



Research reports

A RESEARCH UPDATE
FOR THE VETERINARIAN
FROM AFFINITY PETCARE

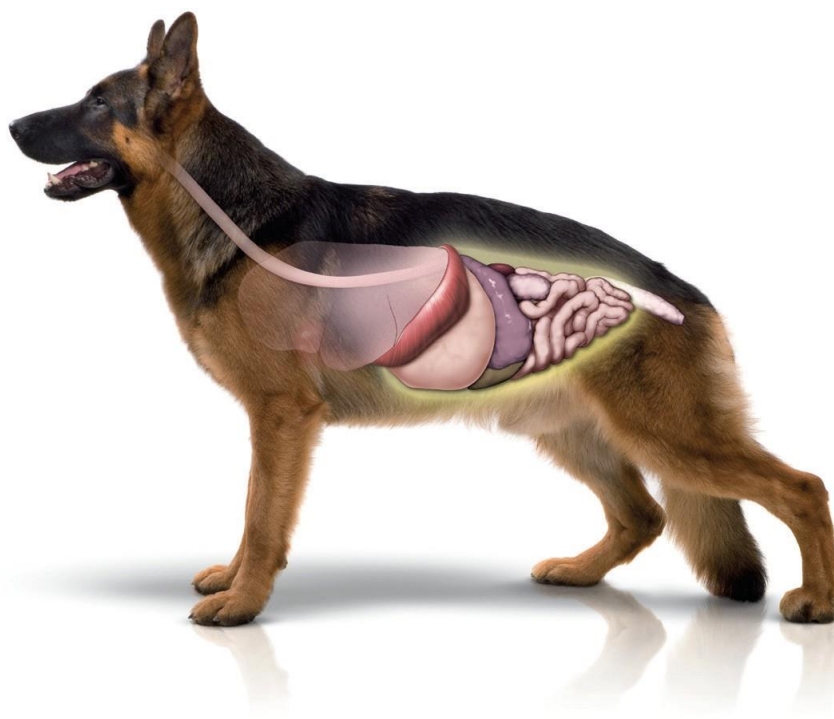
DIETARY TREATMENT OF CANINE GASTROINTESTINAL DISORDERS

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INTRODUCTION

Gastrointestinal disorders, typically characterised by vomiting and diarrhoea in dogs, are one of the main reasons for visiting the small animal veterinary surgeon.

In most instances, these symptoms can be resolved with appropriate treatment, but in some cases their causes are potentially life-threatening. Here we summarise the most common causes of canine gastrointestinal disorders and their dietary treatment.



COMMON GASTROINTESTINAL DISEASES

1. ACUTE GASTROENTERITIS

Table 1 summarises a wide range of disorders that can cause acute gastrointestinal symptoms, as well as their diagnosis and treatment. Acute gastrointestinal disorders can affect the stomach, small intestine and/or large intestine. Traditionally, temporary fasting has been recommended to reduce the amount of nutrients that go unabsorbed in the intestine and which could cause osmotic diarrhoea, reduce bacterial flora and reduce antigenic stimulation of the mucosa. The duration of this fasting depends on the age, severity of the symptoms and whether or not the patient suffers vomiting, although it tends to last for 24-36 hours (maximum of 12 hours for puppies).

Food should then be reintroduced gradually after the fasting period. The provision of small and frequent meals (3-4 a day) minimises

In acute gastrointestinal disorders: an easy-to-digest, low-fat diet with an optimal fatty acid and micronutrient profile is recommended to minimise the secretory effect of the malabsorption of fats and bile acids in the intestine

the osmotic load on the weakened intestine. An easy-to-digest, low-fat diet free from gluten and with an optimal fatty acid and micronutrient profile (such as ADVANCE Veterinary Diets Gastroenteric) is recommended to minimise the secretory effect of fatty acid and bile acid malabsorption.

In human medicine, prolonged fasting is currently considered to cause intestinal atrophy, loss of intestinal disaccharidase activity and increased intestinal permeability. The concepts of “food-based oral rehydration” and “feeding during diarrhoea” are currently applied in modern medicine. In light of these theories, a study in dogs with parvoviral enteritis has shown that early enteral nutrition (12 hours post-admission) resulted in quicker clinical improvement and weight gain than the implementation of a fasting period of up to 12 hours once vomiting had stopped. Similarly, a clinical study by Affinity showed that ADVANCE Veterinary Diets Gastroenteric efficiently resolves cases of acute canine diarrhoea with no prior fasting. However, when trying to extrapolate the feeding during diarrhoea concept to veterinary medicine, it should be noted that dogs tend to suffer from osmotic diarrhoea, in contrast to humans who tend to suffer from secretory diarrhoea.

Table 1. Main causes of acute, severe and mild diarrhoea and/or vomiting in dogs.

DIET

- Sudden change in diet
- Unsuitable diet, intoxication with leftovers
- Food intolerance or sensitivity
- Poisoning, etc.

GASTROINTESTINAL INFLAMMATION

- Gastritis
- Parasites and protozoa (*Cryptosporidium spp.*, *Giardia spp.*, Coccidia, worms, hookworms, etc.)
- Bacteria (salmonellosis, colibacillosis, *Clostridium spp.*, *Campylobacter spp.*, etc.)
- Virus (canine distemper, parvovirus, enterovirus, etc.)
- Ulcers, etc.

FUNCTIONAL OR MECHANICAL ILEUS

- Gastric dilatation-volvulus
- Foreign body
- Electrolyte disorders

DRUGS AND TOXIC SUBSTANCES

- Caustic chemicals
- Plant products
- Heavy metals
- Ethylene glycol
- Pesticides (carbamates, organophosphates)
- Medicines (anti-inflammatories, antineoplastic agents, antibiotics, digoxin, etc.)

NEUROLOGICAL DISORDERS

EXTRA-GASTROINTESTINAL DISORDERS

- Acute pancreatitis
- Liver disease
- Kidney disease
- Hypoadrenocorticism
- Pyometra
- Peritonitis
- Diabetic ketoacidosis
- Septicaemia

2. CHRONIC GASTROENTERITIS

Chronic vomiting and diarrhoea in dogs (intermittent or continuous symptoms for at least 7 days, generally for over 3 weeks) is a common and frustrating problem for both owners and vets. A full and detailed examination of the animal and its environment is essential to ensure a correct diagnosis and treatment, since these clinical signs are common to several different diseases (as shown in Table 2).

