

FROM EARLY CARE TO LIFELONG HEALTH: DIARRHEA MANAGEMENT IN PUPPIES & KITTENS

Purina Institute Microbiome Forum Round Table 2026



A PANEL DISCUSSION

Acute diarrhea in puppies and kittens is often linked to immature gastrointestinal tract development, parasites, and stress. In the following discussion, a panel of experts reviews effective management modalities, focusing on nutrition and intestinal microbiome support, as well as the ramifications of GI disease and dysbiosis on puppies' and kittens' GI and skin health later in life.*



CAUSES OF ACUTE DIARRHEA

**Jan Suchodolski, MedVet,
Dr. Med.Vet., PhD, AGAF, DACVM
(Chair/Moderator)**

Dr. Jan Suchodolski: How common is acute diarrhea?

Dr. Michelle Van Lienden: In the national guide dog organization where I provide veterinary care, up to 40% of puppies develop diarrhea before six months of age. Some cases are self-limiting, but many require veterinary care.

Dr. Suchodolski: What are common causes of acute diarrhea in puppies and kittens?

Dr. Van Lienden: Acute diarrhea in puppies and kittens may be due to intestinal parasites (for example, coccidia and *Giardia*, and in kittens, *Tritrichomonas foetus*), but it is often linked to delayed development of the gastrointestinal system, with stress also a factor.

Dr. Stefan Unterer: In puppies, the microbiota, immune system, and digestive enzymes are still developing, so the gut is less resilient than in adult dogs. As a result, acute diarrhea in puppies is often multifactorial—diet changes, stress, and even a low-level parasite burden may all contribute.

Dr. Suchodolski: How does the gastrointestinal system change from birth over the first weeks to months of life?

Dr. Van Lienden: Newborn puppies have an immature GI tract. Due to limited acid production, stomach pH is higher, and digestive enzyme activity is low—appropriate for a highly digestible, energy-dense milk diet. Milk—especially the colostrum—provides energy plus immunoglobulins and other bioactive factors that support immune development.

At 3–4 weeks, weaning begins and the GI tract rapidly adapts over the next few weeks: Stomach pH drops due to an increase in acid production, and digestive enzymes become more active.

Dr. Unterer: Puppies and kittens are born with a sterile GI tract, then acquire microbes from the environment. In dogs, the core microbiome is largely established by ~8–10 weeks. If evaluating a dysbiosis index before this period (8–10 weeks of age), the index may appear abnormal, but this reflects normal development.

Early on, some bacteria, for example *Peptacetobacter hiranonis*, are limited, so primary-to-secondary bile acid conversion is minimal. By ~7–9 weeks, bile acid-converting bacteria emerge, secondary bile acids rise, and they help suppress pathobionts (including toxin-producing *C. difficile*), which are typically benign commensals that can become pathogenic under certain conditions. This microbiota maturation also supports gut barrier function.

Dr. Van Lienden: We suspect that in some puppies, they have some difficulties in making this transition so they are a little delayed in their development when it comes to the GI system.



“In puppies, the microbiota, immune system, and digestive enzymes are still developing, so the gut is less resilient than in adult dogs. As a result, acute diarrhea in puppies is often multifactorial—diet changes, stress, and even a low-level parasite burden may all contribute.”

**Stefan Unterer, Dr. Med.Vet.,
Dr. habil, Dipl. ECVIM-CA**

NUTRITIONAL MANAGEMENT OF ACUTE DIARRHEA

Dr. Suchodolski: How do you treat the majority of your puppies with acute diarrhea?

Dr. Van Lienden: We typically start by feeding a therapeutic gastrointestinal diet, which resolves many cases. We often add psyllium husk as well, and within about 3 days, approximately 85% of the puppies have normal stool. Psyllium husk is a prebiotic fiber that supports gut peristalsis and absorbs the excess fluid in the colon.

Sometimes puppies need the GI diet for a longer period—from two weeks even up to 6–10 months of age. A small subset requires a change to a hydrolyzed diet. Hydrolyzed diets are useful in cases of food allergy or intolerance. They are also considered very digestible, so they may help even when there is no allergy.

Dr. Suchodolski: What happens if the hydrolyzed diet does not help?

