CASE BY CASE: NUTRITION

Nutritional Management of a Growing Puppy with Food-Responsive Enteropathy

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Chronic enteropathies (CEs) are a group of diseases exhibited by intermittent or chronic gastrointestinal (GI) signs. Groups can be subcategorized according to treatment response as food-responsive, antibiotic-responsive, or immunosuppressive-responsive. The most prevalent is food-responsive enteropathy (FRE; 50% to 65%),[1] which can often be successfully managed with individualized dietary modification. FRE may include a true food allergy, for which a strict dietary elimination trial is indicated to determine which protein sources are allergens for that dog, or it may include more of a food intolerance, in which patient improvement is based on the composition of the diet (e.g., fat, fiber, digestibility).

Dietary manipulations that have been successful for some patients with FRE include hydrolyzed diets, novel protein (and ideally novel carbohydrate) diets, lower-fat diets, or highly digestible home-cooked diets (often novel protein as well). In addition, altering fiber content may benefit some dogs with CE because adding beneficial fiber can act as a prebiotic for the microbiota and help strengthen the microbiome, resulting in production of short-chain fatty acids, lowered colonic pH, and impeded pathogen growth; conversely, removing fiber can improve digestibility for some dogs that do not tolerate fiber supplementation.[2] Different types of fiber can be used in a trial-and-error fashion to see which produces the best response.

Abstract

Diagnosis of chronic enteropathy, also known as chronic inflammatory enteropathy, is based on a history of chronic gastrointestinal clinical signs, histopathologic evidence of intestinal mucosal inflammation, and ruling out of other potential underlying causes. Dogs are often categorized as having a food-responsive enteropathy or non–food-responsive enteropathy. Food-responsive enteropathy may be managed with different nutritional approaches, including highly digestible diets, low-fat diets, hydrolyzed protein diets, limited ingredient and ideally novel protein diets, fiber-enriched diets, or home-prepared diets formulated by a board-certified veterinary nutritionist. When pursuing nutritional management, consider the individual patient needs, including life stage as well as medical conditions. Complex cases, such as large-breed growing puppies, may need adjustments to prevent nutrient deficiencies or excesses that could lead to significant consequences in the short term or later in life.

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Take-Home Points

- Dietary management of chronic enteropathies (CEs), rather than antibiotic treatment, should be the first step as antibiotics may affect the microbiome, may lead to increased antimicrobial resistance, and may result in CE relapse after treatment.
- A thorough diet history (if possible) will help guide the approach to dietary management for patients with acute enteropathy or CE.
- When managing patients with gastrointestinal disease, particularly CEs, make 1 change at a time and evaluate patient response (trial-and-error approach).
- Ensure that a diet for puppies is appropriate for growth. If the dog has the potential to be a large-breed dog, confirm that the diet is specifically for growth of large-breed puppies or evaluate the nutrient profile to determine if it is appropriate for the puppy and discuss with a board-certified veterinary nutritionist.
- Create a plan that includes treats for training and bonding, as training is essential to the health and wellbeing of puppies and critical to the human–animal bond; treats should remain within an appropriate 10% caloric allowance so as not to unbalance the diet.

A subset of dogs with CE may have intestinal lymphangiectasia characterized by pathologic dilation of lymph vessels within the GI system, which can lead to protein loss (protein-losing enteropathy) and is often best managed nutritionally with an ultra–low-fat diet.[3]

Determining which dietary modification will be effective for a patient is currently conducted by trial and error because there are no tests that can clarify how a patient will respond to dietary manipulation or clarify the type of manipulation needed[1]; however, localization

TABLE 1 Localizing Gastrointestinal Signs

GASTROINTESTINAL SIGN	INTESTINE AFFECTED		
	SMALL	MIXED	LARGE
Blood in stool	Melena +/-	Melena or hematochezia +/-	Hematochezia +/-
Mucus in stool	Uncommon	+/-	Common
Volume of stool	Normal to increased	Normal to decreased	Decreased
Urgency of defecation	Normal	Normal to increased	Increased
Frequency of defecation	Normal	Normal to increased	Increased
Weight loss	Common	+/-	Uncommon
Dysrexia	+/-	+/-	Uncommon

TABLE 2 Dietary Modification Considerations for Patients With Gastrointestinal Signs

