lignin, and some hemicelluloses. They are found in cereal grains and seed coats.

There are several potential mechanisms by which dietary fiber supplementation may result in clinical improvement in dogs with FRLBD. Soluble fiber adsorbs a large quantity of water, improving fecal consistency. Colonic bacteria, which make up approximately 40-55% of the dry stool mass, ferment soluble fiber, which results in a vast increase in the numbers (but not types) of colonic bacteria and quantity of bacterial byproducts. Bacterial fermentation of fiber leads to the production of short chain fatty acids, of which butyrate serves as an energy source for colonocytes. Insoluble fiber greatly adds to fecal volume. Thus, dietary fiber can increase fecal bulk which increases colonic distention, the major stimulus for normal colonic motility. With increased colonic distention, an improved motility pattern in dogs with FRLBD may result in resolution of clinical signs.

Psyllium comes from the seeds or husks of the plant ispaghul and consists of approximately 90% soluble fiber. Although there are no other reported studies evaluating the use soluble fibers in dogs with diarrhea, there are in human beings. Treatment with psyllium has been shown to be beneficial in children with nonspecific chronic diarrhea of childhood, adults with chronic idiopathic diarrhea, patients with ulcerative colitis in remission, and some with irritable bowel syndrome. Psyllium has also been shown to improve diarrhea in human burn patients receiving enteral nutrition and in another group of tube-fed patients. Psyllium also improved fecal consistency in humans with experimentally induced secretory diarrhea and also reduced the acceleration of colonic transport in those with lactulose-induced diarrhea.

Table 1. Some limited antigen foods

Company	Food name	Major ingredients	dog or cat	dry or canned
Hills	d/d	Egg, rice	dog	dry
Hills	d/d	Duck, rice	dog	dry
Hills	d/d	Salmon, rice	dog	dry
Hills	d/d	Lamb, rice	dog / cat	canned
Hills	d/d	Whitefish, rice	dog	canned
Purina	LA	Salmon, trout, rice	dog	dry
Iams	Response FP	Catfish, potato	dog	dry, canned
Iams	Response KO	Kangaroo, oats	dog	dry
Iams	Response LB	Lamb, barley	cat	canned
Innovative Veterinary Diets	Limited ingredient diet	Lamb, potato	dog, cat	dry, canned
Innovative Veterinary Diets	Limited ingredient diet	Venison, potato	dog, cat	dry, canned
Innovative Veterinary Diets	Limited ingredient diet	Duck, potato	dog, cat	dry, canned (dog only)
Innovative Veterinary Diets	Limited ingredient diet	Rabbit, potato	dog, cat	dry, canned
Innovative Veterinary Diets	Limited ingredient diet	Whitefish, potato	dog	dry, canned
Royal Canin	Sensitivity RC, LR	Catfish, rice	dog	dry (RC), canned (LR)
Royal Canin	Sensitivity RD, VR	Duck, rice	cat	dry (RD), canned (VR)
Wysong	Anergen	Lamb, rice	dog, cat	dry, canned
Nature's Recipe	Allergy	Venison rice	dog	dry, canned
Nature's Recipe	Allergy vegetarian	Rice, soy, barley	dog	dry, canned
Natural Life	Lamaderm	Lamb, rice	dog, cat	dry, canned
Sensible Choice		Lamb, rice	dog,	dry

Selected References

1. Leib M. Treatment of chronic idiopathic large-bowel diarrhea in dogs with a highly digestible diet and soluble fiber: A retrospective review of 37 cases. *J Am Vet Med Assoc* 2000; 14: 27-32.
2. Guilford W, Jones B, Markwell P, *et al.* Food sensitivity in cats with chronic idiopathic gastrointestinal problems. *J Vet Intern Med* 2001; 15: 7-13.
3. Simpson JW, Maskell IE, Markwell PJ. Use of a restricted antigen diet in the management of idiopathic canine colitis. *J Sm Anim Pract* 1994; 35: 233-238.
4. Nelson R, Dimperio M, Long G. Lymphocytic-plasmacytic colitis in the cat. *J Am Vet Med Assoc* 1984; 184: 1133-1135.
5. Nelson RW, Stookey LJ, Kazacos E. Nutritional management of idiopathic chronic colitis in the dog. *J Vet Int Med* 1988; 2: 133-137.
6. Dimski DS, Buffington CA. Dietary fiber in small animal therapeutics. *J Am Vet Med Assoc* 1991; 199: 1142-1146.
7. Wynn SG. Probiotics in veterinary practice. *J Am Vet Med Assoc* 2009; 234: 606-613.