Dr. Van Lienden: A few puppies do not respond to a hydrolyzed diet, perhaps due to stress playing a larger role, and in some cases the cause is unclear. I have treated some with prednisone, but polydipsia and house-training setbacks can be problematic, and diarrhea may recur after stopping steroids. Loperamide at a dose of 0.08 mg/kg can be given once daily off label, just before bedtime to slow down gut motility at night, so we target nighttime diarrhea. This can buy us some extra time on the diet, which is needed in some cases to resolve the diarrhea. We should avoid Loperamide in herding breeds that have the MDR1 gene mutation.

For cases in which puppies have not improved, we change to an extensively, or ultra-, hydrolyzed diet, which has been consistently effective.

Dr. Suchodolski: What is the difference between hydrolyzed and ultra-hydrolyzed diets?

Dr. Camille Torres-Henderson: The distinction is based on the dalton size of those proteins. Proteins are a series of amino acids that are broken down by digestive enzymes. However, that can trigger recognition by the immune system. By breaking them down into even smaller units or even to the individual amino acid base, they are less likely to be recognized as their original intact protein form.

Dr. Suchodolski: Do you gradually transition from the puppy diet to the GI or hydrolyzed diet?

Dr. Van Lienden: We do not due to the high digestibility of the GI and hydrolyzed diets.

Dr. Suchodolski: What should we consider when choosing a hydrolyzed diet for a puppy?

Dr. Torres-Henderson: We need to consider the nutrient profile and ensure that the diet is meeting the requirements for growth. These are dogs whose intestinal epithelia is potentially in a state of repair from an infection or diarrhea. We need to ensure that they are getting all the nutrients that they need.

The best place to start is often looking at the nutritional adequacy statement on the packaging and ensuring that it says this product is intended for growth or all life stages. For large-breed puppies, choose diets specifically labeled for large-breed growth. The other place we

can look is in the product guides. It helps to become familiar with the various product guides so that we are able to use that information to select an appropriate diet. So we are not just looking for a hydrolyzed diet, but rather a hydrolyzed diet that is appropriate for this particular life stage. However, note that availability of hydrolyzed diets formulated for growth varies around the world.

I also encourage veterinarians to use diet history and response to guide the next step; how a patient responds can point you in the right direction. Even with the same approach, different patients can respond differently.

Diet history helps you make informed choices. For example, if a puppy with acute diarrhea partially responds to a highly digestible but relatively low-fiber diet, consider balancing the diet with psyllium—or switching to a different fiber, if needed. We do not use the same diet or fiber for every patient, but rather we follow the same process of assessing, intervening, and reassessing, and let the patient's response guide what we do next.

Dr. Suchodolski: If the hydrolyzed diet is approved for growth, then we can feed it for an extended period if it is needed, correct?

Dr. Torres-Henderson: Yes, as long as the pet is doing well. Why might we need to change? That can be for a variety of reasons. Sometimes multiple dogs are being fed different diets and that can become complicated. So whether or not we continue a hydrolyzed diet approved for growth for an extended period can be decided on a case-by-case basis.



“We do not use the same diet or fiber for every patient, but rather we follow the same process of assessing, intervening, and reassessing, and let the patient's response guide what we do next.”
Camille Torres-Henderson, DVM, DABVP (Canine/Feline), DACVIM (Nutrition)

Dr. Suchodolski: For fiber supplementation, why psyllium, not inulin or other fibers? What is preferred: husk or ground psyllium? And what dose do you recommend?

Dr. Van Lienden: We use psyllium husk. I do not have experience with inulin or other types of fibers as much. I see very good clinical results with psyllium, particularly when I give it with every meal.

I use a dose of ½ teaspoon to 1 teaspoon per 10 kg BW at each meal (given with each feeding). This means I administer this dose 3 times per day if feeding three meals daily, or 2 times per day if feeding twice daily. I start at ½ teaspoon per 10 kg BW at each meal and have the owner monitor stool quality. If needed, after three days, I increase the dose. Initially I did try to give less, but I did not have the same good results.



