Dietary management in cats and dogs with chronic gastrointestinal disease

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Catherine Bovens looks at diets in small animals with this condition, focusing on the composition, tinned versus dry foods, as well as feed regularity

DIET is an essential part of the treatment of chronic gastrointestinal diseases. Indeed, it may be the sole long-term treatment required for conditions involving adverse food reactions such as food allergy or intolerance.

However, it is also important in other gastrointestinal conditions, such as inflammatory bowel disease (IBD), intestinal lymphangiectasia, antibiotic-responsive diarrhoea or lymphoma.

The two main types of commercial diets used in dogs and cats with gastrointestinal disease are the following:

• “Gastrointestinal” diets (also called “enteric” or “intestinal”, and sometimes confusingly called “hypoallergenic”).

• Exclusion diets. The exclusion diets can further be divided into selected protein diets and hydrolysed diets.

Homemade diets can also be used for gastrointestinal diseases, but need to be nutritionally balanced and tailored for each individual pet and its conditions. Homemade diets are beyond the scope of this article, but it is recommended that a veterinary nutrition specialist is consulted for

individual patients.

A number of factors are important when choosing a diet:

Lifestage

Any diet for a growing animal needs to be nutritionally balanced for growth. Growing pets require more energy, more protein, and optimal amounts of calcium and phosphorus. Ideally, any diet fed to growing animals should have undergone controlled feeding trials to prove it is safe and adequate.

Digestibility

A very important factor to consider in choosing a diet for an animal with gastrointestinal disease is nutrient digestibility. If digestibility of any of the nutrients (protein, fat or carbohydrate) is poor, it will lead to malassimilation, which could contribute to worsening of the clinical signs via weight loss, osmotic diarrhoea or production of large amounts of faeces. Poorly digested nutrients may also be fermented by intestinal bacteria, which may lead to production of abnormal faecal consistency and odour.

It may also encourage the growth of pathogenic bacteria species. Typical commercially available maintenance canine and feline diets have protein and carbohydrate digestibilities around 70 per cent to 85 per cent on a dry matter (DM) basis. For an animal with gastrointestinal disease, the digestibility should be higher – ideally a minimum of 88 per cent DM. Digestibility and amounts of fat, protein and carbohydrates should always be compared on a DM basis rather than a percentage of the diet as fed.

Diet composition

- **Protein**

Providing high-quality, highly digestible, easy-to-assimilate protein is important, particularly in cases of protein malnutrition. The protein should contain the correct proportions of the essential amino acids. Cats have a greater need for protein than dogs and this should be taken into account. Protein-losing enteropathies are a group of conditions (including some forms of inflammatory bowel disease, diffuse neoplasia and lymphangiectasia) in which protein loss occurs via the faeces across damaged intestinal mucosa; these patients are frequently hypoalbuminaemic. Protein malnutrition can further exacerbate existing intestinal disease through impairment of mucosal cell protein synthesis and turnover, and by impairing the local immune function. In hypoalbuminaemic animals, high-quality protein can also be added to the diet if needed (low-fat cottage cheese or cooked egg whites).

The main difference between “gastrointestinal” diets and exclusion diets is the protein source. Gastrointestinal diets usually contain a mixture of protein sources (various meats, fish), while exclusion diets contain a single protein source.

Most pets with food allergy are allergic to one or several proteins; hypersensitivity to carbohydrate sources is rare. Gastrointestinal biopsies often reveal gastrointestinal inflammation and a food allergy cannot be differentiated from other inflammatory enteropathies, such as IBD based on histology results alone. In pets with potential food allergy, an exclusion diet should be tried. The diet can either contain a novel protein source or a hydrolysed protein source.

• Novel protein diets contain a single protein source. The choice should take into account the pet’s feeding history and ideally be a protein the pet has never been exposed to in the past, which means it cannot be allergic to that specific protein (as previous exposure is required for sensitisation).

• Hydrolysed diets contain small peptides (less than 10,000 daltons in size) that are less likely to be allergenic than fullsize proteins. Most hydrolysed diets also only use a single protein source. However, some animals with a hypersensitivity to a specific protein may still have an adverse reaction to the hydrolysed version of the same protein, as hydrolysis to a size below 600 daltons is required to completely prevent antigenicity. If a hydrolysed diet is selected, the protein source should ideally also be novel for the treated animal.