Inflammatory enteropathy in dogs

Canine chronic inflammatory enteropathies, such as food sensitivity, antibiotic-responsive diarrhoea (ARD) and inflammatory bowel disease (IBD), are common in small animals. Moreover, there is increasing evidence that these disorders have a common aetiology involving deregulation of the innate and adaptive immune systems in the gut-associated lymphoid tissue (GALT) and enteric microflora.

The various inflammatory enteropathies can be considered different manifestations of the same disease rather than specific entities.

Although inflammatory enteropathies in dogs are treatable (with antibiotics in the case of ARD and immunosuppression in the case of IBD), conventional drugs have significant side effects. As such, a complementary dietary therapy may help reduce the treatment time or intensity with which the drugs are administered. The diagnostic approach to chronic enteropathies is summarised in Annex 2 (according to the guidelines used by the Small Animal Referral Hospital at the University of Bristol, UK).

A routine clinical examination can exclude anatomical and infectious causes, while ARD is ruled out empirically. Finally, once neoplasms and lymphangiectasia have been ruled out by way of an intestinal biopsy, we are left with a heterogeneous group of patients of whom a small

percentage that will respond to an exclusion diet. We can determine which ones are diet-sensitive if they relapse upon re-exposure to the causative allergens. The rest of the patients, who do not respond to an exclusion diet, can be considered to have an inflammatory bowel disease of idiopathic origin. Although dogs with idiopathic IBD have traditionally been treated with immunosuppressants, given the side effects of long-term therapy, we recommend the administration of a low-fat, easy-to-digest diet that will facilitate the reduction or elimination of the drug therapy.

Canine chronic inflammatory enteropathies have a high prevalence and they share a common aetiology involving deregulation of the innate and acquired immune systems; dietary therapy is decisive for their diagnosis and treatment.

Adverse food reactions: food sensitivity or intolerance?

The term adverse food reaction is used to describe an abnormal reaction, from a clinical perspective, associated with the ingestion of a particular food or additive. This includes non-immunological and immunological reactions (intolerances and allergies, respectively). Intolerance is a non-immunological response to a food that is digested incorrectly or due to metabolic, toxic or pharmacological causes.

A genuine canine food allergy has traditionally been considered a type I hypersensitivity reaction

Table 2. Common causes of chronic vomiting and/or diarrhoea in dogs.

GASTROINTESTINAL DISORDERS

- Chronic kidney failure
- Diabetic ketoacidosis
- Liver disease
- Chronic pancreatitis, exocrine pancreatic failure
- Hypoadrenocorticism
- Mastocytosis

GASTRIC DISORDERS

- Chronic gastritis
- Unsuitable diet
- Immune-mediated or part of an intestinal inflammation (plasmatic, lymphocytic, eosinophilic, etc.)
- *Helicobacter* spp.
- Gastric motility disorder
- Gastric reflux syndrome
- Foreign body
- Ulcer
- Neoplasm
- *Physaloptera* spp.
- Pyloric hypertrophy
- Gastroparesis

SMALL AND/OR LARGE INTESTINE DISORDERS

- Parasites and protozoa (ascariidiosis, ankylostomiasis, trichuriasis, strongyloidiasis, teniasis)
- Adverse food reaction (transgression, allergy, intolerance, etc.)
- Inflammatory bowel disease (IBD)
- Antibiotic-responsive diarrhoea
- Bacteria (*Clostridium perfringens*, *Clostridium difficile*, *Yersinia enterocolitica*, *Campylobacter* spp., *Salmonella*)
- Gluten-sensitive enteropathy
- Lymphosarcoma
- Protein-losing enteropathy
- Lymphangiectasia
- Histoplasmosis
- Ulcer
- Partial obstruction (neoplasm, foreign body, intussusception, extraluminary obstruction, etc.)
- Colitis (plasmacytic, lymphocytic)
- Clostridial enterotoxigenesis
- Fibre-responsive colitis
- Irritable bowel syndrome
- Colonic neoplasm
- Histiocytic ulcerative colitis in Boxers

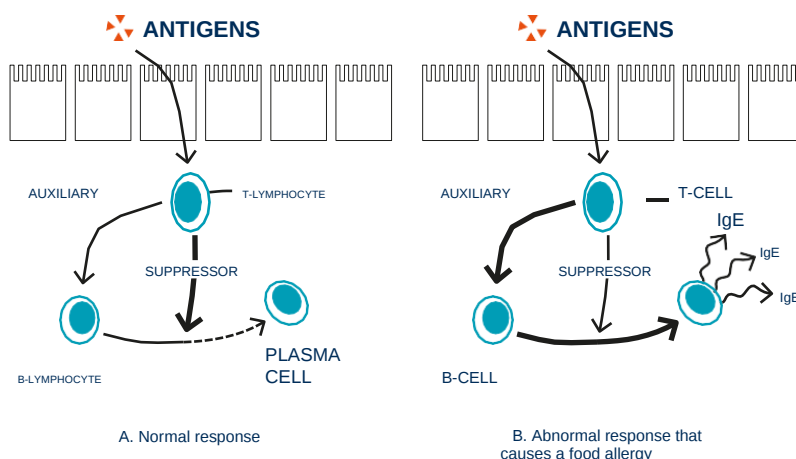
to the ingestion of food-based antigens (Figure 1), although a non-immunomodulated food allergy may also occur. Food-based allergens are typically proteins or glycoproteins with a mass of 10-40 kilodaltons (kDa) that are resistant to heat, acid and enzyme degradation. Less than 1% of the canine population are likely to be affected. Signs are most commonly observed on the skin in the form of pruritus due to self-injury and/or secondary bacterial infections, and less frequently gastrointestinal signs in the form of vomiting, diarrhoea, lack of appetite, abdominal pain and weight loss. It is usually diagnosed when the symptoms are resolved by implementing a strict test diet (exclusion test), comprising a new source of proteins and/or carbohydrates, or a hydrolysed protein diet that includes the whole protein hydrolysed with enzymes to convert it into smaller, less allergenic peptides (such as ADVANCE Veterinary Diets Hypoallergenic) for 2-10 weeks.

However, the clinical signs of other diseases (such as idiopathic IBD) may also improve with a hydrolysed protein diet even in the absence of a food allergy, so a dietary challenge (return to the initial diet) should be considered to confirm the diagnosis of a food allergy if the symptoms reappear. Some breeds are genetically predisposed to gluten sensitivity, for example the Irish Setter and Soft-coated Wheaten Terrier.

Antibiotic-responsive diarrhoea (ARD)

The term "antibiotic-responsive diarrhoea" (ARD) is now used to refer to the condition previously known as "small intestinal bacterial overgrowth" (SIBO) because recent studies have questioned this definition which is based on the detection of large numbers of bacteria in the duodenal juice – something that proves technically complex and impractical.

Figure 1. Immune system response to an oral antigen.



ARD is particularly common in young adult German Shepherds. The most common symptoms are chronic intermittent diarrhoea, often associated with weight loss, and excessive borborygmus. ARD is diagnosed by ruling out other causes and on the basis of a positive response to antibiotic therapy, which may also act as immunomodulators.

ARD may be secondary to exocrine pancreatic insufficiency (EPI), a motility disorder, reduced gastric acid, etc.

Advance Veterinary Gastroenteric Canine, a low-fat, easy-to-digest diet enriched with functional components (bioactive and prebiotic plasma proteins), complements drug therapy in cases of antibiotic-responsive diarrhoea.

Inflammatory bowel disease

Inflammatory bowel disease (IBD) is an umbrella term covering various histopathological descriptions of intestinal mucosal inflammation rather than a specific disease as such. Strictly speaking, we should use the term idiopathic IBD as this provides a more accurate reflection of the unknown aetiology. Dogs with IBD usually manifest chronic vomiting and/or diarrhoea; furthermore, weight loss and blood in the faeces are indicative of a more severe case. Once again, German Shepherds are apparently predisposed to this condition.

Diagnosis involves the elimination of other metabolic and/or infectious diseases and performing intestinal biopsies, which allow for further classification based on the predominant inflammatory cells. The classifications normally applied to dogs are: lymphocytic-plasmacytic enteritis, lymphocytic-plasmacytic colitis, eosinophilic gastroenteritis, eosinophilic colitis, eosinophilic granuloma, hypereosinophilic syndrome, histocytic colitis, granulomatous colitis, transmural granulomatous enterocolitis and suppurative colitis.

In humans, IBD differs from Crohn's disease (CD) and ulcerative colitis (UC) in terms of the distribution of the lesion and evolution of the disease, as well as in the type of inflammatory reaction. Lymphocytic-

plasmacytic enteritis (LPE) occurs much more frequently in dogs than eosinophilic enteritis. Other inflammatory intestinal diseases that have been detected include histiocytic (Boxer) colitis, which is currently considered an infectious disease, protein-losing enteropathy and nephropathy in Soft-coated Wheaten Terriers, immunoproliferative disease in Basenjis and enteropathy syndrome in Sharpeis. These cases are usually treated with a combination of dietary treatment and immunosuppressive therapy using corticosteroids and cyclosporin.

A low-fat, easy-to-digest diet is recommended for the dietary treatment of IBD. In some severe cases, a low-fat, hypoallergenic diet with hydrolysed protein may improve the clinical signs.

Lymphangiectasia

Lymphangiectasia is an abnormal dilatation and dysfunction of the lymph vessels in the mucosa and submucosa. It can be primary or secondary (e.g., lymph blockage due to intestinal inflammation, fibrosis, neoplastic infiltration or liver or heart disease). Chronic diarrhoea with steatorrhoea, weight loss and polyphagia may be observed in early stages. Vomiting, anorexia and lethargy are also possible. The intestine exudes a protein-rich lymphatic fluid (protein-losing enteropathy, PLE), which is accompanied by severe lipid malabsorption leading to ascites, chylothorax or subcutaneous oedema. A low-fat diet is usually recommended (ADVANCE Veterinary Diets Gastroenteric).

Colitis

The typical signs of colitis include a higher frequency of small stools or small volumes of diarrhoea, mucus or blood in stools and tenesmus (in other words frequent, unsuccessful attempts to defecate), sometimes with urgency. As noted above, adverse food reactions and idiopathic inflammatory intestinal diseases can affect both the large and small intestine. However, some diarrhoea-producing conditions are specific to the large intestine. The most common ones include stress-related colitis (or irritable colon syndrome) and fibre-responsive colitis.

Stress-related colitis is a relatively unknown condition that is usually encountered in "stressed" dogs. As such, its aetiopathogenesis is poorly understood, although various hypotheses have been proposed.

Fibre-responsive colitis can be treated with a fibre-rich diet such as Advance Veterinary Diets Diabetes.

However, a different dietary treatment (which is low-fat, low-antigen, easy-to-digest and hydrolysed) is required for other causes of diarrhoea of the large intestine (parasites, adverse food reactions, IBD, irritable colon syndrome, etc.).

3. EXOCRINE PANCREATIC INSUFFICIENCY

Exocrine pancreatic insufficiency (EPI) is another possible cause of chronic diarrhoea in dogs. Dogs with EPI usually have chronic diarrhoea with a large number of yellow or grey stools and moderate to high weight loss. Some animals display itching, coprophagy, fur in a poor condition and loss of muscle mass (protein calorie malnutrition). Nutrient malabsorption

may be particularly serious as the pancreas plays a key role in the digestion of the main components of food (proteins, fats and carbohydrates) and because this may be compromised by a decrease in intestinal enzyme function, bacterial proliferation (ARD) or related diseases of the small intestine. A low-fat, easy-to-digest diet is usually recommended.

The Advance Veterinary Diets Hypoallergenic hydrolysed diet is particularly useful in cases of a food sensitivity caused by the presence of poorly digested antigenic macromolecules.

4. CONSTIPATION

Constipation is difficulty in expelling hard, dry stools. Its main sign is tenesmus. Constipation may occur for several reasons: diet (low-fibre diet, bones, ingesting fur, etc.), pain (anorectal disease, trauma), mechanical obstruction (prostate enlargement, tumour, etc.), neuromuscular dysfunction, metabolic or endocrine disorders (hypothyroidism, etc.), general muscle weakness, etc. Constipation may result in obstipation (secondary degeneration of the colonic muscle). Megacolon is chronic enlargement of the colon's diameter. It can be congenital or acquired (due to fluid-electrolyte imbalance, a low-fibre diet, foreign bodies, painful defecation, neuromuscular disorders, obstruction, etc.).

A high-fibre diet such as Advance Veterinary Diets Diabetes is recommended for constipation.

APPENDIX: DIAGNOSTIC ALGORITHMS

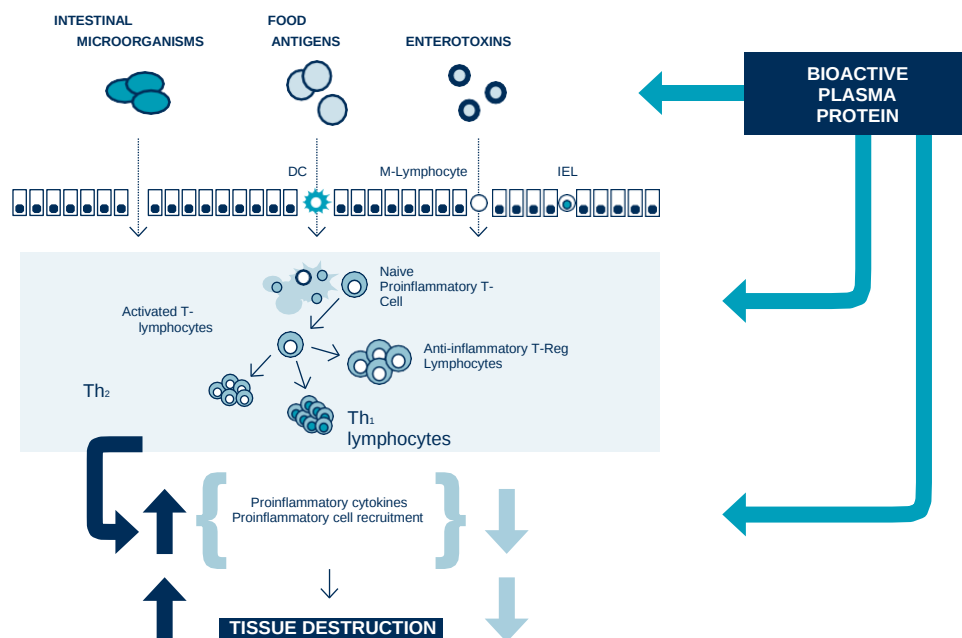
Almost all gastrointestinal diseases present the same general symptoms (anorexia, loss of appetite, abdominal discomfort, weight loss, vomiting, diarrhoea, etc.), so it is often hard to diagnose the specific disease in each case. The algorithms for severe and chronic diarrhoea are used to assist in the identification of certain problems, evaluate their severity, rule out other problems and facilitate the design of a diagnostic and/or treatment plan for each problem ([Annexes 1 and 2](#)).

A complete anamnesis and physical examination must be carried out. The medical history can provide information about descriptions, vaccines, environment, diet, medicines, possible exposure to toxins and infectious agents, weight and evaluation of the animal's physical status. For example, young animals are susceptible to inadequate feeding,

infections (parvovirus, distemper) and parasites, whereas older animals may present metabolic or systemic disorders or gastrointestinal permeability. It should also be remembered that some breeds are predisposed to certain diseases (e.g., miniature Schnauzers are predisposed to pancreatitis, etc.). Animals that roam freely in an open environment are more likely to suffer from parasitic, toxic or infectious gastroenteritis. Environmental stress (police dogs, guide dogs, show dogs, etc.) may cause diarrhoea of the large intestine. Weight loss is usually indicative of a chronic disease in the small intestine. Some tests of a general nature (haematological, biochemistry, radiography, ultrasound, etc.), as well as some specific treatments (antiparasitic agents, antibiotics, specific diets, etc.) and tests (biopsy, endoscopy) also help rule out many of the potential causes.

Actually, it appears that some dogs with colitis also suffer from various diseases of the small intestine at the same time (e.g., inflammatory intestinal disease with colitis and enteritis). As such, it is always advisable to examine both the large and small intestine in the event of colitis symptoms. However, when isolated colitis is suspected, an empirical treatment with fibre can be tested before performing an endoscopy, or a high-fibre diet can be administered if biopsies indicate the presence of isolated colitis.

Figure 2. Proposed action of bioactive plasma proteins on the intestine (adapted from Moreto and Pérez-Bosque, 2009).



DIETARY TREATMENT OF CANINE GASTROINTESTINAL DISEASES

Bioactive Plasma Proteins

Plasma contains a complex combination of bioactive compounds, mainly bioactive proteins such as IgG (Moreto and Pérez-Bosque, 2009). Recent studies have shown that the use of these bioactive proteins as a dietary supplement can reduce the onset and/or severity of a range of intestinal diseases (Abreu et al., 2005; Lerner, 2007). The mode of action of these bioactive proteins, which is also shown in Figure 2, is summarised below.

Plasma proteins with intestinal bioactivity prevent pathogen proliferation (adhesion and activity), reduce the inflammatory response in the intestine and preserve the integrity of the intestinal barrier (by increasing its surface area and reducing its permeability), thereby improving the clinical signs of chronic gastrointestinal.

1. COMBAT INTESTINAL PATHOGENS BY

- Reducing pathogen adhesion to the intestinal mucosa
- Reducing pathogen activity
- Strengthening beneficial faecal microbial flora

2. REDUCE THE INTESTINE'S INFLAMMATORY RESPONSE BY

- Reducing proinflammatory cytokines (INF- γ , TNF- α)
- Increasing anti-inflammatory cytokines (IL-10)

3. MAINTAIN MUCOSAL INTEGRITY BY

- Increasing the height of the intestinal villi, villus height: crypt depth ratio and the area and volume of the villi (Yi et al., 2005).
- Reducing intestinal epithelial permeability and increasing tight junction protein levels during episodes of diarrhoea (Pérez-Bosque et al., 2006).
- Reducing water secretion in the intestine (Pérez-Bosque et al., 2004).
- Increasing nutrient absorption.

LOW FAT, MEDIUM-CHAIN TRIGLYCERIDE AND POLYUNSATURATED FATTY ACID (ω 3-PUFA) CONTENT

- **Medium-chain triglycerides (MCTs)** MCTs are triglycerides with a high content of medium-chain fatty acids (C6-C12: caproic and lauric acid, respectively); coconut oil is a natural source of MCTs. Their low molecular weight and size

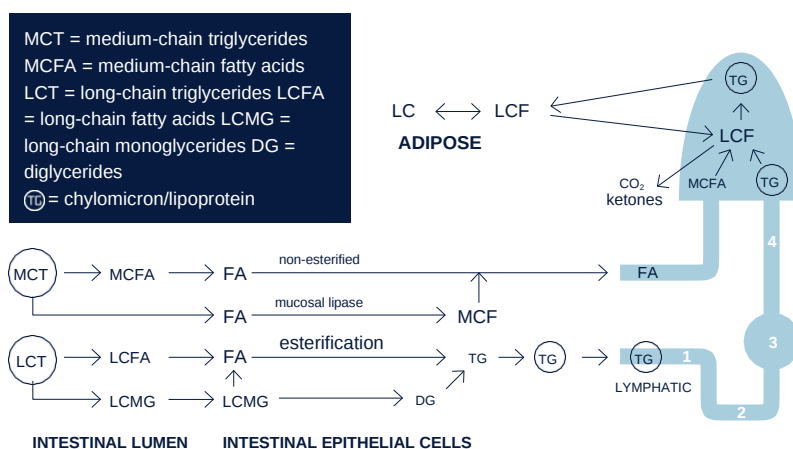
compared to long-chain triglycerides (LCTs) (C16-C22) (Johnson et al. 1990) accelerates pancreatic lipase activity, which hydrolyses MCTs more rapidly than LCTs (Bach and Babayan, 1982). They are markedly ionised at physiological pH and are more soluble in aqueous biological fluids than LCFAs (Johnson et al. 1990; Odle, 1997).

Medium-chain fatty acids (MCFAs) follow the portal system rather than the lymphatic system used by long-chain fatty acids (LCFAs) and are transported in a soluble form bound to albumin (Johnson et al. 1990) instead of the chylomicrons used by LCFAs. As such, they reach the liver more quickly (Figure 3) (Bach and Babayan, 1982; Odle, 1997). MCFAs are oxidised rapidly (Johnson et al. 1990), thus supplying a rapid source of energy (Bach and Babayan, 1982).

· Fish oil as a source of omega-3

The effects of omega-3 fatty acids (DHA-EPA) on the modulation of prostaglandin metabolism, the reduction of proinflammatory

Figure 3. Metabolism of medium- and long-chain fatty acid triglycerides in the intestine, liver and adipose tissue (adapted from Odle, 1997).



1. Lymph duct 2. Vena cava / 3. Heart / 4. Aorta

cytokine production in tissue, and the decrease in triglyceride and cholesterol levels has been widely reported (*Wander et al., 1997; Simopoulos, 2002*).

An improvement in symptoms and reduced steroid administration has been observed in some studies in humans with inflammatory intestinal disease after the introduction of an omega-3 fatty acid supplement (*Simopoulos, 2002*).

GLUTAMINE (GLN)

Glutamine is a non-essential amino acid and its de novo synthesis is carried out in skeletal muscle, although it is considered an essential amino acid when under conditions of stress and inflammation because greater amounts are required (*Yi et al., 2005; Bartell and Batal, 2007*). Glutamine (Gln) has an important and unique metabolic function; it is the main energy source for enterocytes in the small intestine, lymphocytes, macrophages and fibroblasts (*Bartell and Batal, 2007*). It is involved in both the urea and Krebs cycles (*Bertolo and Burrin, 2008*). It is also a carbon source and nitrogen donor responsible for acid-base regulation and protects the body against high ammonia levels (*Bartell and Batal, 2007*).

Glutamine protects the intestine in various situations of stress (trauma, septicaemia, burns, diarrhoea, chemotherapy) by means of different mechanisms:

1. It maintains the integrity of the intestinal barrier, thereby contributing to intestinal epithelium metabolism.

- i. It increases the height, area and volume of intestinal villi.
- ii. It improves nutrient absorption (*Bartell and Batal, 2007*).

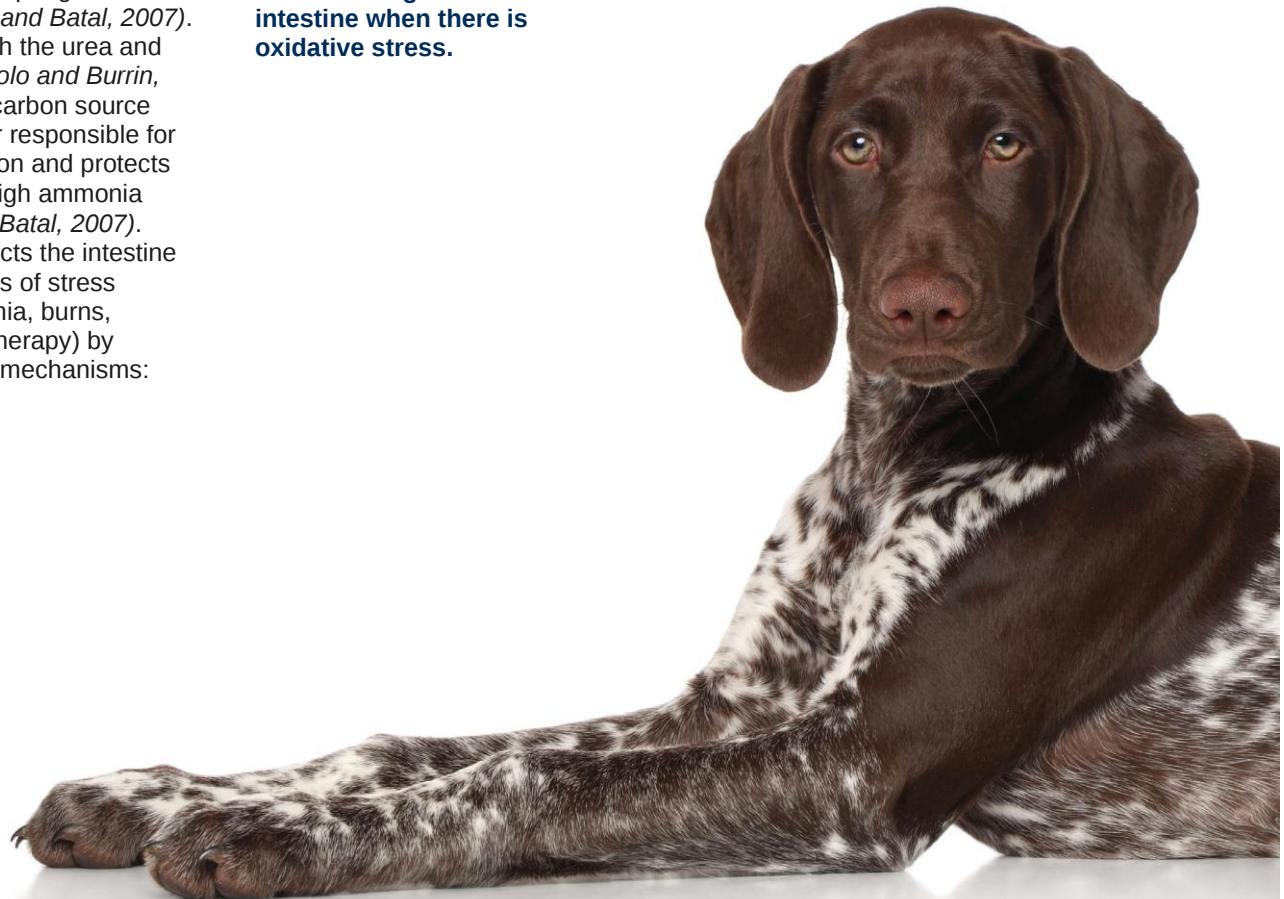
2. It preserves the intestine's immune competence:

- i. It reduces bacterial adherence to the enterocyte (*Yi et al., 2005*).
- ii. It increases IgA production (*Bartell and Batal, 2007; Tian et al., 2009*).