“For psyllium husk, I use a dose of ½ teaspoon to 1 teaspoon per 10 kg BW at each meal (given with each feeding). This means I administer this dose 3 times per day if feeding three meals daily, or 2 times per day if feeding twice daily.”

Michelle Van Lienden, DVM

Dr. Torres-Henderson: It is important to recognize that fiber classification can vary across references. For example, psyllium is often described as a soluble fiber, but it contains some insoluble components, and its fermentability may be characterized as low to moderate depending on the source. If psyllium increases gas in a patient, I consider that to be excessive fermentation and may switch to a lower fermentable fiber.

If I need an insoluble fiber, I may use bran or cellulose. Mixed soluble/insoluble fiber blends can also be a good option.

When we say, “add fiber,” the key is choosing the right type to target the goal in that patient. Different clinicians may mean different fiber sources, so I let the patient’s response guide my choice.

As far as a dose, we tend to be a little conservative, and we start low, gradually increasing until we see the desired response. I am always surprised when I increase by an eighth of a teaspoon to a very large dog, and I see a response. It makes me realize even small amounts of fiber can have a big impact.

Dr. Suchodolski: Can you use psyllium as prevention for stress diarrhea?

Dr. Van Lienden: We do and have seen good results with it.

Dr. Suchodolski: A chicken and rice diet is often recommended for adult dogs with acute diarrhea. Are there any concerns with feeding puppies a chicken and rice diet?

Dr. Torres-Henderson: Home-cooked diets often require much larger volumes than kibble. Owners may feed the same volume and inadvertently underfeed calories, leading to weight loss—especially in growing puppies.

Beyond calorie needs, a chicken and rice diet is not complete for growth and can be deficient in vitamin D, calcium, essential fatty acids, and B vitamins. We need diets that support growth and recovery. We can achieve chicken and rice’s typical nutrient profile of low fat, high protein, and high digestibility with commercial complete and balanced highly digestible diets. If volume is a concern during weight gain, I split meals to reduce the load per feeding.

Dr. Suchodolski: What nutritional suggestions would you have for kittens and adult cats? Do you manage them differently?

Dr. Torres-Henderson: In general, I approach them similarly. We need to balance nutrition with what is most likely occurring clinically and remember some cats may not tolerate higher amounts of soluble fiber. Check the label for soluble fiber ingredients and, if needed, choose a different highly digestible diet based on fiber profile—not just “another GI diet.”

We use psyllium in cats, but palatability can be a challenge; diets that already include psyllium may be an easier way to deliver it. If more insoluble fiber is needed, options include bran (sometimes less palatable) or cellulose.

Start with a small amount of fiber and titrate up. To reduce food aversion in cats, avoid mixing the fiber into the main diet. Instead, offer a small portion separately, perhaps a small amount of wet food with fiber mixed in on a separate plate and retry if they refuse at first.

Keep coming back to the “why”: why you are recommending the diet and why it may or may not work. That framework helps you choose the next step and select diets for their profile, not just because they are labeled as GI diets.

“Beyond calorie needs, a chicken and rice diet is not complete for growth and can be deficient in vitamin D, calcium, essential fatty acids, and B vitamins. We need diets that support growth and recovery.”

Dr. Torres-Henderson

Dr. Suchodolski: Is there an ideal ratio of soluble to insoluble fiber?

Dr. Torres-Henderson: Unfortunately we do not have an optimal ratio that we can apply to all dogs and cats. You need to look at the individual patient and their response.

Dr. Suchodolski: Many veterinarians are still recommending canned pumpkin. How does it compare with psyllium?

Dr. Torres-Henderson: Pumpkin contains such a small concentration of fiber, we are actually providing more moisture than fiber. If it helps, there is no reason to change. But if it does not help, it does not mean that the pet is not fiber responsive. It could mean that we just did not give enough fiber.

As a comparison, some of our high-fiber diets can be in the range of 40–50 g total dietary fiber per 1,000 calories. Two tablespoons of psyllium provide approximately 20 g of fiber. Trying to provide 20 g of fiber with canned pumpkin would require approximately three cups. A dog or cat could not possibly eat enough pumpkin to obtain adequate fiber. However, if the pet really likes pumpkin, we could use pumpkin to deliver the fiber by mixing the concentrated fiber into the pumpkin.

INFECTIOUS AGENTS AND ACUTE DIARRHEA

Dr. Suchodolski: We do often find infectious agents in kittens and puppies. When would you treat specifically for them and when would you manage with nutrition?

Dr. Unterer: If a puppy or kitten has diarrhea and parasites are found, I always treat the parasitic infection. That does not mean that the parasite is the only cause in this young animal, but it might be a factor that pushes them over the threshold to developing diarrhea. I would eliminate the parasites, plus address nutrition.

We have an ongoing preventive health study in which we have collected 320 fecal samples from dogs up to one year of age. We see, and prior literature has shown, that about 20–30% of dogs—depending on age—are positive for *Giardia*, for example. These dogs showed no clinical signs and were presented for routine preventive health care. When owners are questioned, only 20% report that fecal consistency is perhaps not ideal. This shows that these parasites are not always the underlying cause of diarrhea.

Dr. Suchodolski: What about bacterial pathogens? We see frequent testing for bacterial pathogens in acute diarrhea cases. Data shows that pathogens are very, very common in young puppies, but they are often independent

of diarrhea. We need to be careful not to overinterpret findings when we find *C. perfringens* or *C. difficile* in very young puppies because in some, they are normal flora. However, veterinarians often want to use antibiotics for acute diarrhea, and pet owners expect it. In the absence of fever or other signs of sepsis, why should we avoid that?

Dr. Unterer: We try to restrict antibiotics because we know as in human medicine with infants that puppies receiving antibiotics often develop an antibiotic-induced GI dysbiosis and have a higher risk for chronic enteropathy and skin diseases later in life.

A study from Greece showed the same was true for kittens—that if kittens received antibiotics during the first year of life, they had a 20 times higher risk for developing chronic GI signs later in life. We have also shown this in Parvovirus puppies and in *Giardia* infection with diarrhea.

“We try to restrict antibiotics because we know as in human medicine with infants that puppies receiving antibiotics often develop an antibiotic-induced GI dysbiosis and have a higher risk for chronic enteropathy and skin diseases later in life.”

Dr. Unterer

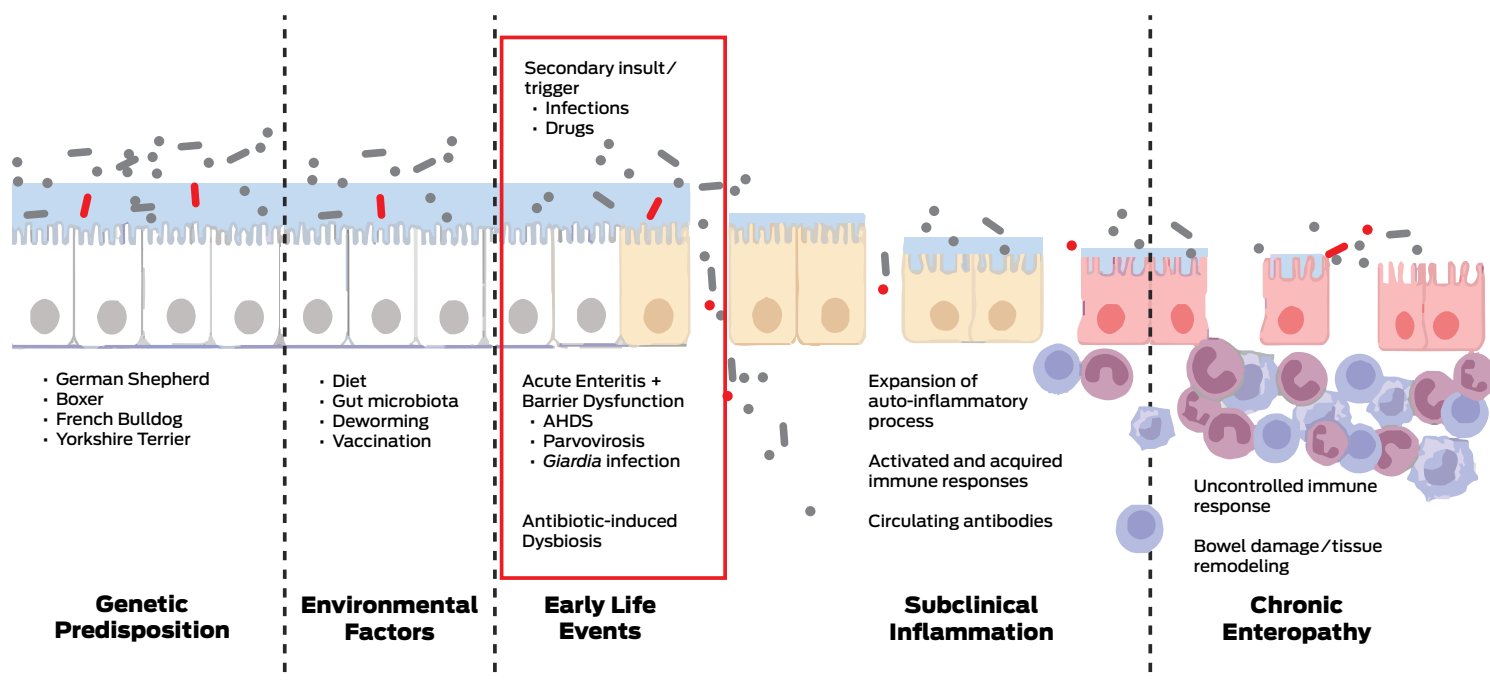


Figure: Pathogenesis of chronic enteropathy in dogs. Note the influence of early life events. Figure created by Stefan Unterer with BioRender.

Accordingly, the administration of antibiotics should be limited, particularly in puppies and young dogs, in which the intestinal microbiota and immune system are not yet fully established. That is an important statement.

We have guidelines in Europe for treatment of diarrhea with antibiotics in adult dogs. I think we should follow the same guidelines or maybe be even more stringent in puppies. This means if there is fever or other signs of sepsis, then antibiotics are indicated. But usually we do not administer antibiotics in a routine diarrhea case.

Dr. Suchodolski: How do you explain to clients that nutritional management, not antibiotics, is indicated? Clients want what they perceive to be a quick fix for the diarrhea.

Dr. Van Lienden: When treating a puppy with acute diarrhea without antibiotics, you need to have a clear conversation with the owner. Show empathy—acute diarrhea can be stressful for families—and set expectations by reviewing the treatment plan and options. With foster puppy families, I explain that this is our first step, and if it does not work, we have a clear escalation plan (e.g., another diet). That reassurance helps.

Dr. Torres-Henderson: It helps to share a clear follow-up plan: This is our first step, this is why it might work, this is why it might not, and this is what we will do next if it does not.

That kind of roadmap reassures families that we are making deliberate choices, not guessing. And it empowers the veterinarian to feel comfortable and confident when discussing the nutritional plan with the pet owner.

I'll also mention that we are not just treating for today, but we are treating for this puppy's future. If I do give antibiotics at this point, how much is that going to shift their microbiome and potentially cause them problems as an adult.

Dr. Suchodolski: If antibiotics are indicated, is it recommended that you add probiotics or other microbiome support at the same time?

Dr. Unterer: For me, especially in the young dog or a kitten, if there is a need for antibiotics, I would address the microbiome because antibiotic-induced dysbiosis might be a concern.

If I can rapidly improve the intestinal microbiota, it might be beneficial. In our clinic, we like to use fecal microbiota transplants.

Dr. Suchodolski: I will add that depending on the product, there are some studies that have shown that when you add a probiotic together with antibiotics, recovery of the microbiome is accelerated. What can we do to protect the gut barrier, limit the amount of damage, and provide the best chances of gut and microbiome recovery when treating Parvovirus since Parvovirus is a risk factor?

Dr. Unterer: We should note that a Parvovirus infection is not always an indication for antibiotics. It again depends if the pet is neutropenic,

which is the driving reason for sepsis. Sometimes there is mild diarrhea because they have antibodies and they do not need antibiotics.

If there is barrier dysfunction, we may be able to prevent overstimulation of the immune system by feeding a hydrolyzed diet. The diet's high digestibility is also a benefit.

