Proceedings of the 34th World Small Animal Veterinary Congress
WSAVA 2009
São Paulo, Brazil - 2009

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NUTRITIONAL MANAGEMENT OF THE MOST COMMON DIGESTIVE DISEASES IN DOGS AND CATS
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Introduction
Common signs associated with digestive disorders include vomiting, diarrhea, anorexia and weight loss. Nutritional management plays an essential role in the treatment and, depending on the underlying condition, it can be more important than the pharmacological intervention. The presence of food in the gastrointestinal (GI) tract provides a variety of trophic stimuli, like; nutrient supply to enterocytes and colonocytes, increased mesenteric blood flow, stimulus to release digestive hormones and enterohormones which influence the replication and differentiation of intestinal cells, IgA secretion, maintenance of the gut-associated lymphoid tissue (GALT), and others. On the other hand, some factors related to the diet can cause severe adverse reactions as a systemic inflammatory response, osmotic diarrhea and a reduced gastrointestinal transit time. The nutritional approach to this group of patients should consider that the digestive tract is the natural pathway through which the food is ingested and digested, and the nutrients are absorbed. Thus, gastrointestinal diseases results in direct disorders of involved organs and in loss of the ability of nutrient absorption, and consequent malnutrition can lead to systemic complications. In this way, the objective of nutritional management of these patients is to restore digestive functions, reestablish the intestinal microbiota balance and supply the animals with nutrients.

Gastroenteritis
The treatment of acute gastrointestinal disorders often involves some rest for the digestive tract. Food is withdrawn for a 24 to 72 hours period to reduce the intestinal osmotic load, and to also reduce the intestinal substrate for bacterial fermentation. This concept has been recently revised. The food withdrawal can have disastrous nutritional consequences. Increasing evidences suggest that enteral nutritional support in anorexic patients is beneficial for animals with gastroenteritis. Dogs infected with Parvovirus showed weight gain, shorter hospitalization period, and reduced mortality when they were fed by nasoesophageal tube, even when vomiting and diarrhea were present, when compared to dogs fasted until these clinical signs are no longer present. The use of early microenteral nutritional support in dogs with hemorrhagic gastroenteritis resulted in a shorter hospitalization period, higher discharge rate and weight gain, when compared to the group that did not receive nutritional support. Enteral nutrition should be started as early as possible, restricting the microenteral nutrition to the period of transition between anorexia and the enteral nutritional support.

Pancreatitis and exocrine pancreatic insufficiency
Nutritional support should be started as early as possible in patients with pancreatitis. If the option is enteral nutrition, the first choice is nasojejunal feeding tube or jejunostomy, and a parenteral nutritional complement can be used. If the animal has been anorexic for less than 5 days (most dogs with edematous pancreatitis), parenteral nutrition therapy can be used. If the situation indicates anorexia for more than 5 days and the option of a jejunostomy tube is not possible, total parenteral nutrition can be used. Pancreatitis in cats has a lower incidence of vomiting, and in this case enteral nutrition should be started as early as possible (maximum of 3 to 4 days), especially if the cat is obese and there is a risk of lipidosis. Patients with exocrine pancreatic insufficiency require an easily digestible diet with low fiber concentrations. Micronutrients supplementation (cobalamin, tocopherol) and enzyme administration are also necessary. Non-enteric coated powder enzyme supplements seemed to work best, probably at individually adjusted dosages. To restore adequate body condition, a high fat diet can be necessary.

Chronic diarrhea
Different clinical conditions are related to chronic diarrhea as food intolerance, stress-related colitis, C. perfringens, fiber-responsive colitis, inflammatory bowel disease, large intestine neoplasias, etc. The dietary management varies according to the underlying disease. Generally, the animal should receive a
diet with moderate levels of fiber and fat, divided into small portions during the day. Commercial or homemade diets can be used, with low fat content and easily digested low antigenicity ingredients. The objectives of a diet are to facilitate intestinal motility regulation, beneficially modify the composition and metabolic activity of the intestinal microbiota, and exclude antigens from the diet. Many patients with chronic colitis respond to hypoallergenic diets. Non-soluble fiber should be used, as cooked string beans, wheat middlings, oat middlings or cellulose. When they are well tolerated, these diets have a regulatory effect on peristalsism and transit time. Soluble fibers, on the other hand, have positive effects on the quality of faeces because they bind water, as cooked carrots, psyllium (*Platago psyllium*) or ispagula (*Plantago ovata*). Fiber fermentation in the large intestine may lead to the production of short chain fatty acids (acetic, propionic and butyric), reducing the intestinal pH and altering the composition and metabolic activity of the eubiota. The butyric acid is used by the colonocytes as energy source, and has trophic, antimutagenic and antiinflammatory properties. Probiotics and prebiotics can also be used for this purpose.