3. It improves the transport of intestinal fluid and electrolytes, reducing the osmolality of the intestinal lumen and diarrhoea (*Coeffier et al., 2005*).

4. It maintains glutathione in the intestine when there is oxidative stress.

Glutamine protects the intestine during periods of stress, maintains the integrity of the intestinal barrier, improves fluid absorption, reduces bacterial adhesion and increases the antioxidant capacity of the intestinal epithelium.



EASY-TO-DIGEST NUTRIENTS (>90% DIGESTIBILITY)

Easy-to-digest nutrients are important in all gastrointestinal disorders as they promote nutrient absorption through the altered intestinal epithelium under unfavourable osmotic and secretory conditions.

High digestibility has been obtained thanks to proteins (bioactive plasma proteins, hydrolysed soy protein), fats (MCT) and cereals (especially rice, a rapidly and easily absorbed source of energy) that are easy to digest and have a low fibre content (Figure 4).

PREBIOTICS (INULIN)

Prebiotics are indigestible ingredients that benefit the host by stimulating the growth and/or activating the metabolism of one or more bacteria that are beneficial for intestinal tract health. Prebiotics stimulate the growth of beneficial intestinal bacteria such as bifidobacteria and lactobacilli, which reduce the presence of pathogenic bacteria

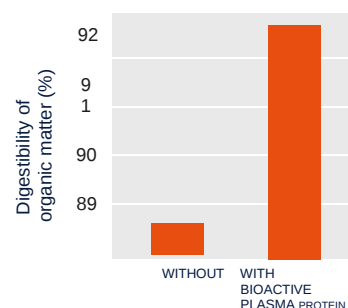
such as bacteroides, clostridia and coliforms (Gibson and Roberfroid, 1995; Kolida and Gibson, 2007).

In dogs, prebiotics can reduce the concentration of putrefaction compounds (ammonia, amines, branched-chain fatty acids, indoles, phenols, etc.) in faeces, thereby improving intestinal health (as some of the catabolites of these proteins contribute to colon carcinogenesis and stress-related intestinal diseases) and the odour of the faeces (Swanson *et al.*, 2002).

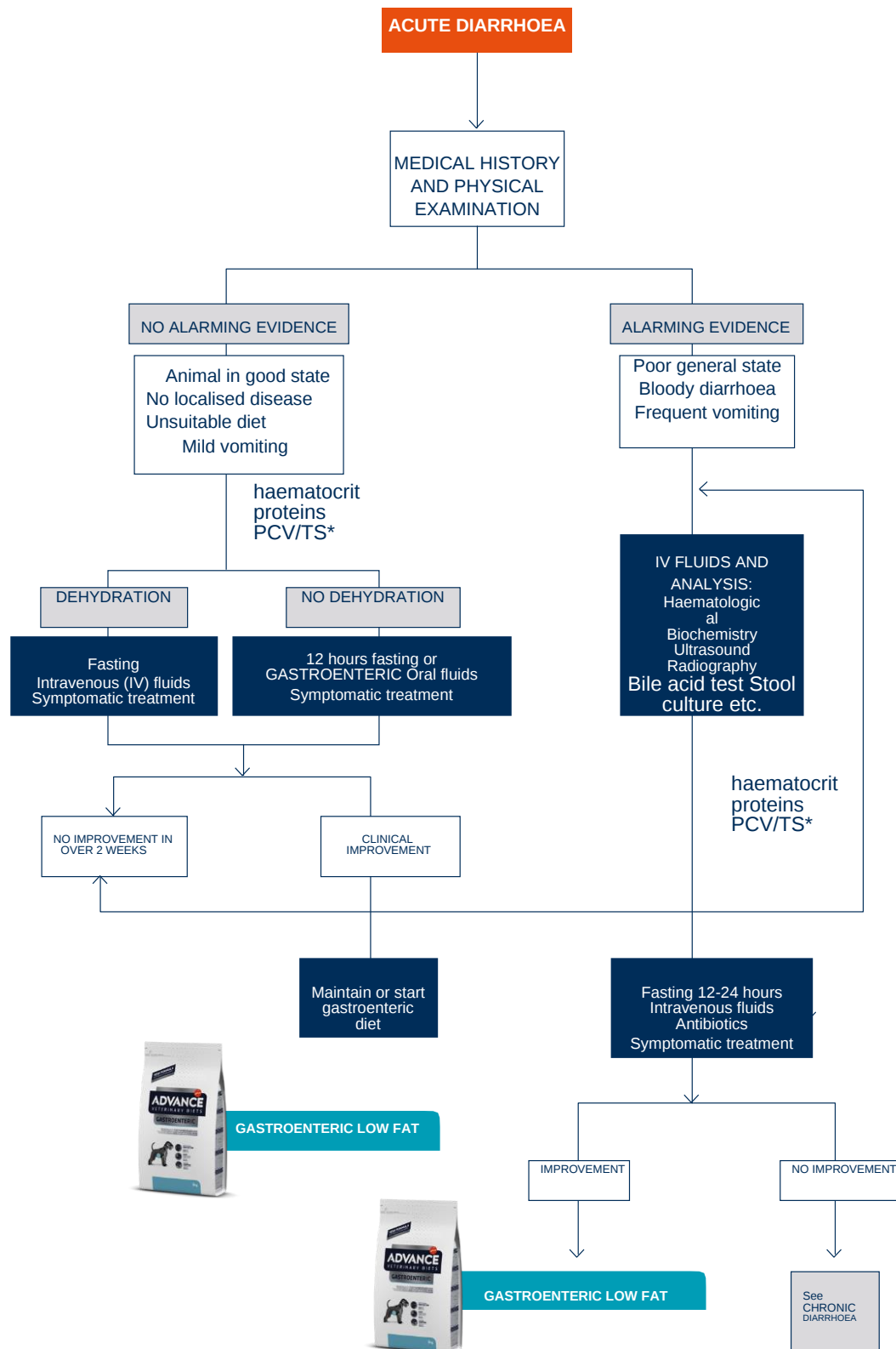
In dogs with antibiotic-responsive diarrhoea, prebiotics act slowly but continuously throughout their administration, whereas antibiotics produce a rapid but temporary improvement. Inulin reduced colitis-related inflammation in a study carried out with rats (Leenen and Dieleman, 2007), while human studies have also shown beneficial effects in the prevention and control of infectious diarrhoea (Verlinden *et al.*, 2006).