Fibers are helpful. Fermentable fibers are broken down to produce short-chain fatty acids, which are an energy source for the intestinal cells in the colon and may support barrier function.

We may be able to accelerate mucosal recovery by improving the microbiome with FMTs or probiotics.

“When treating a puppy with acute diarrhea without antibiotics, you need to have a clear conversation with the owner. Show empathy—acute diarrhea can be stressful for families—and set expectations by reviewing the treatment plan and options.”

Dr. Van Lienden

THE IMPACT OF EARLY GI DISEASE OR DYSBIOSIS ON SKIN HEALTH

Dr. Suchodolski: How could early exposure to antibiotics affect the risk of atopic dermatitis?

Dr. Ana Rostaher: We analyzed this in a blinded, placebo-controlled prospective trial, in which 24 Beagle puppies with atopic dermatitis sensitive to house dust mites (HDM) were allocated into three equal groups: placebo, metronidazole and FMT-treated group. Treatments were administered orally once daily from D1-D90. Video-monitored pruritic behavior, skin lesions, and allergen-specific IgE concentrations were assessed longitudinally. HDM sensitization prevalence was lower in the FMT group (12.5%) during the sensitization phase compared with the other groups (37.5%). Itch bouts after sensitization were significantly reduced in the FMT group compared with the antibiotic group ($p = 0.03$). However, both effects were no longer observed during the challenge phase, several weeks after FMT discontinuation. This pattern supports a time-limited protective effect of FMT on pruritus, acting during immune priming. Lesion scores did not differ significantly among groups at any evaluated time point.

These findings suggest that early-life FMT may attenuate pruritus intensity and allergen sensitization. Further studies are warranted to explore this further.

An additional finding in this study: The dysbiosis index changed markedly in the antibiotic group as compared to FMT and placebo group ($p = 0.0002$), indicating the development of dysbiosis during treatment, which reversed after antibiotic discontinuation, as shown in other studies.



“These findings suggest that early-life FMT may attenuate pruritus intensity and allergen sensitization.”

Ana Rostaher, Dr. Vet.Med., Dipl. ECVD, RCVS

Dr. Suchodolski: So we see patterns similar to those noted in humans, correct? With early life dysbiosis, you have a higher risk for certain chronic diseases later in life. What are the risks or the protective factors that are known for atopic dermatitis?

Dr. Rostaher: We do not know as much as we would like because most of the studies were cross-sectional and questionnaire based. But we have some data which show that being acquired or adopted at a later time after three months or even after six months was a protective factor. Other studies have shown that living in an urban area or having more contact with nature were protective factors. Dogs that have contact with other dogs or farm animals are also more protected. In a birth cohort study, similar to Stefan’s study, where we followed over 100 puppies from the age of a few weeks on, we found that dogs that became allergic often had diarrhea in their early life pointing toward that something is going on in the gut.

We additionally observed that although only a small proportion of dogs were delivered by caesarean section (approximately 14 out of 100 puppies), more than 75% of these dogs subsequently developed atopic dermatitis. This association did not reach statistical significance when compared with the high baseline disease prevalence within the Beagle breed (~50%). However, when the observed prevalence was evaluated

against the expected prevalence of atopic dermatitis in the general dog population (~20%), caesarean delivery was significantly associated with an increased risk of developing atopic dermatitis later in life. Taken together, these findings suggest that caesarean delivery may represent a potential early-life risk factor for development of atopic dermatitis.

Dr. Suchodolski: What is your top take-home message from this discussion?

Dr. Torres-Henderson: In young patients with diarrhea, nutrition should be included as a key component of treatment, using highly digestible complete and balanced diets and targeted fiber while minimizing unnecessary antibiotics and letting the patient’s response guide next steps.

Dr. Rostaher: Early-life factors play a critical role in development of atopic dermatitis. Prevention strategies should therefore focus on the earliest windows of life and be addressed through a collaborative, multidisciplinary approach involving gastroenterologists, nutritionists, behaviorists, and immunologists/allergists. Ultimately, our goal should be to translate these insights into clear, practical guidance that allows clinicians to reduce the risk of disease development before clinical signs emerge, as early-life exposures—including caesarean delivery, antibiotic use, contact with nature, and level of exercise—may represent modifiable risk factors for atopic dermatitis.

“... as early-life exposures—including caesarean delivery, antibiotic use, contact with nature, and level of exercise—may represent modifiable risk factors for atopic dermatitis.”

Dr. Rostaher





PURINA FECAL SCORING CHART

Fecal consistency is primarily a function of moisture in stool and can be used to identify changes in colon health and other problems. In a healthy dog or cat, stools ideally should be firm but not hard, pliable, segmented and easy to pick up (Score 2).

Score	Specimen	Characteristics
1		■ Very hard and dry ■ Often expelled as individual pellets ■ Requires much effort to expel from the body ■ Leaves no surface residue when picked up
2		■ Firm, but not hard; pliable ■ Segmented appearance ■ Leaves little or no surface residue when picked up
3		■ Log shaped; moist surface ■ Little or no visible segmentation ■ Leaves surface residue, but holds form when picked up
4		■ Very moist and soggy ■ Log shaped ■ Leaves surface residue and loses form when picked up
5		■ Very moist, but has a distinct shape ■ Present in piles rather than logs ■ Leaves surface residue and loses form when picked up
6		■ Has texture, but no defined shape ■ Present as piles or spots ■ Leaves surface residue when picked up
7		■ Watery ■ No texture ■ Present in flat puddles

CHAIR/MODERATOR

Jan S. Suchodolski, MedVet, Dr. Med.Vet., PhD, AGAF, DACVM (Chair/Moderator), is Professor and Associate Director of the Gastrointestinal Laboratory at Texas A&M University. He is the Purina PetCare Endowed Chair in Microbiome Research. Dr. Suchodolski has published more than 400 peer-reviewed manuscripts in the field of veterinary gastroenterology and microbiome. He is board-certified in immunology by the American College of Veterinary Microbiologists.

PANELISTS

Ana Rostaher, Dr. Vet.Med., Dipl. ECVD, RCVS, was a senior clinician, researcher, and lecturer at the Vetsuisse Faculty Zurich in Switzerland for 12 years before joining the University of Glasgow in 2025 as a Professor of Dermatology. Research interests include canine atopic dermatitis prevention, feline allergies, allergies to bees and wasps, alopecia, precision medicine, and One Health related to dermatology.

Camille Torres-Henderson, DVM, DABVP (Canine/Feline), DACVIM (Nutrition), is an Associate Professor in Clinical Nutrition at Colorado State University College of Veterinary Medicine and Biomedical Sciences. Her professional interests include clinical nutrition of dogs and cats, obesity management, gastrointestinal and hepatic disease, and advancing the role of nutrition in veterinary education and patient care.

Stefan Unterer, Dr. Med.Vet., Dr. habil, Dipl. ECVIM-CA, is Professor of Small Animal Internal Medicine and Director of the Small Animal Internal Medicine Clinic at the Vetsuisse Faculty Zurich, Switzerland. He is a member of the Comparative Gastroenterology Society, the European Society of Comparative Gastroenterology, and the Society of Comparative Hepatology. Research interests include the intestinal microbiome, acute hemorrhagic diarrhea in dogs, intestinal barrier function, and long-term consequences of acute enteritis.

Michelle Van Lienden, DVM, provides on-site veterinary care for the breeding program, foster puppies, and dog guides in training for the Lions Foundation of Canada Dog Guides. She has initiated a microbiome research study with the Ontario Veterinary College and provides sequential fecal samples to the Texas A&M University Gastrointestinal Laboratory to explore the effect of multimodal treatment on the microbiome.

* Adapted from the live broadcast of the Purina Institute Microbiome Forum Round Table 2026, From Early Care to Lifelong Health: Diarrhea Management in Puppies and Kittens, which is available on demand at [Microbiome Forum Round Table 2026](#).

For more information and a wealth of pet nutrition resources,
visit [PurinalInstitute.com](#) and sign up for scientific communications.

By signing up, you'll receive updates on discoveries in nutritional science, free resources to support you in your nutrition conversations with clients, invitations to events, newsletters, and much more from the Purina Institute.



[PurinalInstitute.com/Sign-Up](#)

Learn more at
[PurinalInstitute.com](#)