Any diet selected for an exclusion diet trial should not contain any other protein sources, including added flavours. The diet should not contain gluten (a protein found in wheat and related grain species, including oats, barley and rye) or lactose, and should ideally also contain a single source of carbohydrate. These diets should not be confused with hypoallergenic, over-the-counter diets, which may contain a limited number of antigens, but are usually not strict enough in their composition to be suitable for an exclusion diet trial.

It should be noted gastrointestinal conditions other than food allergy may also respond to an exclusion diet trial.

• Food intolerance is an adverse reaction to a food ingredient, similar to food allergy, but it does not involve the immune system. For example, if an animal lacks a specific digestive enzyme, it may be intolerant to the food component that requires this enzyme to be digested. Animals with food intolerance may also respond to an exclusion diet if it is free of the ingredient to which they are intolerant (for example, gluten, lactose or an additive).

• Mild IBD cases may also benefit from a limited antigen diet, as loss of immunological tolerance to normal food antigens may play a role in IBD pathogenesis.

• It has been hypothesised that animals with any intestinal disease may develop a hypersensitivity

to food as a consequence of their condition. The normal intestinal mucosa tolerates exposure to normal dietary antigens, but when the mucosa is damaged, antigens may be able to reach the deeper layers of the intestine before having been digested, and may stimulate an immune response. Therefore, animals may become hypersensitive to any protein fed during the active phase of their disease. These animals may improve if the diet is later changed to a different protein source.

• Fats and fatty acids

Dietary fat usually has a high inherent digestibility, but digestion and absorption of fat is a complex process, and malassimilation of fat is common in animals with gastrointestinal disease, leading to bacterial fermentation of undigested fat. A higher fat content in the diet also slows gastric emptying and decreases the tone of the lower oesophageal sphincter, increasing the risk of reflux.

A reduced fat diet is, therefore, recommended for gastrointestinal conditions (less than 15 per cent DM). It's vital energy is provided by protein and carbohydrates, otherwise the low-fat content and, consequently, the low calorific density can exacerbate the rate of weight loss, especially if the patient has a poor appetite. In lymphangiectasia, fat assimilation is severely impaired, so ultra low-fat diets are recommended (less than 10 per cent DM). While most highly digestible diets for gastrointestinal conditions are low fat, this is not always the case for exclusion diets.

There is a lot of focus on adding omega-3 fatty acids to diets, usually via adding fish or linseed oil. Omega-3 fatty acids have anti-inflammatory properties – a higher omega-3 to omega-6 ratio decreases the synthesis of inflammatory eicosanoids and, therefore, may decrease intestinal inflammation. The benefits in adding omega-3 to gastrointestinal diets for cats and dogs are unclear, as few studies have been published looking at their effects in those species. However, positive results obtained in humans and rats with intestinal inflammation are promising. The optimal amounts of omega-3 and optimal omega-3 to omega-6 ratios required to achieve significant reductions in inflammation, but still retain the desired effects of omega-6-derived eicosanoids, are still unknown. Overall, adding omega-3 supplements to gastrointestinal diets is unlikely to be harmful (as long as the diet remains fat restricted overall) and may be beneficial.

Medium-chain triglycerides (MCT) were recommended in the past for lymphangiectasia as it was thought they were absorbed directly in the portal blood and did not enter the lymphatics. However, this theory has been contradicted so they are no longer specifically recommended. MCT remain a highly digestible source of fat and are still present in some gastrointestinal diets.

• Carbohydrates and dietary fibre

The amount of carbohydrates is less important than their digestibility in diets for dogs with gastrointestinal conditions. This may not be true in cats, as they have less ability to digest and metabolise carbohydrates. A gluten-free single carbohydrate source is recommended, such as rice,

potato, corn or tapioca. Some animals may be allergic to corn (shown in cats).

Soluble fibres – such as fructo-oligosaccharides (FOS), mannan-oligosaccharides (MOS) or beet pulp – are added in some diets. These are nondigestible food ingredients fermented by specific species of bacteria and act as prebiotics. The aim of adding them to gastrointestinal diets is to selectively stimulate the growth of and/ or activate the metabolism of health-promoting bacteria in the intestinal tract. So prebiotics may be beneficial, particularly in conditions of the large intestine or in small intestinal diseases involving the bacterial flora (such as antibiotic-responsive diarrhoea or IBD). FOS have beneficial effects in humans with IBD, although no studies have been published demonstrating their effects in dogs and cats with gastrointestinal disease, so their benefits in those species are unclear.

Diets for gastrointestinal disease should be low in insoluble fibres as these decrease digestibility (except in some specific, large intestinal conditions, such as colitis or mild constipation). The amount of total fibre should be less than 10 per cent DM.

- **Additives**

Preservatives, antimicrobials, colouring agents, flavours and flavour enhancers, emulsifying agents, stabilisers and thickeners should be avoided in diets for gastrointestinal disease, as they may cause food intolerance. Carrageenans, a group of thickening agents often present in tinned food, promote gastrointestinal inflammation.

Antioxidants have been proven beneficial in humans with inflammatory intestinal diseases, but, in dogs and cats, chronic intestinal inflammation does not usually involve large numbers of oxidant-producing cells (such as neutrophils and macrophages) and usually involves lymphoplasmacytic or eosinophilic inflammation, so antioxidants may be less beneficial. No published studies demonstrate the benefits of antioxidants in gastrointestinal conditions in cats and dogs.

Tinned or dry food?

Tinned diets are generally more palatable than their dry equivalents; palatability is important in animals with gastrointestinal conditions, as they may have reduced appetite and are frequently underweight or prone to weight loss due to their condition. Palatability is also essential for exclusion diet trials and can be a major problem in cats that choose only to eat one food type. Tinned diets have increased water content, which will make gastric emptying faster, potentially decreasing vomiting. Tinned diets are preferable in cases where gastric ulceration or oesophageal inflammation (for example, secondary to chronic vomiting) may be present, to avoid further trauma to the oesophageal or gastric mucosa.

Dry diets are generally cheaper than their tinned equivalents and may be more practical to use in the long term.

Diets available in both dry and tinned versions have the advantage of allowing the mixing of both textures, which may increase palatability and owner compliance. Owner compliance is particularly important in exclusion diet trials.

When and how much?

Once the appropriate diet has been selected for a specific animal, the amount of daily food should be determined. The caloric contents of the diets can usually be found on the producer's website. The amount fed should meet the animal's energy requirements, including:

• The resting energy requirements (or RER) is the very minimum to cover requirements at rest and avoid weight loss.

• The requirements for activity combined with the RER – this gives the maintenance energy requirements (or MER), which is what an active animal should eat.

• The requirements for weight gain in underweight animals.

Several formulas exist to calculate the RER and MER; one generally accepted equation for dogs and cats is as follows: (BW = bodyweight, in kilograms) $RER = 70 \times (BW)0.75$
$BW0.75 = (BW \times BW \times BW)$ then press "square root" twice; then multiply by 70 to obtain the RER.

The MER can be obtained by multiplying the RER by a factor, depending on the animal.

For adult pets in normal body condition with an average level of activity, the factors are: 1.2 neutered cat; 1.4 intact cat; 1.6 neutered dog; 1.8 intact dog.

For growing animals, the factors are: three for puppies until four months; two for puppies more than four months until adult size; 2.5 for kittens until adult size.

The factors can be adjusted depending on the activity of the pet and its body condition:

• Consider decreasing the factor by 0.2 for sedentary or slightly overweight pets. It should be noted that diets for gastrointestinal disease are not adequate for active weight loss as they would not be balanced if fed in restricted amounts to obtain weight loss.

• Consider increasing the factor by 0.2 in more active or slightly underweight animals.

• A higher factor may be required for severely underweight animals or pets with diseases causing energy loss, such as protein-losing enteropathies.

Sick, hospitalised animals should be fed their RER initially. Their weight should be checked daily

and the amount of food adjusted in function of the weight. Animals who have been anorexic for several days should be fed one third of the RER on day one, two thirds of the RER on day two and the complete RER from day three onwards. Tube-assisted feeding should be considered in dogs and cats eating an insufficient amount.

Pets with gastrointestinal disease who are at home should be fed the MER with the factor adjusted for their individual requirements, as discussed above. They should be weighed weekly initially and the amount of daily food adjusted in function of the weight.

Once the amount of the diet to feed daily has been determined, the daily food allowance should be divided in three to four small meals in animals with gastrointestinal disease. The advantages of feeding small, frequent meals are several: gastric distension is reduced, which reduces the risk of vomiting; the mixing and digestion of food in the stomach is increased; and gastric acid secretion is reduced. However, dividing the daily food in more than four meals per day may be counter-productive, as the stomach then never empties and vomiting may develop or worsen.

In cats and dogs used to grazing throughout the day, the food can remain available ad libitum, but the pet’s actual intake should be monitored (for example, by weighing the food bowl and recording the amount eaten per day), and food not eaten after a few hours should be replaced by fresh food. This feeding method is usually not satisfactory for multi-pet households, as it is essential to be able to determine how much an animal with gastrointestinal disease is eating.