Prebiotics improve intestinal health by increasing the presence of beneficial intestinal bacteria and reducing the pathogenic bacteria that stimulate IBD, ARD and diarrhoea.

Figure 4. The inclusion of bioactive plasma proteins and soy hydrolysate promotes digestion.



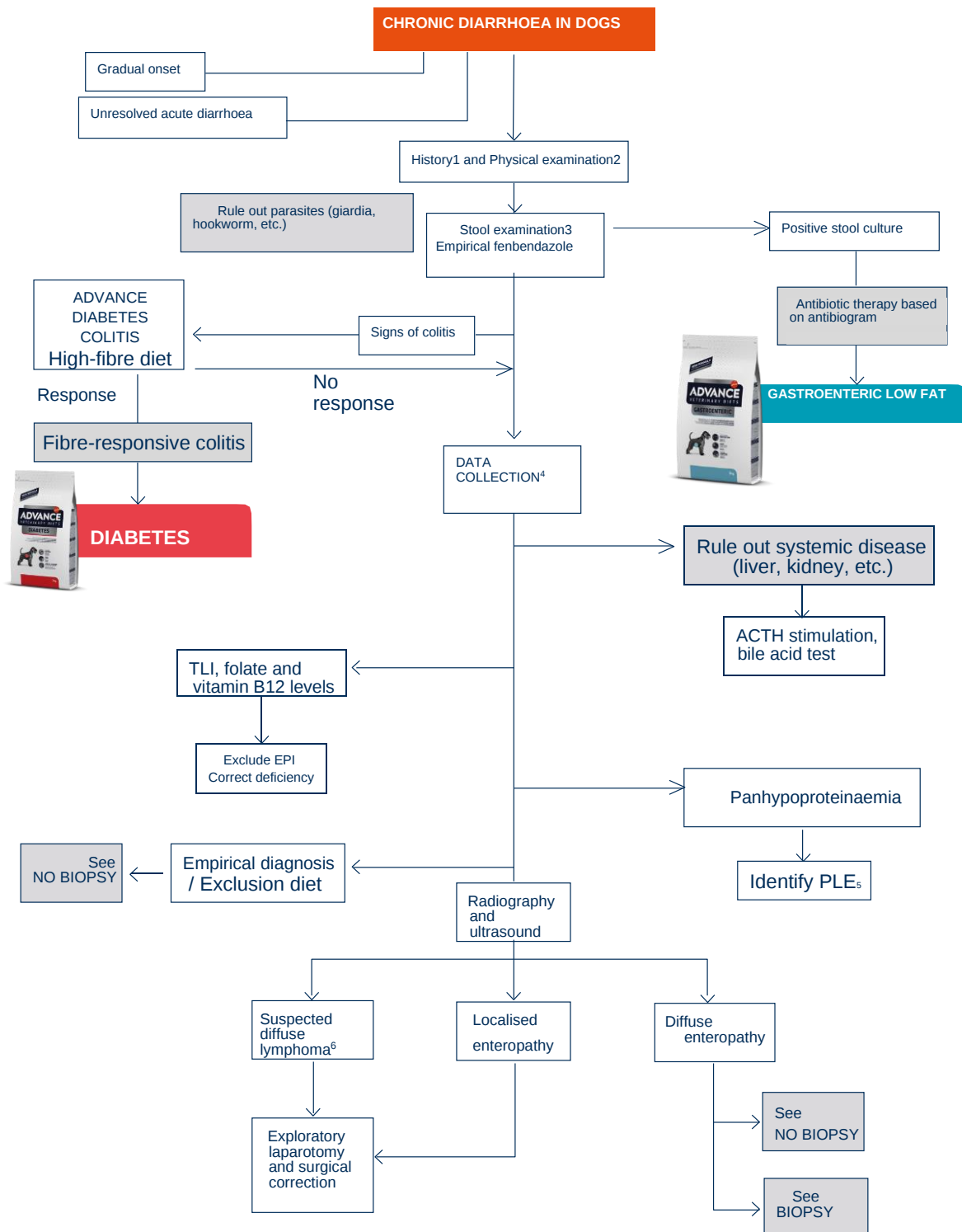
Annex 1. A simplified differential diagnosis for acute diarrhoea



* PCV/TS: Packed cell volume/total solids

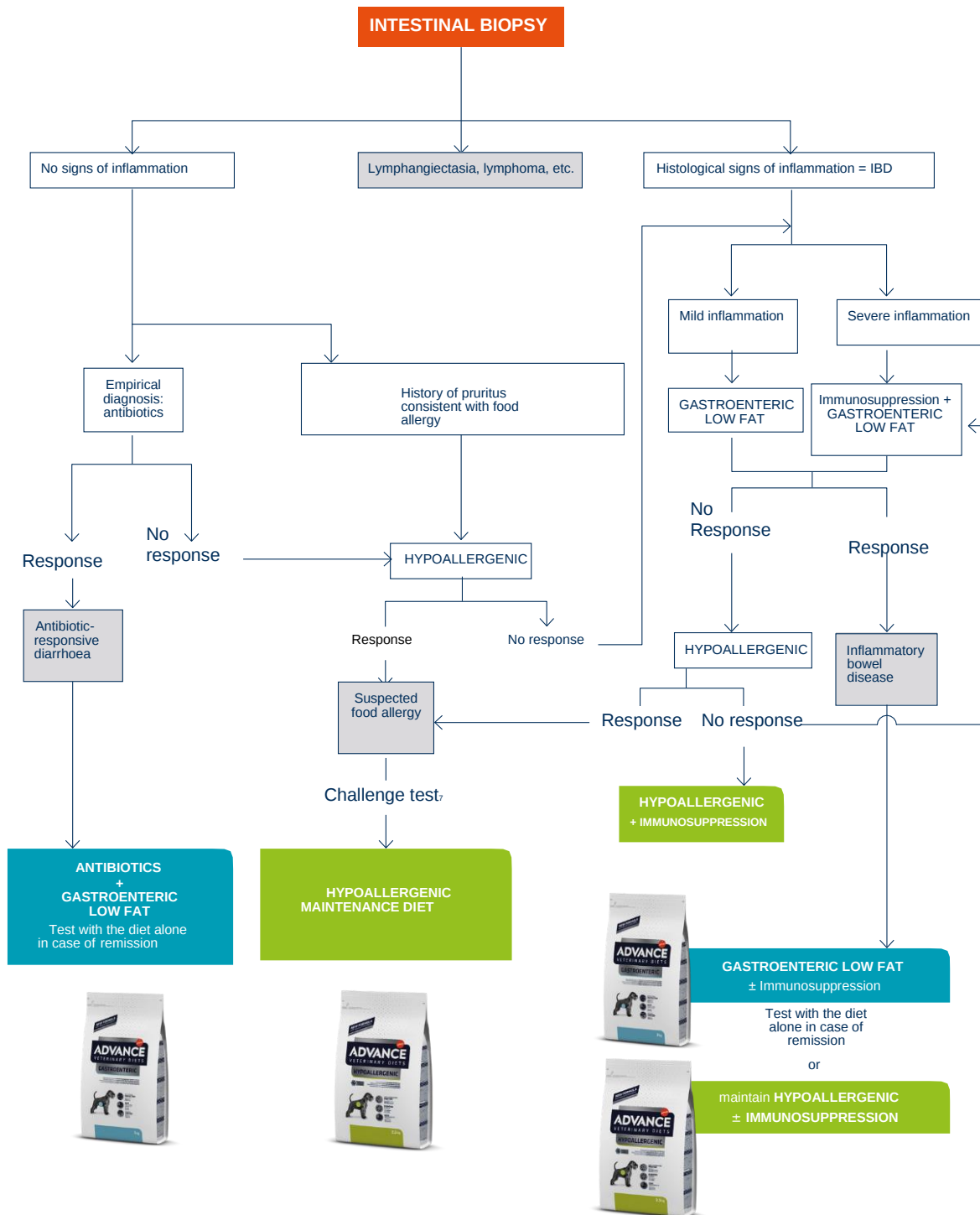
A CLINICAL REPORT FOR THE VETERINARIAN FROM AFFINITY PETCARE

Annex 2.1. A simplified differential diagnosis for chronic diarrhoea

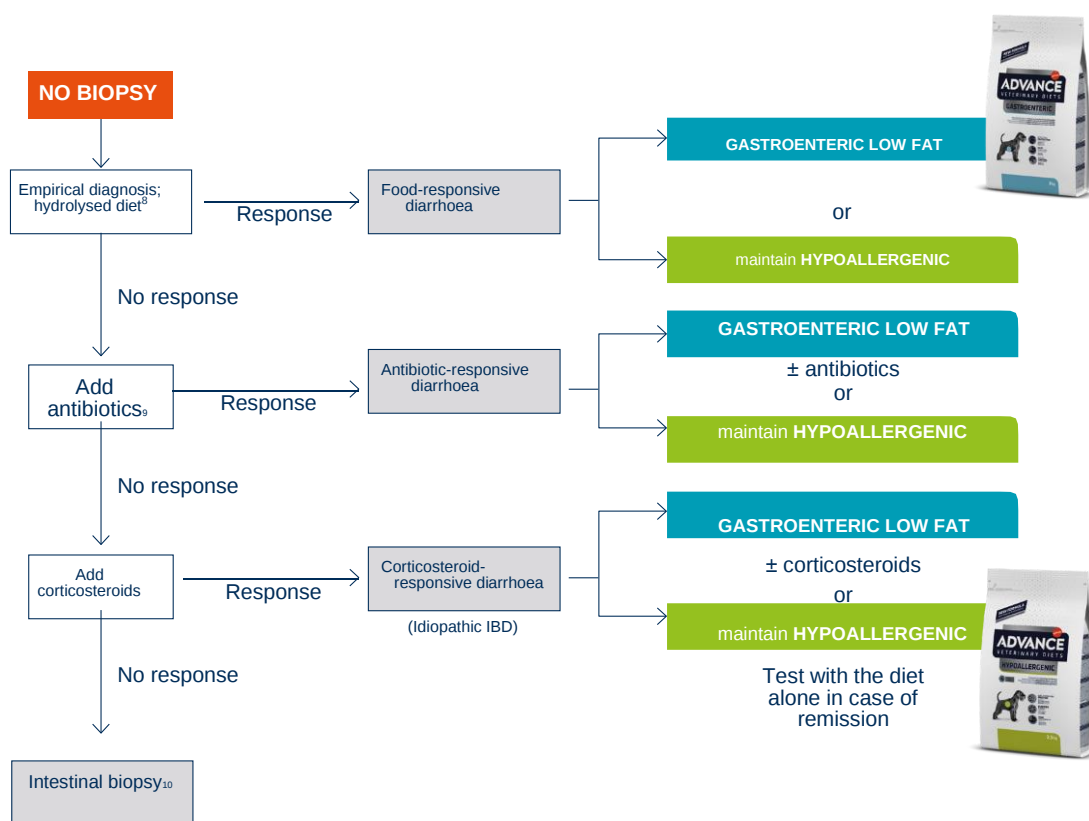


PLE: protein-losing enteropathy, TLI: trypsin-like immunoreactivity, ACTH: adrenocorticotrophic hormone, EPI: exocrine pancreatic insufficiency.

Annex 2.2. A simplified differential diagnosis for chronic diarrhoea



Annex 2.3. A simplified differential diagnosis for chronic diarrhoea



IBD: inflammatory bowel disease

1. History including dietary intake, contact with other affected dogs. 2. Clinical examination that includes abdominal palpation and rectal examination.
3. Faecal parasitology is essential; culture findings may be incorrect. 4. Minimum database: haematology, biochemistry (Na/K, urea, creatinine, etc.), urinalysis. Rule out liver and kidney disease and other non-gastrointestinal diseases. 5. In event of hypoalbuminaemia, rule out liver dysfunction with bile acids and proteinuria based on the urine protein/creatinine (UPC) ratio. 6. Ultrasound shows diffuse thickening and loss of stratification. 7. Perform a relapse test with individual foods, after rescue with hydrolysed diet, until the cause of the problem is identified and the maintenance diet can be selected. 8. Presumptive diagnosis based on empirical response to the exclusion diet.
9. Presumptive diagnosis based on empirical response to antibiotics (previously known as small intestinal bacterial overgrowth, SIBO). 10. If no response to antibiotics or exclusion diet, an intestinal biopsy is recommended. If rejected, empirical treatment for IBD can be attempted.



A CLINICAL REPORT FOR THE VETERINARIAN FROM AFFINITY PETCARE

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