	INITIAL MODIFICATION
PUPPY SIZE	
Small breed	Use a highly digestible growth diet; ensure that patient BCS is 4–5/9
Large breed (i.e., growth potential to >31.8 kg [70 lb] as adult)	Use an appropriate highly digestible growth diet for large-breed dogs; feed to achieve BCS of 4/9
GASTROINTESTINAL SIGN	
Small intestinal disease (e.g., inflammatory bowel disease)	Consider a highly digestible diet, hydrolyzed diet, or novel protein diet
Large intestinal disease (e.g., colitis)	Consider fiber-enriched diet
Fat malabsorption or sensitivity (e.g., hyperlipidemia, pancreatitis, steatorrhea, ileus, dilated lacteals [lymphangiectasia])	Consider a low-fat (~15–25 g fat/1000 kcal ME) highly digestible diet or an ultra–low-fat diet (<15 g fat/1000 kcal ME, formulated by a BCVN)
Dermatologic signs (e.g., recurrent otitis externa, pruritus) concurrent with GI signs	Consider a hydrolyzed or novel protein diet; a longer dietary trial may be required

BCS = body condition score; BCVN = board-certified veterinary nutritionist; GI = gastrointestinal; ME = metabolizable energy

of clinical signs can help direct dietary modification as a starting point (**TABLES 1 AND 2**). After the correct diet has been identified, GI signs in patients with FRE typically improve within 2 weeks.[4]

Nutritional management of puppies requires excellent communication with clients as well as close monitoring to help maintain appropriate growth rates and healthy body condition. Appropriate amounts of essential nutrients (at least 90% of total caloric intake) should be provided by feeding a complete and balanced diet appropriate for the size of the puppy while maintaining approximately 10% of calories as treats for training and bonding purposes. Clients with puppies that may grow to large-breed size (>31.8 kg [70 lb] as adults) should be counseled to feed a diet that is appropriate for growth of large-breed puppies as these diets have controlled nutrient profiles (particularly calcium and phosphorus) and will help the puppy grow at a more appropriate rate while minimizing the risk for growth abnormalities and joint disease. Clients should be informed that to help reduce the risk for health issues associated with excess weight, they should maintain their puppy at a body condition score (BCS) of 4/9.

TABLE 3 Diet History and Nutritional Management of Food-Responsive Enteropathy in the Patient

AGE AT EVALUATION	WEIGHT, KG	BCS	STOOL QUALITY	DIET AND APPETITE HISTORY AT EVALUATION	NUTRITIONAL RECOMMENDATIONS[a]
Growing	NA	NA	5–6, occasionally 7	▪ Multiple diets and training treats, added pumpkin, unknown diets and amounts fed at shelter	▪ Unknown before puppy was adopted from shelter within the past 3–4 months
9 months	23.2	3/9	5–6	▪ **Diet:** PPRx HA Hydrolyzed Chicken Flavor Canine canned and dry diets introduced within the previous month before presentation ▪ **Appetite:** Moderate with varied amounts of food being left behind	▪ **Initial:** Gradual transition to PPRx EN Gastroenteric dry and canned. Increase feedings to 3×/day. Add 1 additional short walk for play and training. ▪ **Follow-up:** Recheck in 6–8 weeks[b]
11 months	25	3/9	4–5, occasionally 6	▪ **Diet:** GI diet (PPRx EN) improving stool quality ▪ **Appetite:** Improved compared with hydrolyzed diet	▪ **Initial:** Feed GI diet (PPRx EN) canned and dry. Adjust intake to achieve a BCS of 4/9. Continue training with canned diet. ▪ **Follow-up:** Recheck in 3–6 months[b]
19 months	27.8	NA	4, occasionally 5	▪ **Diet:** GI diet (PPRx EN) had maintained stool quality ▪ **Appetite:** Patient was becoming uninterested in canned; clients wanted to change to another GI diet	▪ **Initial:** Gradually transition to RC GI Puppy dry and loaf formulas. Continue with 3×/day feedings at the recommended amount. ▪ **Follow-up:** Recheck in 6 months[b]
2 years	30.4	4/9	4, occasionally 5	▪ **Diet:** RC GI Puppy diet continued to improve stool quality ▪ **Appetite:** Canned formula seemed to occasionally create good appetite	▪ **Initial:** Continue with RC GI Puppy dry and loaf formulas ▪ **Follow-up:** Continue to monitor weight, BCS, and MCS at least every 4–6 months and MDB as needed, ideally every 6–12 months[b]
2.5 years	30.3	4/9	3–4	▪ **Diet:** RC GI Puppy formulas were tolerated, and RC GI Low Fat formulas had been attempted and possibly further improved stool ▪ **Appetite:** Moderate appetite interest; clients elected to transition to customized HCD	▪ **Initial:** Gradually transition to HCD; continue with novel, low-fat, highly digestible diet ▪ **Follow-up:** Continue to monitor weight, BCS, and MCS at least every 4–6 months and MDB as needed, ideally every 6–12 months[b]

BCS = body condition score; GI = gastrointestinal; HCD = home-cooked diet; MCS = muscle condition score; MDB = minimum database (complete blood count, serum biochemistry, urinalysis); NA = not available; PPRx = Purina Pro Plan Veterinary Diets; RC = Royal Canin.
[a]Clients were given exact amounts to feed at each recheck appointment, and patient intake was adjusted at each evaluation to maintain ideal BCS (4/9).
[b]Clients were told to have the dog evaluated sooner if necessary or if concerns arose.

Nutritional planning for puppies also requires a training plan as appropriate play and training will often require food or treats as motivation. Similarly, bonding with a growing dog often involves food, and high-value and high-calorie treats that are unbalanced or fed in excess of the recommended 10% treat allowance can lead to an unbalanced diet and nutritional deficiencies that could result in growth abnormalities.

The following case presentation outlines the nutritional approach used for a growing puppy with an FRE and the steps taken to help manage it over time.

NOTES
Received deworming and antibiotics
Only PPRx HA Hydrolyzed Chicken Flavor Canine canned is formulated for growth of large-breed dogs; dry is for adults only. Thus, the patient was transitioned to dry and canned appropriate for growth of large-breed dogs (PPRx EN). HA Canine canned was a higher-fiber product; therefore, clients were asked to note any changes in stool quality (improved/worsened based on lowered fiber content moving forward).
With the patient now eating PPRx EN, the clients noted improving stool quality on the current (lower-fiber) diet and moderate appetite especially with the added canned food (canned was also used in meatball form for training treats).
Clients noted improved stool quality on the PPRx EN dry formula, but occasionally still poor appetite; thus, the patient was transitioned to another GI diet to evaluate palatability (RC GI Puppy formulas).
Clients reported improved palatability and stool quality. They elected to continue the current diet but discussed the possibility of a home-cooked diet to see if further stool improvements could be achieved.
Because at 2.5 years of age the patient had most likely achieved full skeletal maturity, the clients decided to try a course of lower-fat GI diet (they were previously reluctant due to poor palatability and intake). This trial of a veterinary therapeutic low-fat diet resulted in further improved stool quality; however, veterinary therapeutic low-fat diets did not continue to be palatable for the patient and a customized HCD was formulated.

PRIMARY CARE VETERINARIAN WORKUP

At initial assessment by the primary care veterinarian, the patient was an estimated 9-month-old spayed female shepherd mixed-breed dog, weighing 23.2 kg (51 lb) and having a BCS of 3/9 (bit.ly/46hd89G) and normal muscle condition score (bit.ly/3EKXN5w).

She had been recently adopted from a local rescue shelter, where she had been spayed and had at least 3 acute episodes of mixed or large bowel diarrhea that never entirely resolved. These episodes were described as a mild to moderate increase in frequency or urge to defecate and normal to slightly decreased volume of soft stool with no melena, frank blood, or mucus noted (fecal score typically 5/7 to 6/7; bit.ly/45W2wwS). The episodes were attributed to dietary indiscretion or excessive access to treats during training sessions and were managed with supportive care (i.e., dietary modification with over-the-counter diets, addition of unknown amounts of canned pumpkin to a home-prepared unbalanced diet of cooked chicken breast and white rice, deworming with fenbendazole and praziquantel, and antibiotic treatment with tylosin or metronidazole). Stool consistency improved briefly but returned to softer, poorly formed stool after completion of the antibiotic regimen.

The patient was up to date on vaccinations and was receiving heartworm/flea/tick preventive medications. At initial examination, the clients described her as having a poor appetite but enjoying treats during training and play sessions and said that she would try to sneak food off the kitchen floor during food preparation or on walks.

REFERRAL WORKUP

The initial referral assessment of the 9-month-old patient was conducted by a board-certified veterinary nutritionist via telemedicine consultation with the client and also by communication with the referring primary care veterinarian. The referring veterinarian reported that the physical examination had been grossly normal. In agreement with the referring veterinarian's observations, the patient appeared bright, alert, and responsive with appropriate hair coat and no observed abnormalities on neurologic assessment. Although weight loss had not been reported, the patient was underweight at 23.2 kg with a BCS of 3/9, but no muscle wasting was noted. Rectal palpation resulted in a small amount of soft brown stool on the glove, but no

BOX 1 Nutrients of Concern for the Patient

- Fat
- Protein source and type
- Fiber content (adjusted separately as needed, with supplementary psyllium husk powder)
- Vitamins and minerals

blood was noted. Abdominal palpation did not elicit pain and the abdomen was soft on palpation.

Diet History

Before presentation to the veterinary nutritionist, the patient's diet had been varied; in an attempt to achieve better stool quality, the clients had fed many over-the-counter diets and offered many different treats during training sessions (of multiple unknown brands that the clients were unable to remember but were typically beef, chicken, or lamb). Because complete information regarding diet history was unavailable, a full dietary antigen list could not be established. For almost a month, the patient had been fed a veterinary therapeutic hydrolyzed diet (Purina Pro Plan Veterinary Diets HA Hydrolyzed Chicken Flavor dry and canned formulas; purina.com), and stool quality improved slightly (no longer 7s), although the patient was still experiencing soft stools (5s or 6s) (**TABLE 3**).

Diagnostic Testing

Laboratory tests (blood, urinalysis, and fecal polymerase chain reaction) were conducted by the referring veterinarian when the patient was 9, 11, 19, and 24 months of age, and results were communicated to the veterinary nutritionist to facilitate necessary modifications (**TABLE 4**). At the 9-month telemedicine presentation to the veterinary nutritionist, laboratory testing findings were slight hypocalcemia, mild hyperphosphatemia, and hypoalbuminemia, all of which resolved over time with nutritional management.

Treatment Options

Nutrition can significantly affect patients with CE, and for patients with FRE, proper dietary management can play a central role in diagnosis and therapeutic intervention. Nutrient modifications (e.g., increased digestibility of GI diets, novel protein/limited-ingredient diets, hydrolyzed diets, low-fat diets, fiber-enriched diets) can all be potential therapeutic options for management of FRE. The duration of a diet trial to manage signs of CE depends on response to the diet. It should be clearly communicated to the client that if one management strategy is not effective, another strategy may be. Some patients may require a highly digestible hydrolyzed protein diet, others may require a highly digestible low-fat diet or a fiber-enhanced diet, and even others may require formulation of an ultra–low-fat diet. For difficult cases, seeking a board-certified veterinary nutritionist to help manage patients is recommended.

Patients that do not respond to nutritional therapy alone may require immunosuppressive or antibiotic therapy but can often still benefit from appropriate nutritional management, which may enable lower doses or shorter courses of medications.[5] Other treatment options or adjuncts include attempts to correct dysbiosis by providing probiotics or synbiotics to modify the intestinal microbiota and exert a positive effect on the microbiome. Although probiotics can often be helpful for patients with acute gastroenteritis, their use in patients with CE is more difficult to interpret because different probiotics and strains are used.[1] Fecal microbiota transplantation (FMT) is used to transfer functional microbiota from a healthy donor to the patient; however, considerations include donor selection, FMT delivery method, and FMT schedule (some patients may require multiple treatments).[6]

When managing patients with FRE, carefully evaluating key nutrients in previously fed diets can help determine the next step. Considering essential nutrients of concern will help guide choices based on previous responses to diets. For the patient presented here, consideration of fat content, fiber content, and particularly calcium and phosphorus content (for the growing puppy) affected the trial diets (**BOX 1**); the patient's response, including stool quality and appetite, influenced diet choices (**TABLE 5**).

Continued Management

11 to 19 Months

At the 11- and 19-month rechecks, the patient had improved after being fed veterinary therapeutic GI

diets. Stool quality had moderately improved and appetite was adequate; however, at the 19-month recheck the patient's appetite was declining again (TABLE 3).