**Small intestinal bacterial overgrowth (SIBO)**
The bacterial overgrowth takes place under conditions such as partial obstruction, exocrine pancreatic insufficiency, motility disorders, decreased acid production in the stomach, and in inflammatory bowel disease. Diet must be highly digestible (efficiently digested, absorbed and used, reducing its antigenic potential and decreasing the nutrients flow to the colon). Excessive organic matter in the colon can have negative effects such as higher gas production, flatulence and diarrhea. Special attention should be given to the source and amount of protein being used. Hypoallergenic diets can be used, including those with hydrolized proteins in the more severe cases of malabsorption. Rice should be used as the main source of carbohydrate. The amount of fiber should be adjusted according to animal needs – starting with a low level (<2% crude fiber or 6% of dietary fiber). The energy requirement calculation has to be adjusted, as most patients have malabsorption. Fat can be used to increase the energy density of the diet, but the amount has to be adjusted according to the patient’s response. If fat is not absorbed, it can be converted into hydroxylated fatty acids that may cause hypersecretion and the diarrhea becomes more severe. In spite of the positive effects of probiotics and prebiotics, there are few studies demonstrating their use in cases of SIBO.

**Food intolerance or hypersensitivity**
Sometimes, the usual diet is the main cause of the gastrointestinal disorder, whether due to a food allergy or a non-immune intolerance. In these situations, the diet modification is curative and the primary treatment of the disease. In acute cases, the owner will easily associate the food with the gastrointestinal episode, resulting in removing the food and. In chronic cases, however, it is more difficult to detect the food involved in the disease. Inflammatory bowel disease, as eosinophilic gastroenteritis and plasmacytic-lymphocytic enteritis, can also be manifestations of food allergies. In this situation, a “hypoallergenic” diet can be used or diets with new ingredients that were never given before to the animal, as an attempt to eliminate antigens and intolerances.

**Adjuvant diet therapy**
Most often, the diet is not the cause of the gastrointestinal disease. However, due to the digestion and absorption compromising, the use of a conventional diet can lead to diarrhea. In such condition, diet modifications do not cure the disease, but reduces the clinical manifestations, acting as an adjuvant to drug therapy.

Digestibility: damages to intestinal mucosa can reduce the digestion and absorption, so the use of a highly digestible diet is recommended (dry matter digestibility > 87%).

Carbohydrates: rice is the highest digestible cereal to dogs and cats, and cooked rice is an excellent option for homemade diets. Damages to the mucosa can interfere with the brush border, reducing the disaccharidase production and animals can present intolerance to sugars so they should be avoided. This is also true for lactose, so milk and dairy products should be avoided too.

Protein: should have high digestibility (>85%) and biological value. The use of a single protein source can be the best option to several gastrointestinal diseases, and it can be effective when a true diet sensitivity is present. May be it also reduce the risk of hypersensitivity development by the sick intestine.
Fat: reduction of the intestinal surface associated with villi atrophy can result in malabsorption. In cases of bacterial overgrowth in the small intestine, significant fat fermentation could happen. Moderate (<15% diet) or even severe (<6% diet) fat reduction has been recommended. The use of medium chain fatty acids can be an alternative to provide calories to the animals, but their use remain controversial. Fibers: soluble fibers gelatinize the digesta, increase hydration of feces and reduce the food digestibility. Non-fermentable and non-soluble fibers can be used in larger amounts, reducing energy digestibility and helping faeces formation. In general, the recommendation is to use fibers with moderate fermentation and solubility, adding the benefit of these two characteristics to the diet. Small intestine diarrhea require the use of low fiber diet (<2-3% of crude fiber), and in an opposite way for large intestine diarrhea a high fiber diet (>8-10% of crude fiber) could favor colon functions. An empiric recommendation would be to supplement the diet with 2% psyllium fiber as a source of highly soluble and low fermentation fiber source.

Other characteristics of the ideal diet for intestinal disorders include: be gluten free (wheat, barley, oats and rye); supplemented with lipo- and hydrosoluble vitamins; nutritionally balanced; good palatability. Diets should be given in two or three small meals. A larger number of meals could abolish the intestinal “cleansing” provided by the interdigestive peristaltic waves and therefore should not be recommended. Patients with gastrointestinal disease usually have increased nutritional requirements. The initial supply of 0.85 x maintenance energy requirements (MER) can be used as a starting point. Further increases may be necessary to compensate for the digestive and intestinal inability to absorb. Animals with protein loss enteropathies can require up to two times the MER. In these situations, the need of a high intake to overcome losses and higher expenditure should be counterbalanced with the lower intestinal capability and capacity, reinforcing the importance of providing food with high nutritional density and digestibility.

References: