Diarrhea in Small Mammals

Causes and Diagnosis

INTRODUCTION

Diarrhea in those animals which are being rehabilitated can cause even the most stalwart of us to groan with dismay. Depending on the age and body condition of the animal and the severity of the diarrhea, this problem can range from being a nuisance to becoming life-threatening for the animal. What taxes our brains and tries our patience is the fact that **almost anything** can cause diarrhea. Figuring out what is causing the problem so it can be properly treated is oftentimes frustrating.

CAUSES OF DIARRHEA

Stress and diet are probably the two most common causes of diarrhea. The stress of captivity, of being handled, and of being handled by more than one person (people handle animals differently) causes increased anxiety for the animal. Noises and odors different than heard and smelled in the wild, proximity to other animals, and various unfamiliar "den" materials also cause an increased level of tension in the animal, even if the animal is an infant. Add in a strange diet and it is amazing that rehabilitators do not see diarrhea more often.

When considering the diet as the cause of diarrhea, one must first take into account the quality of the diet. If a commercially prepared diet is fed, as in formula or puppy kibble, two brands may have the same percentage of protein, for example, but the quality of the protein may not be the same. Food dyes and preservatives present in the food may also cause adverse digestive reactions. When feeding separate foods to a weaned animal, there may be an improper ratio of carbohydrates to protein to fat. Rabbits are one species which need much more roughage than carbohydrates for proper digestion.

The younger the infant, the more easily its body functions can be upset. Abrupt changes in the concentration of a formula, inconsistency of formula temperatures, or allowing the infant to overfeed can bring on diarrhea. Even such changes as irregularity of the feeding schedule or of being handled by too many different people during feeding will cause diarrhea.

Another cause of diarrhea related to diet is that of **foreign bodies**. These can be feathers or bones from the animal's ingestion of birds or mice given them as part of their diet, the ingestion of part of the bedding material (who knows why they eat it?!), or, as with rabbits, the formation of hairballs which obstruct the gut and induce inflammation.

Poor husbandry and parasites are still other causes for diarrhea. Overcrowding causes increased stress. Improper sanitation allows for the spread of viral, bacterial, and parasitic diseases which may cause diarrhea. An animal which lives in feces and urine cannot be healthy. When straw or hay is used for bedding, the animal may be put at risk due to exposure to fungi or mites which live in the material.

Both internal and external parasites contribute to the onset of diarrhea. External parasites such as fleas, mites, ticks, and lice increase the likelihood of diarrhea not only through the stress of their physical presence but also because the parasites may infect the animal with a disease of which diarrhea is a symptom. Intestinal parasites produce damage to the lining of the bowel by attaching themselves to it and sucking blood and other nutrients. This, in turn, causes inflammation, improper digestion, and diarrhea with or without blood.

Toxins and medications can also contribute to the presence of diarrhea. An animal may be presented with diarrhea. Unknown to the rehabilitator is the fact the animal had been munching

on grasses or plants which had been sprayed with insecticides or pesticides. If a rehabilitator is picking grasses for rabbits or other herbivores, the source field may have been sprayed or spray may have drifted over and contaminated a clean yard. Some plants are known to possess toxins within their structure. Adult or juvenile animals which get into garbage cans can eat spoiled food which has bacterial endotoxins present.

Any medication given has the risk of inducing diarrhea. Antibiotics kill the existing bacterial population in the gut and alter the digestive process. Some dewormers may produce diarrhea by killing off a large population of intestinal worms. This die-off, in turn, may cause diarrhea because the body is trying to push a ball of worms through the gut and inflammation with straining occurs. A frequent reaction to the administration of vaccines may be a mild diarrhea as the immune system is stressed. In some cases, a rehabilitator may inadvertently cause diarrhea through improper or overuse of **probiotics** such as Bene-Bac®, yogurt, or products containing *Acidophilus* or *Enterococcus* bacteria. While the bacteria in these products do not colonize the gut, they will cause a change in the ratio of digestive bacteria leading to bacterial overload and maldigestion.

Another important cause of diarrhea is that of disease due to **viral or bacterial** infections or because of **metabolic** malfunctions. Parvovirus, coronavirus, canine distemper, and rabies viruses (among many others) may have diarrhea as one of the signs of infection. Pathogenic bacteria such as *Clostridium spp, Salmonella,* and *Campylobacter* may produce endotoxins which cause diarrhea or may induce diarrhea due to the direct attack of the bacteria on the gut lining. Organs of the body other than the intestinal system involved with digestion may function improperly and thereby also cause diarrhea. Both the liver and the pancreas play an important part in digestion and diarrhea may be a sign of malfunction in one of these organs.

DIAGNOSIS OF DIARRHEA

It is easy to see that determining the cause of diarrhea may be difficult as there are so many reasons for diarrhea to occur. The first thing to do is to (1) ***evaluate the feces***. Consider what is normal for the age of the animal versus the diet being given versus the species being fed. A formula diet tends to produce feces which are softer in consistency and yellow in color versus a diet of solid food which is more brown and firm. Some species of animals produce pelleted feces while others produce "cow patties" and still others eliminate feces in tubular form.

Observe the diarrhea for **consistency**. Is it soft, pudding or liquid? Are any of the feces formed among the liquid portion? Note the **color** of the feces. Some food dyes may change the color of the waste material. Metabolic problems involving the liver or pancreas may cause the feces to turn green or pasty white. Bleeding in the gut due to inflammation or parasites may show as bright red or cause the feces to become dark and tarry. Is there a strong or foul **odor** to the feces which may indicate improper digestion? Is flatulence present? Is **mucus, parasites, or any foreign bodies** present in the feces suggesting inflammation or damage to the gut's lining? Mucus is produced in the large intestine to help protect the lining of the gut during inflammatory processes. Run a fecal flotation to determine the parasite status (yes, you can and should learn to do it yourselves).

Finally, determine whether there is a change in the gut's **motility** and how severe that change is. Are defecations controlled or uncontrolled? Is projectile diarrhea present? Are the sounds of borborygmus (gut noises-growling) excessive? Is the animal **straining** to defecate? How much waste is being passed at a time?

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Note whether the diarrhea is **"hot" versus "cold**". "Hot" diarrhea produces anal inflammation, swelling, uncontrolled defecation, and straining which may result in rectal prolapse. The animal may have a fever with abdominal pain. This type of diarrhea tends to be far more serious than a "cold" diarrhea which does not cause pain, fever, or external inflammation. Many of the pathogenic bacteria will cause "hot" diarrhea as will some viral or parasitic infections.

Determine if the diarrhea is acute (<3 wks duration) versus chronic and sudden versus gradual. Acute diarrheas tend to be self-limiting and are usually caused by dietary changes, stress, toxins, medications, or viruses and bacteria. Chronic diarrheas, on the other hand, tend to have a gradual onset and are frequently produced due to poor diet, parasites, and metabolic problems. Weight loss is common along with poor body condition secondary to poor absorption of nutrients.

Attempt to (2) ***localize the diarrhea*** to either the small intestine or large intestine. The primary functions of the small intestine (SI) are digestion and absorption of nutrients. Bacteria in the SI break down the food into smaller components so they can be absorbed into the bloodstream. Diarrhea caused by malfunction in the SI is of **high volume with low frequency**. Flatulence with a foul odor is often present. The animal does not tend to strain during defecation, nor is there mucus present. If there is bleeding into the SI, it is digested and produces dark tarry stools. If the diarrhea is chronic in nature, weight loss and poor body condition occur. Reasons for SI diarrhea include maldigestion and/or malabsorption, bacterial overload, some parasites, medication usage, and viral infection.

The large intestine (LI) functions to reabsorb water and electrolytes and serves as a storage area. Diarrhea produced in the LI is of **low volume with high frequency**. Mucus and straining is often present. Blood shows as bright red. If the diarrhea is chronic, there is no loss of weight or body condition as digestion has already taken place prior to the waste products reaching the LI. Frequent causes of diarrhea in the LI include parasites, pathogenic bacteria, and a change in motility.

The next step in diagnosing the cause of diarrhea is to (3) ***evaluate the animal***. Perform a complete physical examination; taking a rectal temperature if possible and making sure to palpate the abdomen. Note any loss of weight or body condition, the presence of abdominal pain, neurological signs, fever, pale mucus membranes, or dehydration. Is vomiting, lack of appetite or listlessness present? Any of these signs may indicate a more serious metabolic problem or viral/bacterial infection than what a rehabilitator can handle alone. A visit to your veterinarian is recommended and additional tests may be needed. If the animal is still active, alert, and eating, you can probably treat the diarrhea yourself.

The final step is to (4) ***correlate*** all of the information obtained from the evaluation of the feces and the physical exam with the diet being fed, any changes in the stress level of the animal, the previous response to medications given, and the results of any additional tests performed. Continue to evaluate the animal and the diarrhea and keep detailed records to assist in ongoing or future problems.

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Causes and Diagnosis Outline

"Diarrhea results from excessive fecal water content….It is characterized by an abnormal increase in the frequency, fluidity, and volume of feces."
(R. Sherding and S Johnson in Diseases of the Intestines, Saunders Manual of Small Animal Practice)

A. CAUSES

-stress - handling, captivity, noise, etc
-poor husbandry – overcrowding, poor sanitation, etc
-dietary – quality, abrupt changes, **overfeeding**, food allergy (dyes, preservatives, etc), rabbits need increased roughage/decreased carbohydrates
-toxins – synthetic chemicals (insecticides, pesticides) plant toxins, bacterial endotoxins
-medications – antibiotics, some dewormers, vaccinations
-parasites –coccidia, roundworms, hookworms, tapeworms, lungworms, pinworms, stomach worms, etc
-metabolic – pancreatic, liver, kidney, etc
-"foreign bodies" – bones, feathers, bedding, rabbits (hairballs)
-viral/bacterial – disease, bacterial overload/imbalance, parvovirus, rotavirus, pathogenic bacteria:Clostridium/Salmonella/Campylobacter, Giardia, Bene-Bac/yogurt/Acidophilus

Diarrhea may have a primary cause with secondary signs
e.g. the use of antibiotics may cause a bacterial imbalance which produces a primary diarrhea and leads to a secondary problem of poor digestion

B. APPEARANCE
What is normal for age vs. diet vs. species?

Observe feces for:
-consistency – soft, lumpy, liquid
-color –lighter, darker, colored, (dyes->color change, grape Pedialyte-> green feces)
-odor – strong vs. metallic (blood) vs. foul, monitor flatulence
-presence of blood/mucus/foreign objects
-frequency/motility - controlled/uncontrolled, borborygmus
-straining to defecate – projectile, little/no feces

"Hot" versus "cold" diarrhea
anal inflammation, prolapse, pain, straining, fever

Pathogenic Bacteria – signs of large bowel diarrhea seen, zoonotic
a) *Salmonella spp*: acute, watery mucoid diarrhea, possible vomiting, straining, fever, lethargic, abdominal pain, dehydration, no appetite
-increased risk due to antibiotic usage, overcrowding, young age, immunocompromised
-may be healthy carriers

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b) *Campylobacter spp*: watery, mucoid diarrhea lasting 14 days, occasional blood, poss vomiting or straining
-increased risk with overcrowding, poor sanitation
-may be healthy carrier

c) *Clostridium perfringens/difficile*: watery or soft feces, poss blood, mucus, straining
-part of normal flora: diarrhea self-limiting
-increased risk if on antibiotics
C. botulinum = cause of botulism

C. DIAGNOSIS

Perform complete physical exam, palpate abdomen, temperature if possible

Determine:

-acute vs. chronic - <3wks, acute tends to be self-limiting, **when was the animal last fed and how much?** chronic not usually due to diet, toxins, viral
-sudden vs. gradual onset
-small bowel vs. large bowel (may have signs of both)

Small bowel – functions for digestion and absorption
bacteria degrade and ferment components of food
- hi vol/lo freq, foul odor, gas, mucus, no straining
- chronic assoc with wt loss, decreased body condition,
- if blood-feces are dark->indicates severe inflammation, ulceration, parasites

Causes of diarrhea include maldigestion, malabsorption, bacterial imbalance or overload, some parasites, antibiotic usage, viral

Large bowel – functions to reabsorb water and electrolytes
- lo vol/hi freq, presence of mucus, straining, if blood-fresh/red, no loss of body wt/condition

Causes of diarrhea include parasites, pathogenic bacteria such as Campylobacter/Salmonella/Clostridium, change in intestinal motility

-correlation with diet, stress, medication
-parasite status – visual, fecal flotation/smears
-other signs: weight loss, vomiting, listlessness, no/decreased appetite, abdominal pain, neurological signs, rectal prolapse, fever, pale mucus membranes, dehydration
-response to previous treatments

Option for laboratory tests: fecal flotation/smear, bloodwork, fecal C/S occult blood, radiographs

Ongoing evaluation. Keep records.

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DIFFERENTIATION OF SMALL BOWEL DIARRHEA FROM LARGE BOWEL DIARRHEA

Observation	Small Intestine	Large Intestine
Frequency of defecation	Normal to slightly increased	Very frequent
Fecal output	Large volumes	Small volumes frequently
Urgency or tenesmus	Absent	Present
Dyschezia	Absent	Present with rectal disease
Mucus in feces	Absent	Present
Hematochezia (red blood)	Absent(except in acute hemorrhagic diarrhea)	Present sometimes
Melena (digested blood)	Present sometimes	Absent
Steatorrhea	Present in maldigestive or malabsorptive disease	Absent
Flatulence &: borborygmus	Present in maldigestive or malabsorptive disease	Absent
Weight loss	Present in maldigestive or malabsorptive disease	Rare
Vomiting	Present sometimes in inflammatory bowel disease	Rare

Reprinted from "Diseases of the Intestines", R Sherding and S Johnson, Saunders Manual of Small Animal Practice

Fecal Flotation for Parasite Evaluation

microscope
+/- centrifuge (gives more accurate results if used)
glass slides
+/- cover slips
flotation solution – sodium nitrate, zinc sulfate, etc
sample holders – syringe casings, pill bottles, etc
rack to hold samples – test tube holder, baby food jar with small gravel, etc
timer
gauze sponges (for straining)
mixing cup
tongue depressors or other utensil for mixing

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Treatment

A. CAUSES

-stress, poor husbandry, diet (incl overfeeding), toxins, infectious, medications, parasites, metabolic, foreign bodies/obstruction

B. ACUTE DIARRHEA

1. Resolve the obvious problems
   - -sanitation, overcrowding, decrease stress, stop medications
   - -dietary, supportive therapy, +/-symptomatic therapy
   - -mild diarrhea with active animal which continues to eat may be self-limiting with only food restrictions

2. Dietary
   - -adult animal - no food 24-36 hours, allows gut to rest and repair
   - -infant/emaciated – skip one or two feedings only
   - -don't overfeed, 5% body wt, rabbits 10% body wt
   - -continue with fluids!
   - -bland diet, low-fat/easily digestible for small bowel D,
   - -high-fiber diet for large bowel D
   - -smaller amounts more frequently-esp w LBD
   - -rabbits-need increased roughage and decreased carbs
   - -may not need medication

3. Toxins
   - -diarrhea is body's way of getting rid of them
   - -treat the toxin –specific if possible, symptomatic if not
   - -activated charcoal-binds toxin and removes from gut
   - -supportive treatment until passes, watch for neurological or other signs

4. Viral/bacterial
   - -consider whether infection maintained in the gut or has passed into bloodstream
   - -antibiotics not recommended unless specific agent identified or there is severe mucosal damage with high risk of sepsis (e.g. fresh blood, severe inflammation, fever)
   - -viral-rehydration/correction of electrolyte imbalances +/- antibiotics for secondary bacterial component
   - -bacterial-overload or disease +/- antibiotics
     - -consult exotic formulary for appropriate species dosages
     - -broad-spectrum/anaerobic activity-tetracyclines, metronidazole, ampicillin, chloramphenicol, tylosin, erythromycin
   - -treat minimum 10-14 days? (I sometimes treat for 2 days after resolution of signs-why upset the gut flora more?)
   - -Bene-Bac/Acidophilus/yogurt-may cause imbalance, only use small amounts every other day (1/16 – ½ tsp depending on size)

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PATHOGENIC BACTERIA - ZOONOTIC
-*Salmonella spp* - self-limiting? antibiotics may create carrier states
use antibiotics if presence of shock, fever, dehydration, bloody diarrhea, extreme depression, Baytril or SMZ-TMP x 7-10d
-*Campylobacter spp*-organisms difficult to isolate
erythromycin (x 7d) may have anorexia and vomiting as side effect, Baytril or doxycycline may also be effective
-*Clostridium perfringens*-part of normal gut flora
Amoxi, ampicillin, Flagyl, tylosin, tetracycline,self-limiting chloramphenicol –standard dosages x 5-7d
-*Clostridium difficile*: metronidazole or tetracycline
(note: *C. botulinum* is the bacteria which causes botulism)

5. Medications-stop, reduce dosage, or change medication
some dewormers, antibiotics, vaccinations, etc

6. Parasites – preferable to diagnose specific parasite
-internal and external parasites need to be treated
(external -> stress -> D)
-appropriate dewormer, sulfa antibiotics may also treat coccidia
-consult exotic formulary for species dosages
-Panacur, Pyrantel pamoate, Ivermectin, Baycox, Albon/sulfa drugs, Droncit (praziquantel), Metronidazole (Giardia)

7. Metabolic-symptomatic treatment unless more involved testing performed
-maldigestion/malabsorption-e.g. Vital, Ensure, Electramine, easily digestible diet, digestive enzymes-Prozyme, Pancrezyme, Viokase

8. Foreign bodies-rehydration, small amounts of food if not obstructed, time, +/- surgery if obstructed (abd pain, fever, vomiting, no feces, weakness)
(rabbits are unable to vomit due to their anatomy so watch for other signs, especially hairballs in admitted adults)

9. Alternative/supplemental treatments-homeopathics, herbals, gas relief, Panacur/Barium/Sucralfate to coat gut's lining
water-soluble vitamins – B and C (good for stress also)
anti-diarrheal drugs modify motility/fluid absorption/secretion-short-term use (3-5 days)
-loperamide (Imodium)
-Bismuth subsalicylate (Pepto Bismol)-caution
-Kaolin-pectin (old type Kaopectate)

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10. Tips: don't give several remedies at once
    -allow time for each treatment to work
    -keep re-evaluating feces and animal's condition
    -may need repeated fecal checks-do them yourself!
    -gas may be frequent by-product of diarrhea

C. CHRONIC DIARRHEA

1. may indicate more serious underlying condition
   veterinary tests more often required
2. the longer the duration, the longer to resolve diarrhea
3. anti-inflammatories-prednisolone, non-steroidal may be effective-possible ulceration of stomach/gut lining, use cautiously
4. limit type of food-little/no variation, feed smaller amounts more frequently
5. try anti-diarrheal drugs