19 to 24 Months

At the 19-month recheck, the patient was transitioned onto a highly digestible higher-fat GI puppy diet due to declining appetite. Stool quality mildly improved, as did appetite very briefly, and at the 24-month recheck a highly digestible low-fat diet was discussed. Considering that a lower-fat diet may further improve stool quality, veterinary therapeutic GI low-fat diets were fed as a trial after 24 months of age; stool quality improved but patient acceptance was poor (TABLE 3). Palatability was a concern due to the patient's history of poor appetite and demonstrable dislike of commercial veterinary therapeutic low-fat diets. Because the patient's body condition score was ideal (4/9) and her skeletal frame was reported to most likely be full size, the clients elected to transition to a home-cooked diet.

TABLE 4 Laboratory Test Results for the Patient

LABORATORY TEST RESULTS (REFERENCE RANGES)	AGE (MONTHS)				NOTES ON ABNORMAL VALUES
	9	11	19	24	
COMPLETE BLOOD COUNT					
Hematocrit (40%–55%)	42.8	49.8	NR	45.9	
White blood cells (6–12 k/μL)	6.9	7.9	NR	7.5	
Platelets (150–500 k/μL)	152	149[a]	NR	182	Low, clumping noted
SERUM BIOCHEMISTRY					
Calcium (9.6–11.2 mg/dL)	9.5[a]	9.6	9.9	10.2	Low
Phosphorus (2.6–5.2 mg/dL)	5.4[a]	5.2	4.8	4.1	High
Magnesium (1.9–2.5 mg/dL)	1.8[a]	1.9	NR	2.1	Low
BUN (11–33 mg/dL)	13	14	11	14	
Creatinine (0.8–1.5 mg/dL)	0.9	1	0.8	1	
Albumin (3.4–4.3 g/dL)	2.6[a]	3.2[a]	3.5	3.8	Low
Globulin (1.7–3.1 g/dL)	2.7	2.3	2.4	2.8	
Total protein (5.4–6.9 g/dL)	5.3	5.3	5.8	6.4	
Cholesterol (139–353 mg/dL)	148	137[a]	143	270	Low
Vitamin B_{12} (271–875 ng/L)	311	602	NR	NR	
Spec cPL (0–100 μg/L)	81	NR	NR	NR	
T4 (1–4 μg/dL)	1.3	NR	NR	NR	
URINALYSIS					
Specific gravity	1.027	1.033	NR	NR	
pH	8	7.5	NR	NR	
Protein, glucose, ketones	Negative	Negative	NR	NR	
Sediment	Quiet	Quiet	NR	NR	
FECAL TESTING					
Fecal panels[a]	Negative	NR	NR	NR	Tests were run before presentation to the veterinary nutritionist
Parvovirus testing	Negative	NR	NR	NR	

BUN = blood urea nitrogen; NR = values not reported or testing not performed; Spec cPL = canine pancreas-specific lipase (IDEXX, idexx.com); T4 = thyroxine.

[a]*Testing for ova, parasites,* Giardia, *and roundworm/hookworm/whipworm antigen.*

TABLE 5 Dietary Management and Nutrients to Consider for Management of FRE Patients

VARIOUS DIETS FED	NUTRIENT ME, G/1000 KCAL (% ME)[a]			NUTRIENT, G/1000 KCAL[a]				LIFE STAGE NUTRITION STATEMENT
	PROTEIN	FAT	CARBOHYDRATE	TDF	CA	P	MG	
AAFCO growth and reproduction minimum (maximum) for large-breed puppies	56.3	21.3			3 (4.5)	2.5 (4)	0.15	
Purina Pro Plan Veterinary Diets HA Hydrolyzed Chicken Flavor Canine Formula, dry	52.9 (20)	32.2 (29)	139.9 (51)	10.6	2.8	2.2	0.4	Formulated for maintenance of adult dogs
Purina Pro Plan Veterinary Diets HA Hydrolyzed Chicken Flavor Canine Formula, canned	76.7 (27)	36 (31)	121.4 (42)	48	4	3.8	0.2	Formulated for growth of puppies (including growth of large-breed dogs) and adult maintenance
Purina Pro Plan Veterinary Diets EN Gastroenteric Canine Formula, dry	66.7 (25)	30.9 (29)	120.9 (46)	19.3	3.2	2.6	0.3	Animal feeding tests substantiate complete and balanced for growth of puppies and maintenance of adult dogs, including growth of large-breed dogs
Purina Pro Plan Veterinary Diets EN Gastroenteric Canine Formula, canned	93.3 (32)	46.7 (39)	82.3 (29)	18.4	4	3	0.2	Animal feeding tests substantiate complete and balanced for growth of puppies and maintenance of adult dogs, including growth of large-breed dogs
Royal Canin Gastrointestinal Puppy, dry	73.4 (27)	53 (47)	69.1 (26)	14.9	3.3	2.6	0.2	Formulated for growth of puppies (including growth of large-breed dogs), gestation, and lactation
Royal Canin Gastrointestinal Puppy ultra soft mousse in sauce, canned	98.5 (36)	60.1 (54)	25.6 (10)	15.8	3.3	2.8	0.2	Formulated for growth of puppies, including growth of large-breed dogs
Royal Canin Gastrointestinal Low Fat, dry	63.7 (24)	18.8 (17)	157.5 (59)	25.2	3.1	2.4	0.3	Formulated for maintenance of adult dogs
Royal Canin Gastrointestinal Low Fat, loaf	77.5 (29)	18.1 (16)	144.6 (55)	26.9	2	1.5	0.2	Formulated for maintenance of adult dogs
Home-cooked diet (fish and white rice)	52.4 (22)	15.6 (14)	157.1 (64)	15.8	2.2	1.7	0.3	Formulated for maintenance of adult dogs

AAFCO = Association of American Feed Control Officials; Ca = calcium; FRE = food-responsive enteropathy; ME = metabolizable energy; Mg = magnesium; P = phosphorus; TDF = total dietary fiber.
[a]Values provided from historical Royal Canin and Purina product guides. Diets are subject to change; thus, it is recommended that clinicians verify nutrient content indicated on current products with the diet provider.

TABLE 6 Customized Home-Cooked Diet for the Patient

CONTENT	AMOUNT
Tilapia, baked	266 grams raw, 205 grams cooked
White rice	286 grams dry, 800 grams cooked
Corn oil	2 tsp
Nordic Naturals Omega-3 Pet Liquid (nordic.com)	1.5 tsp
Morton iodized salt	1/4 tsp
Balance It Canine supplement (shop.balance.it)	10 tsp
TOTAL	
90% (without treats)	1434 kcal/day
100% (with occasional 143 kcal/d [10%] treat allowance)	1577 kcal/day

Muscle condition was not reported at that time but was reportedly normal throughout the approximate 24 months of nutritional management.

2.5 Years

During the 6 months between rechecks, veterinary therapeutic low-fat diets were trialed but palatability was poor and a transition to a home-cooked diet with tilapia as the protein source was formulated and initiated at 2.5 years of age (TABLE 6). The home-cooked diet was highly digestible, contained a novel (according to the patient's known diet history) protein, and was determined to be palatable to the patient. White rice was the chosen carbohydrate source because it is a low-fat ingredient and highly digestible. Although rice was not a novel carbohydrate and carbohydrate sources can have protein that can result in problems, rice was tested and determined to be tolerated. A small amount of corn oil provided a source of linoleic acid, an essential omega-6 polyunsaturated fatty acid for dogs. In addition, fish oil provided a source of eicosapentaenoic acid and docosahexaenoic acid at 128 mg/kg$^{0.75}$, a dosage associated with benefits for management of dogs with inflammatory diseases such as inflammatory bowel disease.[7] To ensure adequate essential vitamins and minerals, a supplement was added to the diet (slowly, to evaluate patient tolerance) and no palatability problems were reported (TABLE 6).

Because at 2.5 years of age the patient was an adult, the diet was formulated to meet nutrient requirements of adult dogs based on the Association of American Feed Control Officials guidelines (aafco.org). The diet provided approximately 1434 kcal/day with a caloric distribution of 21% protein, 14% fat, and 65% carbohydrate on a metabolizable energy basis. A treat allowance of 10% (~143 kcal/day) in addition to the diet was also provided to account for treats and training if still needed. The diet was initiated and gradually transitioned to the fully home-cooked diet over 2 weeks to allow for adjustment to the new diet.

Follow-up and Outcome

At the most recent follow-up visit (2.5 years of age), the patient had continued to maintain a healthy body weight (~30.4 kg [67 lb]) with appropriate BCS (4/9), and the client has consistently reported adequate stool quality (typically 3 with occasional 4s), with no urgency or frequency, and a small volume of stool appropriate for intake. The patient maintains a good appetite for the home-cooked diet. She enjoys very occasional treats of watermelon or cucumber, which are reported to be well tolerated. Muscle condition was not reported at every follow-up visit but according to the referring veterinarian was consistently normal throughout the approximate 2 years of patient nutritional management. Fiber supplementation was discussed with the client and was not necessary to achieve appropriate stool quality.

SUMMARY

Episodes of vomiting or diarrhea in puppies can occur for myriad reasons, and acute episodes can range from mild and self-limiting to severe life-threatening disease. If diarrhea becomes a chronic problem, dietary management through use of appropriate growth diets can provide opportunities to determine if the CE is food responsive and can help mitigate the use of antibiotics or steroids (partially or entirely).

Zenalpha®
(medetomidine and vatinoxan hydrochlorides injection)
Sedative, Analgesic
For Use in Dogs Only

CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

BRIEF SUMMARY: (for full prescribing information, see package insert)

DESCRIPTION: Zenalpha is a combination of medetomidine and vatinoxan hydrochlorides. Each mL of Zenalpha contains 0.5 mg medetomidine hydrochloride, 10 mg vatinoxan hydrochloride, 32.5 mg mannitol (USP), 4.16 mg citric acid monohydrate (USP), 1.8 mg methylparaben (NF), 0.2 mg propylparaben (NF).

INDICATION: Zenalpha is indicated for use as a sedative and analgesic in dogs to facilitate clinical examination, clinical procedures and minor surgical procedures.

CONTRAINDICATIONS: Do not use Zenalpha in dogs with cardiac disease, respiratory disorders, shock, severe debilitation, that have hypoglycemia or are at risk of developing hypoglycemia, or are stressed due to extreme heat, cold or fatigue.

Zenalpha is contraindicated in dogs with a known sensitivity to medetomidine or vatinoxan.

WARNINGS:
Human User Safety Warnings
Not for use in humans. Keep this and all medications out of reach of children and pets.

Avoid skin, eye or mucosal contact. Use caution while handling and using filled syringes. Absorption of the active ingredients is possible following exposure via the skin, eye or mucosa. In case of accidental eye exposure, flush eyes with water for 15 minutes, remove contact lenses then continue to flush. In case of accidental skin exposure, wash with soap and water and remove contaminated clothing. If symptoms occur, seek the advice of a physician.

In case of accidental oral intake or self-injection, seek medical advice immediately and show the package insert to the physician. DO NOT DRIVE as sedation, loss of consciousness, and changes in blood pressure may occur.

Persons with cardiovascular disease (for example, hypertension or ischemic heart disease) should take special precautions to avoid any exposure to this product.

Pregnant women should exercise special caution to avoid exposure. Uterine contractions and decreased fetal blood pressure may occur after accidental systemic exposure.

Persons with known hypersensitivity to any of the ingredients should avoid contact with Zenalpha.

Caution should be exercised when handling sedated animals. Handling or any other sudden stimuli, including noise, may cause a defense reaction in an animal that appears to be heavily sedated.

Note to physician: Zenalpha contains medetomidine, an alpha$_2$-adrenoceptor agonist, in combination with vatinoxan, a peripherally selective alpha$_2$-adrenoceptor antagonist. Symptoms after absorption or accidental self-injection may include dose-dependent sedation, respiratory depression, bradycardia, tachycardia, and hypotension.

Animal Safety Warnings
Zenalpha should not be administered in the presence of pre-existing hypotension, hypoxia or bradycardia. Due to the pronounced cardiovascular effects of alpha$_2$-adrenoceptor agonists, only clinically healthy dogs (American Society of Anesthesiologists [ASA] classes I and II) should be administered Zenalpha. Dogs should be monitored frequently for cardiovascular function and body temperature during sedation.

Zenalpha is not intended for use in cats. The use of Zenalpha in cats has been associated with hypotension.

PRECAUTIONS: Dogs should be monitored frequently during sedation for changes in heart rate, blood pressure, respiratory rate and body temperature. Tachycardia may occur in some dogs after recovery from sedation.

In the event of hypoxia or apnea, supplemental oxygen should be administered.

Following administration of Zenalpha, a decrease in body temperature may occur and an external heat source may be needed to maintain body temperature. Hypothermia may persist longer than sedation and analgesia.

