Diagnosis and Dietary Management of Gastrointestinal Disease

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DIAGNOSIS AT YOUR FINGERTIPS
Download our free iPhone GI Diagnostic app for easy access to the diagnostic algorithms. Make diagnosis of your patients' condition easier than ever — wherever you are.

DEBORAH S. GRECO, DVM, PHD, DACVIM
History-Taking Tips

DIAGNOSING GI DISEASE

Although one may be tempted to take a cursory history for a seemingly simple complaint, a thorough evaluation of all body systems may be necessary to determine the cause of GI signs. Often the more nebulous the problem, the more important the history. Not only is the GI tract the way food — and sometimes a foreign object — enters the body, the GI tract is of paramount importance in maintaining the overall health of the pet. It is the means for nourishment and elimination of waste and an important route for drug delivery. In addition to what goes into and is assimilated (or not) by the GI tract, underlying disease can have an effect on GI function. Secondary GI disease is caused by an underlying disorder (or disorders that may lie outside of the intestinal tract), but primary GI disease is concerned only with the GI tract and its functionality.

Listening to the pet owner while getting a history is as important as the physical exam and appropriate testing. Information on day-to-day eating and elimination habits, food types, and observed behavior helps in selecting the appropriate diagnostic tests and making beneficial therapeutic recommendations. The owner can assist in this by filling out a written history before the pet’s visit, or at least prior to the examination.

BASIC CONSIDERATIONS

• Recognize the difference between vomiting and regurgitation as well as the difference between small and large bowel disease — key to correctly diagnosing and treating GI disease.

• Ask questions directed at the presenting complaint. For example, for a complaint of constipation and dehydration: “Does your dog/cat drink or urinate excessively?” This type of question may help differentiate secondary constipation caused by renal disease from primary gastrointestinal disease.

• Localize the cause and determine if the condition is primary or secondary GI disease. Identifying the location of the problem will assist in choosing a plan of action — e.g., laparotomy for investigating generalized bowel disease versus colonoscopy for primary large bowel disease.

• Signalment may be very important. In an unvaccinated young puppy with fever, anorexia, vomiting and profuse bloody diarrhea, infectious causes such as parvo or distemper virus would be at the top of the list of suspects. In a kitten from a cattery, Tritrichomonas may be one of the first pathogens to look for if large bowel diarrhea is the complaint. Weight loss with an increased appetite has fewer differentials (e.g., diabetes mellitus in the dog, hyperthyroidism in the cat) than does weight loss with anorexia. Questions about the general health of the pet, such as the presence of polyuria/polydipsia, may help narrow the differential list.

• Take the time to ask open-ended questions of the pet owner — it will pay off in the long run with valuable clues for the selection of diagnostics. For example, if you ask the owner: “Does your dog have diarrhea?” The answer may be “no,” as the owner has not observed the dog’s stools because it defecates outside the house. If the question is asked in an open-ended manner, such as: “Describe your dog’s stools,” then the client is free to elaborate on the type of abnormalities that may have been observed.

GASTROINTESTINAL (GI) PROBLEMS ARE A COMMON COMPLAINT AT VETERINARY HOSPITALS. LOCALIZING THE PROBLEM IS THE FIRST STEP IN MAKING A CORRECT DIAGNOSIS. IN ADDITION TO TAKING A HISTORY, PERFORMING THE PHYSICAL EXAM AND OBTAINING A MINIMUM DATABASE, THE USE OF TIMESAVING GI ALGORITHMS CAN HELP TRACE NORMAL AND ABNORMAL SIGNS, TEST RESULTS, RULE-OUTS, AND NEXT STEPS TOWARD RESOLVING THE PROBLEM.
OBTAINING A DIETARY HISTORY

The dietary history is another key component for diagnosing GI disease. It can assist in identifying dietary indiscretions up front as well as help pinpoint the need for a change in food or for dietary support for an underlying condition.

An additional concern is that clients are often misinformed about dietary concerns in GI disease and may give confusing or incorrect information about a pet’s eating habits. The history questionnaire on page 6 includes dietary information and is often the best and most expedient way of dealing with the more common areas of misunderstanding, such as:

• **Treats and other dietary items** (table food, vitamins, etc.) are often not perceived as part of a pet’s diet.

• **More than one family member feeding food or treats** without mentioning it to the primary caregiver, or the consumption of food intended for other household pets.

• **Withholding certain foods**, food flavors, or foods with certain ingredients such as corn or wheat because of worries about “allergies” or other misinformation.

• **Some clients may be embarrassed** or unwilling to divulge exactly what and how much is being fed to their pet for fear of being judged negatively.

A CONCERN IS THAT CLIENTS ARE OFTEN MISINFORMED ABOUT DIETARY CONCERNS IN GI DISEASE AND MAY GIVE CONFUSING OR INCORRECT INFORMATION ABOUT A PET’S EATING HABITS.

CHECKLIST — HISTORY

- Localize the problem.
- Note the pet’s physical condition and BCS.
- Recognize the difference between vomiting and regurgitation.
- Recognize the difference between small and large bowel diarrhea.
- Be precise in determining the primary complaint.
- Ask owners open-ended questions, not leading questions.
- Listen to the owner — only he or she knows this pet’s particular habits.
- Ask owners to describe the stool or vomitus in their own words.
- Don’t rush the owner.
- Don’t ignore, but don’t give too much weight to, previous medical complaints or diagnoses.
- Don’t try to lump all complaints into one diagnosis, which can result in early exclusion of the correct diagnosis.
- Don’t assume that “common diseases occur commonly.”
- Pay attention to dietary history and signalment.
- Use history forms that owners can fill out before the visit or in the waiting room.
**Patient History Worksheet**

**Pet's Name ______________________ Age ____ Breed ____________**

### SIGNS — VOMITING OR REGURGITATION
- Is there abdominal effort or is it more of a passive act? ________________
- How many times a day? ________________
- What is the character of the vomitus? ________________
- Is food digested? ______ Or undigested? ______
- Are there any nonfood items? ______
- Is there any fresh blood? ______
- Is there a “coffee grounds” appearance? ______
- What is the shape of the vomitus? ______
- Does your pet have bad breath? ______

### SIGNS — DIARRHEA
- How many stools a day? ________________
- What is the character of the stools? ________________
- Is there any fresh blood? ______
- Is there any mucus? ______
- Are the stools bulky? ______ Or thin? ______
- What is the shape of the stools? ______
- Is the stool color normal for your pet? ______
- What is the stool? ________________

### HISTORY
- How long has your pet been ill? ________________
- Has your pet lost weight? ______ How much? ______
- Is your pet exclusively indoors? ______ Outdoors? ______
  Or both? ______
- How many dogs are in your household? ______
- How many cats are in your household? ______
- Any other pets? ______

- What is your pet’s vaccination history? ________________

### DIETARY HISTORY
- Is the pet food homemade, raw, commercial? ______
- Is it primarily dry food, canned food, or a mixture of dry and canned foods? ______
- If it’s a commercial food, what brand, formula and flavor is it? ______

- If the food is homemade, what are the ingredients and amounts of each ingredient? ________________

- How long has the food been fed? ______
- How frequently is the type of food changed? ______
- When was the type of food last changed? ______
- How much food is actually eaten per day? ______
- How is food measured (weight vs volume)? ______

- Is the pet fed ad libitum or with measured portions? ______

- How many times per day is the pet fed? ______
- Who feeds the pet (ages of children, grandparents, etc)? ______

- If there are other pets in the household, what are they being fed? ______
- Does the pet have access to the outdoors? ______
- Does the pet receive additional items (treats, vitamins, etc)? ______

- Does the pet receive “people food”? ______
- Are medications administered by mouth or in food (amount and type)? ______
- Does the pet eat nonfood items (tissues, clothing, diapers, etc)? ______

- Is milk given? ______
- Is fresh water provided daily? ______

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**Please fill out before hospital visit or in the waiting room**

- Any toys/nonfood items/small household objects missing? ______
- Any change in exercise habits? ______
- Any change in behavior, eyesight, body posture? ______

- Any change in your household environment (eg, remodeling, relocation, new members, absent members, new pets)? ______

---

**Cat □ Dog □ Male □ Female □ Neutered □ Spayed**
Physical Examination Tips

FIRST THINGS FIRST
Once a history and dietary information have been taken, the next step is to assess the presenting GI problem. Tips for Localizing GI disease as well as Distinguishing vomiting from regurgitation and Distinguishing small from large bowel diarrhea are located on this page. They will aid in the physical exam, selecting diagnostic tests and using the diagnostic GI Algorithms on pages 16 through 27.

POSTURE, BEHAVIOR & ATTITUDE
• Lack of alertness may indicate metabolic problems such as hepatic encephalopathy.
• Abnormal posture eg, animals with severe pancreatitis may assume the “praying” position in an effort to alleviate cranial abdominal pain.
• Generalized muscle weakness along with GI signs is characteristic of hypoadrenocorticism.
• Salivation and “lip smacking” indicate nausea, gastric or esophageal foreign bodies, or hepatic encephalopathy in cats.
• Aversion to food can be a sign of nausea.
• Distended abdomen may indicate ascites, a large abdominal tumor, or gas accumulation due to gastric dilatation/volvulus (GDV).

VITAL SIGNS & PHYSICAL CONDITION
• Systemic signs, such as fever, tachycardia or poor physical condition, may indicate whether a GI problem is primary or secondary.
• Body condition score (BCS charts on pages 10 and 11) helps to assess general wellness and physical condition and allows for comparison each time the pet is seen. The impact of chronic disease on weight gain or weight loss (and vice versa) can assist in making a correct diagnosis and recommending dietary support.
• Hydration abnormalities, such as increased capillary refill time, tacky membranes and skin turgor, may indicate dehydration severity.
• Eye and skin signs, such as pallid sclera and membranes, numerous small points of hemorrhage (petechiation), and yellowing of skin and whites of the eyes (icterus), may indicate systemic disease.

LOCALIZING GI DISEASE

UPPER GI
• Regurgitation – Esophageal disease; gastric motility disorder
• Excessive salivation – Hepatic encephalopathy in cats, foreign body in dogs
• Oral ulceration – Chronic kidney disease, immunocompromise (FIV, FeLV in cats)
• Halitosis – Foreign body, chronic small bowel problem, periodontitis

LOWER GI
• Borborygmus – Noises from abnormal carbohydrate and protein fermentation are indicative of colitis, inflammatory bowel disease or antibiotic-responsive diarrhea.
• Guarded abdomen – Pain because of an obstruction
  — Left cranial abdomen for hepatic pain
  — Dorsal for cecum
  — Dorsocranial for intussusception
  — Right cranial for pancreatitis

DISTINGUISHING VOMITING FROM REGURGITATION

<table>
<thead>
<tr>
<th>VOMITING</th>
<th>REGURGITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active (abdominal contractions)</td>
<td>Passive (no abdominal contractions)</td>
</tr>
<tr>
<td>Unrelated to food intake</td>
<td>Shortly after eating</td>
</tr>
<tr>
<td>Digested food</td>
<td>Undigested food</td>
</tr>
<tr>
<td>Bile/blood</td>
<td>No bile/blood</td>
</tr>
<tr>
<td>Low pH</td>
<td>Neutral pH</td>
</tr>
</tbody>
</table>

DISTINGUISHING SMALL FROM LARGE BOWEL DIARRHEA

<table>
<thead>
<tr>
<th>SIGN</th>
<th>SMALL BOWEL</th>
<th>LARGE BOWEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constipation/tenesmus</td>
<td>Rare</td>
<td>Common</td>
</tr>
<tr>
<td>Frequency</td>
<td>Normal to 2 to 3x normal</td>
<td>&gt; 3x normal</td>
</tr>
<tr>
<td>Urgency</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
<tr>
<td>Volume</td>
<td>Increased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Mucus</td>
<td>Rare</td>
<td>Common</td>
</tr>
<tr>
<td>Fresh blood</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
<tr>
<td>Weight loss</td>
<td>Common</td>
<td>Uncommon</td>
</tr>
</tbody>
</table>
A COMPLETE PICTURE OF THE PATIENT IS NEEDED TO DIFFERENTIATE PRIMARY FROM SECONDARY GI DISEASE.

- History
- Dietary history
- BCS
- Localization
- Vomiting vs regurgitation
- Small vs large bowel diarrhea
- Acute (presence of mucus or blood)
- Chronic
- Physical examination
- Diagnostic tests
- Algorithms for decision making

HEAD & MOUTH

- Tongue should be examined at the root in order to rule out string or foreign bodies.

- Loss of senses (sight or smell), presence of dental disease or temporal muscle atrophy (myositis) may indicate a secondary cause for anorexia (pseudoanorexia).

- Neck and throat palpation may reveal foreign bodies or pain indicative of underlying disease, as in dysphagia (difficulty swallowing) or regurgitation.

AUSCULTATION OF THE CHEST

- Air, fluid, abnormal heart rhythms, etc. For example, bradycardia is characteristic of hypoadrenocorticism or can indicate increased vagal tone. Heart murmurs may indicate anemia.

- Fluid in the chest and abdomen can be caused by heart failure, liver disease resulting in hypoalbuminemia, or protein-losing enteropathies (PLE).

- Arrhythmias or cardiac murmurs would indicate that heart failure is a possibility and that GI signs may be secondary to venous congestion in the intestines.

- Abnormal lung sounds may indicate aspiration pneumonia secondary to megaesophagus.

- Increased respiratory rate or dyspnea may indicate esophageal problems, such as foreign bodies that can cause pain.

ABDOMINAL PALPATION & FECAL EXAM

- Identify each organ in the abdominal cavity starting with the liver, followed by the kidneys (easier to palpate in the cat), bladder, spleen and intestines.

- Assess each organ for size (is the liver protruding past the ribs?), symmetry and texture.

- Intestinal lymph nodes may be palpable, in the mesentery if enlarged.

- Intussusception of the intestine will be identified by the presence of a large, firm tubular section of bowel.

- Foreign bodies such as bones, peach pits, corncobs and plastic toys may be palpable, depending on their location within the intestine.

- Palpate cranial abdomen (lift the forelegs) for additional assessment of the internal organs.

- Rectal/fecal examination – Rectum and anus should be palpated 360° for the presence of tumors, thickening or foreign material. Pay particular attention to the anal sacs to rule out impaction or tumors; expression of the anal sacs will help to determine the location of a mass if detected. This is an excellent opportunity to obtain a stool sample for fecal examination.
### DIAGNOSTIC TESTS

Test results help differentiate primary from secondary disease and can help pinpoint treatment and dietary support protocols. Start with the minimum database (MDB) and add appropriate tests as needed for species, breed, age and circumstances. See **DIAGNOSTIC TEST TIPS** section on pages 12 through 15 for common differentials.

### ALGORITHMS FOR DECISION MAKING

Along with the history, physical examination and diagnostic tests, the **GI Algorithms** provided on pages 16 through 27 are designed to assist the practitioner in differentiating disease as well as making decisions for treatment and dietary support protocols. It is important to keep in mind what judgements have already been made during history taking, the physical exam and minimum database collection when using the algorithms. The animal’s condition and circumstances also are important because GI disease can be complicated.

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**EVERY PET VISIT SHOULD INCLUDE A BODY CONDITION ASSESSMENT THAT IS RECORDED IN THE PATIENT FILE FOR COMPARISON FROM VISIT TO VISIT (SEE NEXT PAGE FOR PURINA BODY CONDITION SYSTEM™ GUIDELINES).**

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**DIAGNOSTIC TESTS FOR GI DISEASE**

<table>
<thead>
<tr>
<th>TESTS FOR MDB</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Urinalysis (including urine specific gravity)</td>
</tr>
<tr>
<td>• Fecal direct examination/scoring</td>
</tr>
<tr>
<td>• Fecal parasite examination</td>
</tr>
<tr>
<td>• Fecal cytology</td>
</tr>
<tr>
<td>• Complete blood count (CBC)</td>
</tr>
<tr>
<td>• Serum chemistry profile</td>
</tr>
<tr>
<td>• TT&lt;sub&gt;4&lt;/sub&gt; (total thyroxine)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADDITIONAL TESTS AS NEEDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Canine virology (parvovirus)</td>
</tr>
<tr>
<td>• Feline virology (FeLV, FIV)</td>
</tr>
<tr>
<td>• Pancreatic lipase immunoreactivity (dog = cPLI, cat = fPLI)</td>
</tr>
<tr>
<td>• Malabsorption profile (trypsin-like immunoreactivity, vitamin B&lt;sub&gt;12&lt;/sub&gt; and folate)</td>
</tr>
<tr>
<td>• Fecal alpha-1 protease</td>
</tr>
<tr>
<td>• Thoracic and abdominal radiography, ultrasonography, laparotomy</td>
</tr>
</tbody>
</table>
**A Note**

The BODY CONDITION SYSTEM was developed at the Nestlé Purina Pet Care Center and has been validated as documented in the following publications:

- Laflamme DP. *Development and Validation of a Body Condition Score System for Dogs*. *Canine Practice* July/August 1997; 22:10-15
- Kealy, et al. *Effects of Diet Restriction on Life Span and Age-Related Changes in Dogs*. *JVMA* 2002; 220:1315-1320

Call 1-800-222-VETS (8387), weekdays, 8:00 a.m. to 4:30 p.m. CT

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### Body Condition System

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Ribs, lumbar vertebrae, pelvic bones and all bony prominences evident from a distance. No discernible body fat. Obvious loss of muscle mass.</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Ribs, lumbar vertebrae and pelvic bones easily visible. No palpable fat. Some evidence of other bony prominence. Minimal loss of muscle mass.</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Ribs easily palpated and may be visible with no palpable fat. Tops of lumbar vertebrae visible. Pelvic bones becoming prominent. Obvious waist and abdominal tuck.</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Ribs easily palpable, with minimal fat covering. Waist easily noted, viewed from above. Abdominal tuck evident.</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Ribs palpable without excess fat covering. Waist observed behind ribs when viewed from above. Abdomen tucked up when viewed from side.</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Ribs palpable with slight excess fat covering. Waist is discernible viewed from above but is not prominent. Abdominal tuck apparent.</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Ribs palpable with difficulty; heavy fat cover. Noticeable fat deposits over lumbar area and base of tail. Waist absent or barely visible. Abdominal tuck may be present.</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Ribs not palpable under very heavy fat cover, or palpable only with significant pressure. Heavy fat deposits over lumbar area and base of tail. Waist absent. No abdominal tuck. Obvious abdominal distention may be present.</td>
</tr>
</tbody>
</table>
1. Ribs visible on shorthaired cats; no palpable fat; severe abdominal tuck; lumbar vertebrae and wings of ilia easily palpated.

2. Ribs easily visible on shorthaired cats; lumbar vertebrae obvious with minimal muscle mass; pronounced abdominal tuck; no palpable fat.

3. Ribs easily palpable with minimal fat covering; lumbar vertebrae obvious; obvious waist behind ribs; minimal abdominal fat.

4. Ribs palpable with minimal fat covering; noticeable waist behind ribs; slight abdominal tuck; abdominal fat pad absent.

5. Well-proportioned; observe waist behind ribs; ribs palpable with slight fat covering; abdominal fat pad minimal.

6. Ribs palpable with slight excess fat covering; waist and abdominal fat pad distinguishable but not obvious; abdominal tuck absent.

7. Ribs not easily palpated with moderate fat covering; waist poorly discernible; obvious rounding of abdomen; moderate abdominal fat pad.

8. Ribs not palpable with excess fat covering; waist absent; obvious rounding of abdomen with prominent abdominal fat pad; fat deposits present over lumbar area.

9. Ribs not palpable under heavy fat cover; heavy fat deposits over lumbar area, face and limbs; distention of abdomen with no waist; extensive abdominal fat deposits.

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URINALYSIS
Urine evaluation can give an overall indication of health and can also be used to rule diseases in or out. A lot has been written about urinalysis, but here are a few key issues for GI disease.

- Hydration status
- Urinary tract infection
- Kidney function
- Endocrine disease (diabetes)
- Protein-losing nephropathy

BASIC FECAL EXAMINATION
The basic fecal examination is one of the most important aspects of the minimum database for GI disease. The basic fecal exam consists of three parts.

PART 1 – Direct examination. Look for abnormal color or consistency, and observe and record shape if possible (see Fecal scoring on opposite page). Acholic (colorless or pale) stools may indicate exocrine pancreatic insufficiency (EPI) or bile duct obstruction. The stool should be examined for the presence of melena, fresh blood, mucus or nonfood material (string, carpet, plastic, rock). Greasy stools are indicative of EPI or malabsorptive conditions, such as protein-losing enteropathies (PLE). Put a small amount of stool on a glass slide with a coverslip. In cats, look for Tritrichomonas foetus, particularly in kittens from catteries. Giardia trophozoites may also be detected by direct smear (feces mixed with saline). Coccidian oocysts (protozoa) may be observed.

PART 2 – Fecal parasite examination. Flotation may identify nematode worm eggs such as Toxocara and Ancylostoma. It may be helpful to use zinc sulfate centrifugation for whipworm eggs (Trichuris) and Giardia cysts. As primary parasites, ascarids (Toxocara and Toxascaris) are rarely a cause of diarrhea, but a large infestation can obstruct a small puppy or kitten’s GI tract, resulting in vomiting.

PART 3 – Fecal cytology. A simple smear of feces or rectal scraping can be stained with Diff-Quik (Romanowski stain) to identify cells such as neutrophils and eosinophils. Characteristically shaped “safety pin” spores of Clostridium or spirochetes such as Campylobacter may be identified under the microscope at high power. Acid-fast stains may identify Cryptosporidium and mycobacteria. In endemic areas, intracellular fungal infections, such as with Histoplasma, may be found.

OTHER FECAL TESTS
Fecal antigen tests – If a thorough fecal exam, including direct smear (feces mixed with saline), flotation and zinc sulfate centrifugation is negative for Giardia, a fecal Giardia antigen test may be indicated. Approximately 25% of Giardia patients can be negative on fecal exam, but positive for Giardia antigen. A young puppy with a history of vomiting and diarrhea should have a parvovirus antigen test to rule out this potentially fatal disease.

Fecal culture – If the dietary history indicates that a raw food diet is being fed, a Salmonella culture may be indicated. In some cases, overgrowth of pathogens such as drug-resistant E coli and Campylobacter may induce chronic relapsing diarrhea. In such cases, fecal culture may be helpful.
**Fecal Scoring**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very hard and dry; often expelled as individual pellets; requires much effort to expel from body; no residue left on ground when picked up.</td>
</tr>
<tr>
<td>2</td>
<td>Firm, but not hard; pliable; segmented in appearance; little or no residue on ground when picked up.</td>
</tr>
<tr>
<td>3</td>
<td>Log-shaped; little or no visible segmentation; moist surface; leaves residue on ground, but holds form when picked up.</td>
</tr>
<tr>
<td>4</td>
<td>Very moist, soggy; log-shaped; leaves residue and loses form when picked up.</td>
</tr>
<tr>
<td>5</td>
<td>Very moist, but has a distinct shape; piles rather than distinct logs; leaves residue and loses form when picked up.</td>
</tr>
<tr>
<td>6</td>
<td>Has texture, but no defined shape; present as piles or spots; leaves residue when picked up.</td>
</tr>
<tr>
<td>7</td>
<td>Watery; no texture; flat puddles.</td>
</tr>
</tbody>
</table>

Fecal consistency is primarily a function of the amount of moisture in the stool and can be used to identify changes in colonic health and other problems. Ideally, in a healthy animal, stools should be firm but not hard, pliable and segmented, and easy to pick up (Score 2).
**SEROLOGIC TESTS**

- **Complete blood count** (see **CBC results** chart)
- **Serum chemistry profile** (see **Serum chemistry profile results** chart)
- **TT<sub>4</sub>** – Thyroid status may help explain some GI signs.
- **Virology** – Tests for FeLV and FIV (feline) and parvovirus (canine) can explain possible primary GI disease signs.

**INTESTINAL FUNCTION TESTS**

Most intestinal function tests are not practical in clinical settings, but can be helpful in assessing the following:

- **Serum trypsin-like immunoreactivity** (TLI) may be helpful in assessing pancreatic insufficiency.
- **Serum pancreatic lipase immunoreactivity** (PLI) may be helpful in assessing pancreatitis. Specific feline and canine tests are available.
- **Serum vitamin B<sub>12</sub>** (cobalamin) may be used to assess deficiency resulting from ileal disease or pancreatic insufficiency.
- **Serum folate** levels increase with bacterial overgrowth and in antibiotic responsive diarrhea.
- **Fecal alpha-1 protease** may be an indicator of early PLE.

**RADIOGRAPHY VERSUS ULTRASOUND**

- **Abdominal radiography** is of limited value in most chronic disorders. In acute vomiting cases, however, radiographs are indicated to rule out foreign bodies, gastric dilatation/volvulus (GDV), intussusception and obvious tumors.
- **Thoracic radiography** is helpful in assessing the esophagus in cases of retching or regurgitation.

**ENDOSCOPY VERSUS LAPAROTOMY**

- **Abdominal ultrasonography** may be very helpful to assess the location of disease within the GI tract. Specifically, ultrasonography may be helpful in detecting gastric ulceration, gastric masses and thickening of the stomach lining. The intestines can be assessed for localized disease (e.g., ileal tumor) and thickening and enlargement of mesenteric lymph nodes, which may indicate neoplasia. The liver and pancreas also can be evaluated.

**CBC RESULTS — SOME POSSIBLE DIFFERENTIALS**

<table>
<thead>
<tr>
<th>FINDING</th>
<th>INDICATION(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macrocytosis without anemia</td>
<td>Hyperthyroidism</td>
</tr>
<tr>
<td>High PCV</td>
<td>Severe dehydration</td>
</tr>
<tr>
<td>Low PCV</td>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt; deficiency, bleeding tumor, ulcers, exocrine pancreatic insufficiency (EPI), liver disease</td>
</tr>
<tr>
<td>Hypochromic microcytic anemia</td>
<td>Chronic blood loss such as from GI bleeding</td>
</tr>
<tr>
<td>Leukopenia</td>
<td>Parvovirus, panleukopenia</td>
</tr>
<tr>
<td>Lymphopenia</td>
<td>Lymphangiectasia</td>
</tr>
<tr>
<td>Inflammatory leukogram</td>
<td>Infectious diarrhea</td>
</tr>
<tr>
<td>B&lt;sub&gt;12&lt;/sub&gt; deficiency</td>
<td>Macrocytic anemia (pancreatic disease or ileal inflammation in cats)</td>
</tr>
<tr>
<td>Negative stress leukogram</td>
<td>Hypoadrenocorticism (dogs)</td>
</tr>
<tr>
<td>Eosinophilia</td>
<td>Parasitism, neoplasia</td>
</tr>
</tbody>
</table>

PCV = packed cell volume

*Most intestinal function tests are not practical in clinical settings, but can be helpful in assessing primary disease.*
### Serum Chemistry Profile Results — Some Possible Differentials

<table>
<thead>
<tr>
<th>FINDING</th>
<th>INDICATION(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased Na/K ratio</td>
<td>Hypoadrenocorticism, whipworm infection, third space fluid accumulation</td>
</tr>
<tr>
<td>Decreased Ca and Mg</td>
<td>PLE</td>
</tr>
<tr>
<td>Increased P, BUN/CREA</td>
<td>Renal disease</td>
</tr>
<tr>
<td>Increased BUN/CREA</td>
<td>Hypoadrenocorticism, renal disease, whipworms</td>
</tr>
<tr>
<td>Increased liver enzymes</td>
<td>Liver disease, hyperthyroidism, pancreatitis, gallbladder disease</td>
</tr>
<tr>
<td>Decreased total protein (TP)</td>
<td>PLE</td>
</tr>
<tr>
<td>Decreased albumin</td>
<td>PLE, PLN, liver disease</td>
</tr>
<tr>
<td>Decreased cholesterol</td>
<td>PLE</td>
</tr>
<tr>
<td>Increased ALP</td>
<td>Biliary disease</td>
</tr>
<tr>
<td>Increased ALT</td>
<td>Hepatic necrosis, toxic hepatopathy, compromised GI function</td>
</tr>
</tbody>
</table>

**ALP =** alkaline phosphatase  
**ALT =** alanine aminotransferase  
**BUN =** blood urea nitrogen  
**Ca =** calcium  
**CREA =** creatinine  
**K =** potassium  
**Mg =** magnesium  
**Na =** sodium  
**P =** phosphorus  
**PLE =** protein-losing enteropathy  
**PLN =** protein-losing nephropathy

**Exploratory laparotomy** with full-thickness biopsies might be indicated if the history and physical exam indicate that the gastrointestinal disease is localized — particularly if there is a suggestion of duodenal, jejunal or ileal involvement. The disadvantage of exploratory surgery is the length of anesthesia and the risk of dehiscence, particularly in patients with low serum protein. The advantage is that the biopsies are full thickness, multiple organs can be biopsied, and the biopsies can be taken from grossly affected tissues within the abdominal cavity.

**Imaging and biopsy are valuable tools for localizing and identifying primary or secondary disease.**
GI Algorithms

DIAGNOSIS AT YOUR FINGERTIPS
Download our free iPhone GI Diagnostic app for easy access to the following diagnostic algorithms.

COMBINED CANINE & FELINE
- Anorexia....................................................... 18
- Constipation/tenesmus .............................. 19
- Diarrhea, acute ......................................... 20
- Diarrhea, chronic (small bowel) ............... 21
- Diarrhea, chronic (large bowel) ............... 22
- Flatulence/borborygmus, chronic ............ 23
- Regurgitation, dysphagia ......................... 24
- Vomiting, acute ......................................... 25
- Vomiting, chronic ....................................... 26
- Weight loss .............................................. 27
The GI algorithms on the following pages employ the abbreviations and conventions below and indicate which Purina Veterinary Diets® formulas are appropriate in each situation.

### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylcholine</td>
<td>ACh</td>
</tr>
<tr>
<td>Adrenocorticotropic hormone</td>
<td>ACTH</td>
</tr>
<tr>
<td>Antigen</td>
<td>Ag</td>
</tr>
<tr>
<td>Body condition score</td>
<td>BCS</td>
</tr>
<tr>
<td>Body weight</td>
<td>BW</td>
</tr>
<tr>
<td>Blood urea nitrogen/creatinine</td>
<td>BUN/CREA</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>CKD</td>
</tr>
<tr>
<td>Cerebrospinal fluid</td>
<td>CSF</td>
</tr>
<tr>
<td>Canine pancreatic lipase immunoreactivity</td>
<td>cPLI</td>
</tr>
<tr>
<td>Canine pancreatic lipase</td>
<td>cPLI</td>
</tr>
<tr>
<td>Canine thyroid stimulating hormone</td>
<td>cTSH</td>
</tr>
<tr>
<td>Enzyme-linked immunosorbent assay</td>
<td>ELISA</td>
</tr>
<tr>
<td>Exocrine pancreatic insufficiency</td>
<td>EPI</td>
</tr>
<tr>
<td>Feline pancreatic lipase</td>
<td>fPLI</td>
</tr>
<tr>
<td>Feline pancreatic lipase immunoreactivity</td>
<td>fPLI</td>
</tr>
<tr>
<td>Gastric dilatation/volvulus</td>
<td>GDV</td>
</tr>
<tr>
<td>German shepherd dog</td>
<td>GSD</td>
</tr>
<tr>
<td>Hour</td>
<td>H</td>
</tr>
<tr>
<td>Irritable bowel disorder</td>
<td>IBD</td>
</tr>
<tr>
<td>Immunoglobulin A</td>
<td>IgA</td>
</tr>
<tr>
<td>Ionized potassium</td>
<td>K+</td>
</tr>
<tr>
<td>Medium-chain triglycerides</td>
<td>MCT</td>
</tr>
<tr>
<td>Minimum database</td>
<td>MDB</td>
</tr>
<tr>
<td>Sodium</td>
<td>Na</td>
</tr>
<tr>
<td>Nonsteroidal anti-inflammatory drugs</td>
<td>NSAID</td>
</tr>
<tr>
<td>Physical exam</td>
<td>PE</td>
</tr>
<tr>
<td>Protein</td>
<td>P</td>
</tr>
<tr>
<td>Protein-losing enteropathy</td>
<td>PLE</td>
</tr>
<tr>
<td>Protein-losing nephropathy</td>
<td>PLN</td>
</tr>
<tr>
<td>Percutaneous endoscopic gastrostomy</td>
<td>PEG</td>
</tr>
<tr>
<td>Right aortic arch</td>
<td>RAA</td>
</tr>
<tr>
<td>Resting energy requirement</td>
<td>RER</td>
</tr>
<tr>
<td>Small intestinal bacterial overgrowth</td>
<td>SIBO</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>SpGr</td>
</tr>
<tr>
<td>Trypsin-like immunoreactivity</td>
<td>TLI</td>
</tr>
<tr>
<td>Total thyroxine</td>
<td>TT₄</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>UA</td>
</tr>
<tr>
<td>Urine protein:creatinine ratio</td>
<td>UPC</td>
</tr>
<tr>
<td>Upper respiratory infection</td>
<td>URI</td>
</tr>
<tr>
<td>Urine</td>
<td>UR</td>
</tr>
<tr>
<td>Vitamin</td>
<td>Vit</td>
</tr>
</tbody>
</table>

### Purina Veterinary Diets® & Supplements for GI Support*

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Fiber Control® Canine</td>
<td>DCO</td>
</tr>
<tr>
<td>Dietetic Management® Feline</td>
<td>DM</td>
</tr>
<tr>
<td>Dermatologic Management® Canine</td>
<td>DRM</td>
</tr>
<tr>
<td>Gastroenteric® Canine &amp; Feline</td>
<td>EN</td>
</tr>
<tr>
<td>Hypoallergenic® Canine &amp; Feline</td>
<td>HA</td>
</tr>
<tr>
<td>Kidney Function® Canine &amp; Feline</td>
<td>NF</td>
</tr>
<tr>
<td>Overweight Management® Canine &amp; Feline</td>
<td>OM</td>
</tr>
<tr>
<td>Nutritional Supplement</td>
<td>FortiFlora®</td>
</tr>
</tbody>
</table>

Complete listing available at PurinaVeterinaryDiets.com.

### Legend

GI Algorithms apply to both dog and cat. When they differ, the canine diet recommendation is in GREEN and the feline diet recommendation is in BLUE.

- **Canine**
- **Feline**

- **ABNORMAL**
- **PURSUE DIAGNOSIS**
- **NORMAL**
- **RULE OUT**

*For information about Purina Veterinary Diets,* call the Veterinary Resource Center at 1-800-222-VETS (8387) weekdays, 8:00 am to 4:30 pm CT, or visit our website at PurinaVeterinaryDiets.com.
Perform PE, diet history, oral exam, BCS, MDB*

**ABNORMAL**
- **RULE OUT**
  - Respiratory disease
    - Chest radiographs
    - Endoscopy, biopsy
  - Dental disease/stomatitis, retrobulbar or pharyngeal myositis
    - Biopsy, radiographs, removal of affected teeth
  - Pseudoanorexia, loss of senses, blindness, anosmia
  - Neurologic vestibular disease, cerebral disease
- Treat other primary disease

**NORMAL**
- **CAT - RULE OUT** pancreatitis
  - fPLI, ultrasound

**NORMAL with GI signs**
- Survey radiographs
  - ABNORMAL
    - Specific therapy or PURSUE DIAGNOSIS
  - NORMAL
    - GO TO PAGES 20, 21, 22 DIARRHEA ALGORITHMS
    - GO TO PAGES 25, 26 VOMITING ALGORITHMS

*Provide appropriate nutritional support while pursuing diagnosis.
Perform MDB
DOG – TT4 & cTSH
CAT – neuro exam, abdominal radiographs

NORMAL

Idiopathic
Stool softeners, motility modifiers, fluids
DOG – change diet to DCO
CAT – change diet to OM

ABNORMAL

Mass or anatomic defect
Biopsy/removal/repair
High fructosamine, glucose (diabetes mellitus)
DOG – change diet to DCO, insulin
CAT – change diet to DM, insulin or oral hypoglycemics
Elevated cTSH, reduced TT4
Hypothyroid
Hypokalemia
Supplement K+, PURSUE DIAGNOSIS

Mass or anatomic defect
Biopsy/removal/repair
Neoplasia
Anal sac disease
Perineal hernia
Foreign body
Pelvic fracture, old or new

Hematochezia
Neurologic deficit

Fecal exam
RULE OUT foreign body, neoplasia, NSAIDs, IBD

PURINA VETERINARY DIETS®
DCO Dual Fiber Control® Canine
DM Dietetic Management® Feline
NF Kidney Function® Canine & Feline
OM Overweight Management® Canine & Feline
Perform PE, diet history
Increased frequency?
Blood? Mucus? Normal
BW? Urgency?

No
Small Bowel
Clinical signs?
Dehydrated?

MILD
Withhold food 24 H,
then EN diet,
± FortiFlora

RESPONSE
Continue EN diet,
FortiFlora if needed

NO RESPONSE
GO TO PAGE 21
CHRONIC DIARRHEA ALGORITHMS

MODERATE TO SEVERE
Perform MDB, fecal exam
DOG – Parvovirus test
CAT – TT₄

ABNORMAL
GO TO PAGE 21
CHRONIC DIARRHEA ALGORITHMS

NORMAL

RESPONSE
Continue diet

NO RESPONSE
GO TO PAGE 22
CHRONIC DIARRHEA ALGORITHMS

Large Bowel
Fecal cytology,
parasite exam

NORMAL
Empirical
anthelmintics,
FortiFlora,
change diet to
DOG – DCO or EN
CAT – EN or OM

ABNORMAL
Anthelmintics,
antibiotics if indicated,
FortiFlora,
change diet to
DOG – DCO or EN
CAT – EN or OM

DYRHEA
ACUTE

PURINA VETERINARY DIETS®
DCO Dual Fiber Control® Canine
EN Gastroenteric® Canine & Feline
OM Overweight Management® Canine & Feline
FortiFlora®
*See also Distinguishing Small From Large Bowel Diarrhea on page 7.
**DIARRHEA®**  
**CHRONIC SMALL BOWEL**

- Perform PE, diet history, MDB, abdominal radiography or ultrasound, CAT – TT₄
  - **NORMAL**
  - **ABNORMAL**
    - **TLI, B₁₂ & folate**
      - **NORMAL**
      - **ABNORMAL**
        - Elimination diet trial, change diet to HA
          - **RESPONSE**
          - Continue diet
          - **NO RESPONSE**
            - PURSUE DIAGNOSIS Endoscopy/laparotomy
            - **GO TO Endoscopy/laparotomy (TOP RIGHT)**
    - **Low TLI**
      - **Low B₁₂**
        - Parenteral B₁₂ supplement, change diet to EN
        - Increased folate
        - Antibiotics for SIBO, FortiFlora, change diet to EN
        - **PURSUE DIAGNOSIS**
    - **Eosinophilic inflammation**
      - Specific therapy, anthelmintics, change diet to HA
      - Parenteral B₁₂ supplement, change diet to EN
      - **NO RESPONSE** change diet to EN
      - Neutrophilic, lymphoplasmacytic
        - Specific therapy, FortiFlora, change diet to EN
      - **PURSUE DIAGNOSIS**
    - **Lymphangiectasia, PLE**
      - **DOG ONLY** Lymphangiectasia therapy, change diet to EN or HA
      - **DOG ONLY** breed-specific diseases
        - Serum IgA in GSD, specific therapy, FortiFlora, DRM or HA diet
      - **Lymphoma**
        - Specific therapy, change diet to EN
      - **RULE OUT** portosystemic shunts, infection, inflammatory hepatopathy
      - **RULE OUT** Addison’s, ACTH stimulation
      - **ABNORMAL liver ultrasound ± elevated liver enzymes ± low albumin**
        - **ABNORMAL intestines, lymphadenopathy**
      - **ENDOSCOPY/LAPAROTOMY** with biopsy

**PURINA VETERINARY DIETS®**
- DRM Dermatological Management® Canine  
- EN Gastroenteric® Canine & Feline  
- HA Hypoallergenic® Canine & Feline  
- FortiFlora®

*See also Distinguishing Small From Large Bowel Diarrhea on page 7.
**DIARRHEA**

**CHRONIC LARGE BOWEL**

Perform PE, diet history, MDB, fecal cytology, fecal flotation, Giardia ELISA, CAT – TT4

- **NORMAL**
  - Elimination diet trial, change diet to HA
  - **RESPONSE**
  - Continue diet
  - **NO RESPONSE**
  - Empirical anthelmintics
    - **RESPONSE**
    - Coloscopy, biopsy
    - **NORMAL**
    - **ABNORMAL**
      - Nonspecific diet therapy, EN, HA, DRM, FortiFlora
      - DOG – Histiocytic
        - Boxer or similar breed
          - Fluoroquinolones, change diet to HA or DRM, FortiFlora
            - Neutrophilia
          - Antibiotics, FortiFlora
            - Neutrophilia
            - Antibiotics, FortiFlora
            - ± corticosteroids, etc, change diet to EN or HA
            - Eosinophilic inflammation
            - Anthelmintics, specific therapy, change diet to HA or DRM
    - **NO RESPONSE**
      - **RULE OUT** food allergy with food elimination diet trial, change diet to HA

- **ABNORMAL**
  - Parasites
    - Antibiotics, FortiFlora, change diet to DCO or OM
    - Boxer or similar breed – fluoroquinolones
    - Clostridium, Campylobacter
      - Antibiotics, FortiFlora, change diet to DCO or OM
  - Inflammatory cells, neutrophils, histiocytes
    - Neutrophilia
  - **NO RESPONSE**

**PURINA VETERINARY DIETS**

DCO Dual Fiber Control® Canine
DRM Dermatologic Management® Canine
EN Gastroenteric® Canine & Feline
HA Hypoallergenic® Canine & Feline
OM Overweight Management® Canine & Feline
FortiFlora®

*See also Distinguishing Small From Large Bowel Diarrhea on page 7.
FLATULENCE / BORBORYGMUS

CHRONIC

Perform PE, diet history

No other GI signs

Highly digestible low fiber food, FortiFlora, change diet to EN

IMPROVEMENT

Continue EN & FortiFlora

OTHER GI SIGNS?

HIGHLY DIGESTIBLE LOW FIBER FOOD, FORTIFLORA, CHANGE DIET TO EN

NO IMPROVEMENT

Try moderate fiber formula, change diet to DCO or OM, FortiFlora

OTHER GI SIGNS?

WEIGHT LOSS?

OTHER GI SIGNS?

WEIGHT LOSS?

PURSUE DIAGNOSIS

GO TO PAGES 25 & 26 VOMITING ALGORITHMS

GO TO PAGES 20, 21, 22 DIARRHEA ALGORITHMS

GO TO PAGE 18 ANOREXIA ALGORITHM

GO TO PAGE 27 WEIGHT LOSS ALGORITHM

OTHER GI SIGNS?

WEIGHT LOSS?

OTHER GI SIGNS?

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OTHER GI SIGNS?

WEIGHT LOSS?
Perform PE, diet history, oral exam

**NORMAL**

Thoracic radiographs ± contrast

**NORMAL**

**NORMAL**

ACh receptor antibody test, ACTH stimulation, cTSH, TT4

**RULE OUT**
myasthenia, Addison’s (rare), hypothyroidism (rare)

**ENDOSCOPY**

**NORMAL**

**ABNORMAL**

Tumor

Persistent RAA

Foreign body

**RULE OUT**

strictures, inflammation, megaesophagus, hiatal hernia

**RULE OUT**

GI disease, vomiting, diarrhea

**GO TO PAGES 25 & 26 VOMITING ALGORITHMS**

**GO TO PAGES 20, 21, 22 DIARRHEA ALGORITHMS**

Upper respiratory signs

**PURSUE DIAGNOSIS**

upper respiratory infection, neoplasia

**PURSUE DIAGNOSIS**

dental disease, foreign body, neoplasia

**ORAL DISEASE**

**DYSPHAGIA**

**REGURGITATION**

See also [Distinguishing Vomiting From Regurgitation](#) on page 7.
**VOMITING: ACUTE**

**RULE OUT**
- dietary indiscretion

**NORMAL**
- Primary GI abdominal radiography and/or ultrasound

**ABNORMAL**
- Increased K, decreased Na, lymphocytosis
- ACTH stimulation
- Increased liver enzymes
- Bile acids, abdominal ultrasound, ± biopsy

**RULE OUT**
- toxins

**DOG – GDV**
- Decompression, surgery when stable
- Foreign body
- Endoscopic or surgical removal
- Mass, intussusception
- Exploratory surgery & biopsy

**NO RESPONSE**
- Go to Page 26
- Chronic Vomiting Algorithm

**RESPONSE**
- Continue EN as needed

**Parasites (occult)**
- Anthelmintic therapy, change diet to EN

**PARASITES** (occult)
- Anthelmintic therapy, change diet to EN

**VOMITING**
- Acute

**PURINA VETERINARY DIETS®**

EN Gastroenteric® Canine & Feline

*See also Distinguishing Vomiting From Regurgitation on page 7.

**CHRONIC VOMITING ALGORITHM**

**RULE OUT**
- dietary indiscretion, drugs, toxins

**NORMAL**
- Withhold food 12 to 24 H, parenteral fluids
- Change diet to EN

**ABNORMAL**
- Go to Page 26
- Chronic Vomiting Algorithm

**RESPONSE**
- Continue EN as needed

**NO RESPONSE**
- Go to Page 26
- Chronic Vomiting Algorithm

**PARASITES** (occult)
- Anthelmintic therapy, change diet to EN

**VOMITING**
- Acute

**PURINA VETERINARY DIETS®**

EN Gastroenteric® Canine & Feline

*See also Distinguishing Vomiting From Regurgitation on page 7.
Perform PE, diet history, MDB, fecal exam
CAT – TT₄, heartworm Ag

NORMAL

PRIMARY GI
abdominal radiograph or ultrasound
DOG – cPLI, CAT – fPLI

NORMAL

Parasites (occult)
Anthelmintic therapy

RESPONSE

No RESPONSE

Change diet to EN

Non-specific gastroenteritis

ACTH stimulation, coagulation test, endoscopy, gastrin

Hematemesis, anemia

SECONDARY GI

Increased K, decreased Na, lymphocytosis

ACTH stimulation

Increased liver enzymes

Abdominal ultrasound ± biopsy, bile acids, change diet to EN

CAT – increased TT₄ (hyperthyroid)

Increased lipase, inflammatory leukogram

Increased BUN/CREA

Abdominal ultrasound, paracentesis

Urine P:CREA, blood pressure, ultrasound, urine culture

OBSTRUCTION

Surgery & biopsy

Motility disorder

Motility modifiers

Inflammatory lesions, infections

Change diet to HA

Motility disorder

Exploratory surgery & biopsy

Mass, intussusception

Endoscopic or surgical removal

Hematemesis, anemia

CHANGE DIET TO EN

Nonspecific gastroenteritis

Contrast radiography, endoscopy, surgery, biopsy

RULE OUT chronic pancreatitis

Abnormal

Obstruction

Surgery & biopsy

Inflammatory lesions, infections

Change diet to HA

Motility modifiers

Student: Distinguishing Vomiting From Regurgitation on Page 7.

PURINA VETERINARY DIETS®

EN Gastroenteric® Canine & Feline
HA Hypoallergenic® Canine & Feline

VOMITING®
CHRONIC
Purina Veterinary Diets® for GI Support

COMBINED CANINE & FELINE

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- DM Dietetic Management® Feline ................. 29
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- EN Gastroenteric® Feline .......................... 30
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- DRM Dermatologic Management® Canine ...... 34
- FortiFlora® ........................................... 34

*For information about Purina Veterinary Diets,* call the Veterinary Resource Center at 1-800-222-VETS (8387) weekdays, 8:00 am to 4:30 pm CT, or visit our website at PurinaVeterinaryDiets.com.
CLINICAL CONSIDERATIONS
The role of dietary management in canine diabetes mellitus and colitis is to provide a proper balance of total nutrients while meeting the special dietary needs of the patient. Complex carbohydrates and dietary fiber help to delay the absorption of glucose from the intestinal tract and minimize postprandial fluctuation of glucose in dogs with diabetes mellitus. Soluble fiber in the diet may also prolong gastrointestinal transit time, allow greater water absorption and promote the production of short-chain fatty acids, which nourish the intestinal mucosa.

DIET CHARACTERISTICS
- Complete and balanced nutrition for maintenance of adult dogs
- High level of complex carbohydrates
- Targeted urine pH-acid (6.0–6.2)
- Increased fiber, including soluble fiber
- Moderate total dietary fat and calories
- Source of omega-3 and omega-6 fatty acids

MEDICAL INDICATIONS
- Diabetes mellitus
- Constipation
- Fiber-responsive colitis
- Large bowel diarrhea

MEDICAL CONTRAINDICATIONS
- Conditions associated with catabolic states

MEDICAL INDICATIONS
- Diabetes mellitus
- Persistent hyperglycemia
- Critical care management of cats and dogs
- Enteritis, diarrhea

MEDICAL CONTRAINDICATIONS
- Conditions associated with catabolic states
- Renal failure
- Hepatic encephalopathy

DCO Dual Fiber Control Canine Formula

DM Dietetic Management Feline Formula

CLINICAL CONSIDERATIONS
The role of dietary management in feline diabetes mellitus is to provide a proper balance of nutrients while meeting the special dietary needs of the patient. Cats are unique in their requirement to metabolize high concentrations of dietary protein. A high percentage of protein is used for gluconeogenesis. The increased concentration of high-quality protein in this diet provides the cat’s essential amino acid requirements and a substrate for glucose production. With glucose production from dietary amino acids, the carbohydrate content of the diet may be dramatically reduced, as with this formulation. Glucose derived from hepatic gluconeogenesis is delivered to the bloodstream at a slower rate compared to the release of glucose from digestion of dietary carbohydrate. The result is a more consistent, steady release of glucose and the potential for reduced insulin requirements.

DIET CHARACTERISTICS
- Complete and balanced nutrition for the adult cat
- High protein
- Source of omega-3 and omega-6 fatty acids
- Low carbohydrate
- High level of antioxidants

MEDICAL INDICATIONS
- Diabetes mellitus
- Persistent hyperglycemia
- Critical care management of cats and dogs
- Enteritis, diarrhea

MEDICAL CONTRAINDICATIONS
- Renal failure
- Hepatic encephalopathy
CLINICAL CONSIDERATIONS
The role of dietary management in canine gastrointestinal conditions is to provide a proper balance of total nutrients while meeting the special dietary needs of the patient. Dietary fats from long-chain triglycerides (LCTs) can be one of the most complex nutrients to digest, and fermentation of undigested fats can contribute to diarrhea. Medium-chain triglycerides (MCTs) provide a readily digested and utilized energy source. Feeding a properly formulated diet designed to be highly digestible yet restricted in long-chain triglycerides may be beneficial in the management of certain gastrointestinal conditions while meeting the nutritional needs of the animal.

DIET CHARACTERISTICS
- Complete and balanced nutrition for growth of puppies and maintenance of adult dogs
- High digestibility
- Moderate fat
- Source of omega-3 and omega-6 fatty acids
- Low fiber
- Increased antioxidant vitamins E and C
- Added zinc
- Source of MCTs (22% to 34% of fat)

MEDICAL INDICATIONS
- Enteritis, gastritis and diarrhea
- Pancreatitis
- Exocrine pancreatic insufficiency (EPI)
- Hyperlipidemia
- Inflammatory bowel disease (IBD)
- Malabsorption and maldigestion
- Lymphangiectasia
- Hepatic disease not associated with encephalopathy

MEDICAL CONTRAINDICATIONS
- None

EN Gastroenteric® Canine Formula

CLINICAL CONSIDERATIONS
The role of dietary management in feline gastrointestinal conditions is to provide a proper balance of total nutrients while meeting the special dietary needs of the patient. Some cats with diarrhea are sensitive to dietary carbohydrates. Feeding a high-quality diet that is high in protein and low in carbohydrates provides optimal nutrition for these cats with compromised gastrointestinal tracts. With added B vitamins, easily absorbed chelated minerals and high fat content, EN provides the nutrients needed to help support cats with GI tract problems.

DIET CHARACTERISTICS
- Complete and balanced nutrition for growth of kittens and maintenance of adult cats
- Low carbohydrate
- Added B vitamins
- High protein
- Exceptional palatability
- Chelated minerals (copper, zinc, manganese)
- Moderate fat

MEDICAL INDICATIONS
- Enteritis
- Gastritis
- Diarrhea
- Vomiting
- Hepatic lipidosis

MEDICAL CONTRAINDICATIONS
- Renal failure
- Hepatic encephalopathy

EN Gastroenteric® Feline Formula
CLINICAL CONSIDERATIONS
The role of dietary management in canine food allergy is to provide a proper balance of total nutrients while meeting the special dietary needs of the patient. Most common food allergens are proteins with a molecular weight of 18,000 to 70,000 daltons. Protein modification is a process that alters the physical characteristics of protein molecules, reducing the antigenicity and rendering them less able to elicit an immune response. By reducing the molecular weight of the protein molecule below 18,000 daltons, this process can result in a protein that is truly hypoallergenic.

DIET CHARACTERISTICS
• Complete and balanced nutrition for growth of puppies and maintenance of adult dogs
• Hydrolyzed protein source (average molecular weight below 12,200 daltons)
• Single protein source
• Source of medium-chain triglycerides (MCTs), 23% of fat
• High digestibility
• Vegetarian diet
• Low-allergen carbohydrate source

MEDICAL INDICATIONS
• Elimination diet for food trials
• Dermatitis associated with food allergy
• Pancreatitis
• Gastroenteritis associated with food allergy
• Exocrine pancreatic insufficiency (EPI)
• Protein-losing enteropathy (PLE)
• Inflammatory bowel disease (IBD)
• Lymphangiectasia
• Malabsorption
• Hyperlipidemia

MEDICAL CONTRAINDICATIONS
• None

CLINICAL CONSIDERATIONS
The role of dietary management in feline food allergy is to provide a proper balance of total nutrients while meeting the special dietary needs of the patient. Most common food allergens are proteins with a molecular weight of 18,000 to 70,000 daltons. Protein hydrolysis is a process that reduces the protein size to small polypeptides, reducing the antigenicity and rendering them less able to elicit an immune response. By reducing the molecular weight of the protein molecule below 18,000 daltons, this process can result in a protein that is truly hypoallergenic.

DIET CHARACTERISTICS
• Complete and balanced nutrition for growth of kittens and maintenance of adult cats
• Hydrolyzed protein with a low molecular weight
• Low allergen carbohydrate source
• Source of medium-chain triglycerides (MCTs), 23% of fat
• High digestibility

MEDICAL INDICATIONS
• Elimination diet for food trials
• Food intolerance
• Gastroenteritis associated with food allergy
• Chronic nonspecific diarrhea and vomiting
• Dermatitis associated with food allergy
• Inflammatory bowel disease (IBD)

MEDICAL CONTRAINDICATIONS
• None

HA Hypoallergenic
Canine Formula

HA Hypoallergenic
Feline Formula

Purina Veterinary Diets
GI Support
CLINICAL CONSIDERATIONS

The role of dietary management in canine kidney conditions is to provide a proper balance of total nutrients while meeting the special dietary needs of the patient. Low phosphorus intake helps to protect against hyperphosphatemia and associated renal damage. Restricted but high-quality protein in the diet minimizes the intake of nonessential amino acids. This helps decrease the production of nitrogenous waste products. Reduced levels of sodium help compensate for the diseased kidney’s inability to regulate this important mineral. Increased omega-3 fatty acids may help reduce glomerular hypertension.

DIET CHARACTERISTICS

- Complete and balanced nutrition for maintenance of adult dogs
- Low phosphorus
- Reduced protein
- Added potassium
- Reduced sodium
- Target urine pH-alkaline (6.7–7.5)
- Source of omega-3 and omega-6 fatty acids

MEDICAL INDICATIONS

- Renal failure
- Calcium oxalate urolithiasis
- Early stages of congestive heart failure
- Hepatic disease associated with encephalopathy

MEDICAL CONTRAINDICATIONS

Conditions that require high protein or phosphorus intake

CLINICAL CONSIDERATIONS

The role of dietary management in feline kidney conditions is to provide an appropriate balance of total nutrients while meeting the special dietary needs of the patient. Low phosphorus intake helps to protect against hyperphosphatemia and the associated renal damage. Restricted but high-quality protein in the diet minimizes the intake of nonessential amino acids. This helps decrease the production of nitrogenous waste products. Reduced levels of sodium help compensate for the diseased kidney’s inability to regulate this important mineral. Increased omega-3 fatty acids may help reduce glomerular hypertension.

DIET CHARACTERISTICS

- Complete and balanced nutrition for maintenance of adult cats
- Low phosphorus
- Reduced sodium
- Target urine pH-alkaline (6.7–7.5)
- Source of omega-3 and omega-6 fatty acids
- Added potassium
- Reduced protein
- Added B-complex vitamins

MEDICAL INDICATIONS

- Renal failure
- Hepatic disease associated with encephalopathy
- Early stages of congestive heart failure

MEDICAL CONTRAINDICATIONS

- Conditions that require high protein or phosphorus intake
**CLINICAL CONSIDERATIONS**
The role of dietary management in canine obesity is to reduce calorie intake sufficiently to induce weight loss, while providing a proper balance of total nutrients. A low fat diet can be helpful in controlling calorie intake. Dietary crude fiber helps reduce the amount of available calories and contributes to satiety. Increased dietary protein increases metabolic activity and may promote satiety. In addition, an increased protein:calorie ratio promotes loss of body fat while helping to minimize the loss of lean body mass during weight loss. Obese animals experience an increase in oxidative stress. Isoflavones have been shown to reduce oxidative stress in overweight dogs. Isoflavones also aid in weight maintenance by helping to reduce weight rebound and the associated accumulation of fat. Feeding a diet that is low in calories, high in protein and fiber, and that contains isoflavones, may be beneficial in the management of obesity while meeting the nutritional needs of the animal.

**DIET CHARACTERISTICS**
- Complete and balanced nutrition for weight loss and weight maintenance of adult dogs
- Low fat
- Low calorie
- High fiber
- High protein:calorie ratio
- Target urine pH-acid (6.2-6.4)
- Contains a source of isoflavones (dry)

**MEDICAL INDICATIONS**
- Fiber-responsive colitis
- Hyperlipidemia in overweight dogs
- Neutered/spayed dogs
- Diabetes mellitus in overweight dogs
- Obesity

**MEDICAL CONTRAINDICATIONS**
- Conditions associated with catabolic states

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**OM Overweight Management® Canine Formula**

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**OM Overweight Management® Feline Formula**

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**CLINICAL CONSIDERATIONS**
The role of dietary management in feline obesity is to provide a proper balance of total nutrients while meeting the special dietary needs of the patient. Dietary fats contribute more than twice the available energy compared to carbohydrates and protein. A low fat diet can be helpful in controlling calorie intake. Dietary crude fiber is poorly digested and helps reduce the amount of available calories and may contribute to satiety. Increased dietary protein may promote both increased metabolic activity and satiety. In addition, an increased protein:calorie ratio promotes loss of body fat while helping to minimize the loss of lean body mass during weight loss. Feeding a properly formulated diet designed to be restricted in calories, and high in fiber and protein, may be beneficial in the management of obesity while meeting the nutritional needs of the animal.

**DIET CHARACTERISTICS**
- Complete and balanced nutrition for weight loss and weight maintenance of adult cats
- Low fat
- Promotes acidic urine
- Low calorie
- High fiber
- High protein:calorie ratio

**MEDICAL INDICATIONS**
- Obesity
- Fiber-responsive colitis
- Diabetes mellitus in overweight cats
- Constipation
- Hairballs

**MEDICAL CONTRAINDICATIONS**
- Conditions associated with catabolic states
**purina Veterinary Diets**

**Gi support**

**CLINICAL CONSIDERATIONS**

Gastrointestinal tract conditions such as diarrhea are commonly seen in dogs and cats and are often associated with an imbalance in the intestinal microflora. Restoring microflora balance is a key component of the effective management of these conditions. FortiFlora is a nutritional supplement that contains a probiotic, *Enterococcus faecium* strain SF68, for the dietary management of dogs and cats with diarrhea. This probiotic has been shown to be safe, stable and effective in restoring normal intestinal health and balance.

**DIET CHARACTERISTICS**

- Contains a guaranteed level of viable microorganisms
- Proprietary microencapsulation process for enhanced stability
- Proven to promote normal intestinal microflora
- Promotes a strong immune system
- Shown to be safe for use in dogs and cats
- Contains high levels of antioxidant vitamins A, E and C
- Excellent palatability

**MEDICAL INDICATIONS**

- Diarrhea associated with microflora imbalance
- Diarrhea associated with stress, antibiotic therapy and diet change
- Acute enteritis
- Poor fecal quality in puppies and kittens
- Compromised strong immune system

**MEDICAL CONTRAINDICATIONS**

- Dogs and cats with food allergies
- Severely immune-compromised dogs and cats

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**Dermatologic Managament® Canine Formula**

**CLINICAL CONSIDERATIONS**

The role of dietary management in canine atopy, dermatitis and other inflammatory skin conditions is to provide a proper balance of total nutrients while meeting the special dietary needs of the patient. Nutritional management of dermatitis involves providing nutrients that can support healthy skin and help to reduce the production of inflammatory mediators. Essential fatty acids, key vitamins and amino acids, and trace minerals such as zinc are critical to healthy skin. Long chain omega-3 fatty acids have been shown to reduce the inflammation and clinical signs associated with atopy and allergic dermatitis, so may be beneficial in these and other inflammatory skin conditions. A diet with novel protein ingredients may also help in the management of dogs with food allergies.

**DIET CHARACTERISTICS**

- Complete and balanced nutrition for growth of puppies and maintenance of adult dogs
- High omega-3 fatty acid content
- Appropriate levels of omega-6 fatty acids
- Increased antioxidant vitamins A, E and beta-carotene
- Added zinc
- Limited number of novel protein ingredients

**MEDICAL INDICATIONS**

- Atopy
- Food allergy dermatitis
- Other inflammatory skin conditions
- Pruritus

**MEDICAL CONTRAINDICATIONS**

- Allergies to listed ingredients

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**FortiFlora® Nutritional Supplement**

**CLINICAL CONSIDERATIONS**

Gastrointestinal tract conditions such as diarrhea are commonly seen in dogs and cats and are often associated with an imbalance in the intestinal microflora. Restoring microflora balance is a key component of the effective management of these conditions. FortiFlora is a nutritional supplement that contains a probiotic, *Enterococcus faecium* strain SF68, for the dietary management of dogs and cats with diarrhea. This probiotic has been shown to be safe, stable and effective in restoring normal intestinal health and balance.

**DIET CHARACTERISTICS**

- Contains a guaranteed level of viable microorganisms
- Proprietary microencapsulation process for enhanced stability
- Proven to promote normal intestinal microflora
- Promotes a strong immune system
- Shown to be safe for use in dogs and cats
- Contains high levels of antioxidant vitamins A, E and C
- Excellent palatability

**MEDICAL INDICATIONS**

- Diarrhea associated with microflora imbalance
- Diarrhea associated with stress, antibiotic therapy and diet change
- Acute enteritis
- Poor fecal quality in puppies and kittens
- Compromised strong immune system

**MEDICAL CONTRAINDICATIONS**

- Dogs and cats with food allergies
- Severely immune-compromised dogs and cats