The analgesic effect of Zenalpha will not last longer than the sedative effects. Additional analgesic(s) should be administered as needed.

Nervous, excited or agitated dogs with high levels of endogenous catecholamines may exhibit a reduced pharmacological response to Zenalpha (ineffectiveness). The onset of sedative/analgesic effects could be slowed, or the depth and duration of effects could be diminished or nonexistent. Therefore, allow the dog to rest quietly for 10 to 15 minutes after injection.

With the alpha$_2$-adrenoceptor agonist drug class, including Zenalpha, the potential for isolated cases of hypersensitivity, including paradoxical response (excitation) exists.

Repeat dosing with Zenalpha has not been evaluated.

Zenalpha has only been evaluated in fasted dogs; therefore, the effects on fed dogs (for example occurrence of vomiting) have not been characterized.

The concurrent use of anticholinergic medications and Zenalpha has not been evaluated.

Zenalpha may decrease serum glucose in healthy dogs and this effect may persist longer than sedation.

The safe use of Zenalpha has not been evaluated in dogs with hepatic or renal impairment, dogs younger than 4.5 months old, or dogs that are pregnant, lactating, or intended for breeding.

ADVERSE REACTIONS: The most common adverse reactions observed in the field study were decreased body temperature (not requiring external heat support), reduced respiratory rate, diarrhea, muscle tremor, signs of colitis, hypothermia (requiring external heat support).

To report suspected adverse events, for technical assistance or to obtain a copy of the SDS, contact Dechra Veterinary Products at (866) 933-2472. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at http://www.fda.gov/reportanimalae.

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Dechra Veterinary Products
7015 College Boulevard, Suite 525
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Approved by FDA under NADA # 141-551

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R 03 2021

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Ensuring appropriate intake of a complete and balanced diet (90% of total caloric intake) appropriate to the life stage and puppy size is essential, particularly for large-breed dogs. Providing appropriate treats within a 10% treat allowance can ensure that essential training and bonding can occur without risk of unbalancing the diet, inducing nutrient deficiencies, causing potential growth abnormalities, or causing further GI upset. Regular follow-up visits, client communication, and patient monitoring are essential to help achieve a positive outcome. TVP

References

1. Jergens AE, Heilmann RM. Canine chronic enteropathy – current state-of-the-art and emerging concepts. *Front Vet Sci*. 2022;9:923013. doi:10.3389/fvets.2022.923013
2. Tolbert MK, Murphy M, Gaylord L, Witzel-Rollins A. Dietary management of chronic enteropathy in dogs. *J Small Anim Pract*. 2022;63(6):425-434. doi:10.1111/jsap.13471 wils
3. Kathrani A. Dietary and nutritional approaches to the management of chronic enteropathy in dogs and cats. *Vet Clin North Am Small Anim Pract*. 2021;51(1):123-136. doi:10.1016/j.cvsm.2020.09.005
4. Allenspach K, Culverwell C, Chan D. Long-term outcome in dogs with chronic enteropathies: 203 cases. *Vet Rec*. 2016;178(15):368. doi:10.1136/vr.103557
5. Makielski K, Cullen J, O'Connor A, Jergens AE. Narrative review of therapies for chronic enteropathies in dogs and cats. *J Vet Intern Med*. 2019;33(1):11-22. doi:10.1111/jvim.15345
6. Chaitman J, Gaschen F. Fecal microbiota transplantation in dogs. *Vet Clin North Am Small Anim Pract*. 2021;51(1):219-233. doi:10.1016/j.cvsm.2020.09.012
7. Bauer J. Therapeutic use of fish oils in companion animals. *JAVMA*. 2011;239(11):1441-1451. doi:10.2460/javma.239.11.1441

Sarah Wilson

Dr. Wilson is a 2008 graduate of the veterinary technician program at the University of Guelph, Canada. After 2 years in private practice in Guelph, she studied veterinary medicine at St. Matthew's University, Cayman Islands. In 2013, she completed her clinical year at the Western College of Veterinary Medicine in Saskatchewan, Canada, and in 2014 completed a small animal rotating internship. In 2017, she completed a small animal clinical nutrition residency at the University of California, Davis, Veterinary Medical Teaching Hospital. Dr. Wilson is a board-certified veterinary nutritionist and works as a private consultant for industry and clinical patients, primarily via telemedicine.