Beyond the Gut: How the Health of the GI Microbiome Affects the Health of the Host

Q: What does research tell us about the importance of the gastrointestinal (GI) microbiome in the health of dogs and other species?

A: In dogs, most research has focused on the link between the enteric microbiome and the development and function of the GI tract. However, studies have revealed that the GI microbiome exerts profound effects on nearly every tissue in the body. In addition to its digestive function, the gut works as a sensory organ for the immune system because it is always sampling what’s in the outside world. Everything that enters the mouth is exposed to the gut. The metabolites produced by digestion travel to other parts of the body via the bloodstream and can subsequently activate or suppress inflammatory processes.

Thousands of years ago, Hippocrates said that all diseases begin in the gut, and we now know that he wasn’t far from the truth. In humans, abnormalities in the GI microbiome have been associated with diverse non-GI diseases including asthma, rheumatoid arthritis, obesity, metabolic syndrome, autism spectrum disorder, Alzheimer’s disease, Parkinson’s disease, multiple sclerosis and stroke.1,2

Q: How does an animal’s GI microbiome change over its lifespan? What factors influence these changes?

A: From research conducted in humans and other mammals, it is clear that the development of the GI microbiome in the immediate postnatal and neonatal period is essential to the long-term health of the host. Humans are believed to acquire their first enteric microbes from their mothers and their environment. In the neonatal period, the developing microbiome is unstable, but stabilizes with maturity.3 However, adult microbiomes can still change in response to environmental, nutritional and pathogenic stimuli, with both positive and negative effects.

Adverse changes in the GI microbiome are associated with diseases such as inflammatory bowel disease, acute hemorrhagic diarrhea syndrome and obesity.4 although it is unclear whether changes in the microbiome cause these diseases or are secondary to the disease process itself. Antibiotics can also be devastating to the GI microbiome. While the GI microbiome recovers rapidly after antibiotic administration in most dogs, some suffer from longer-term dysbiosis.5 In terms of positive influences, studies in dogs and other mammals have consistently shown that dietary fiber influences the composition of the GI microbiome.6 Prebiotic fibers are metabolized by beneficial bacteria in the GI tract, producing short-chain fatty acids that promote mucosal health and interact with host immune systems and metabolism. The GI microbiome can also be altered by therapeutic interventions, including probiotics.

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Q: What excites you about the study of the microbiome? What advances might veterinarians anticipate in the future?

A: From an evolutionary perspective, the microbiome is fascinating because it allows us to adapt to changing environmental conditions. Mammalian genomes are static, but the microbial genome in the gut of mammals is continuously changing, helping us to successfully adapt to new environmental conditions. Fiber digestion is a great example. Most mammals lack the genes needed to digest dietary fiber, but some of the microbes in our gut contain those genes in abundance. Their presence makes it possible for us to harvest energy and vital nutrients from otherwise undigestible substrates.

Developing more targeted approaches to probiotic therapy is a very exciting and promising area of research. While we know that certain probiotics are effective in the management of diseases in dogs, it is difficult to predict whether individual dogs will respond positively to probiotic therapy. In the future, we hope to identify biomarkers that will help clinicians understand when to use probiotics and which probiotic supplements are effective for different diseases.
How Prebiotics Support a Healthy Intestinal Microbiome

Over the past decade or more, veterinarians have become comfortable using probiotics to help promote gastrointestinal (GI) health. But could prebiotics fit into your patients’ GI health regimens? How about a combination of both? Following is a brief overview of the tools available to promote GI health and their functions.

Defining probiotics, prebiotics and synbiotics

**Probiotics** are live, beneficial microorganisms (typically bacteria) which, when consumed in adequate amounts, can provide health benefits to the pet. Probiotics can help manage dogs and cats with GI issues by inhibiting pathogens via phagocytosis, thus blocking attachment of pathogens to the intestinal wall and priming the local immune system.

**Prebiotics** are typically dietary fibers that are selectively fermented by beneficial bacteria in the colon, thus promoting growth and metabolic activity of these bacteria. Well-studied prebiotics include inulin, resistant starch and fructooligosaccharides.

**Synbiotics** are a mixture comprising live microorganisms and substrate(s) selectively utilized by host microorganisms that confers a health benefit on the host. There are different types of synbiotics but most are complementary, meaning that the probiotic and prebiotic work independently to achieve one or more health benefits.

How prebiotics function

Prebiotics are broken down or “fermented” by beneficial bacteria predominantly in the large intestine. This fermentation results in the production of short-chain fatty acids, which have positive effects on gut health. Intestinal cells use the short-chain fatty acids, especially butyrate, as an energy source. Since beneficial bacteria can use prebiotics as an energy source, prebiotics in the diet can also help stimulate the growth of beneficial bacteria while inhibiting growth of pathogenic bacteria. Short-chain fatty acids also help lower the intestinal pH, creating an optimal environment for beneficial bacteria to thrive.

Psyllium demonstrates unique prebiotic properties

Prebiotics like resistant starch and fructooligosaccharides, though beneficial, tend to be very rapidly fermented. Negative side effects of that can be flatulence, bloating and loose stools while the intestinal population adjusts to a new fermentation source.

Psyllium, on the other hand, is a unique prebiotic fiber, with properties of both soluble and insoluble fibers. Fiber derived from psyllium has a high water-holding and gelling capacity that may help promote normal stool quality in pets. Prebiotics like psyllium can also increase gastrointestinal microbial diversity.

**Purina® Pro Plan® Veterinary Supplements FortiFlora®** SA Synbiotic Action contains the probiotic Enterococcus faecium SF68®, which has been proven to promote normal intestinal microflora; and prebiotic fiber (psyllium) to stimulate the growth of specific bacteria including Lactobacillus and Bifidobacterium species. The synbiotic action of prebiotics and probiotics helps to manage diarrhea and support a healthy intestinal microbiome.

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Inform Clients About the Benefits of Research-Backed Products That Promote GI Health

While probiotics have long played a role in how I manage pets with GI disease, the increasing receptivity of clients to strategies for improving the health of the gastrointestinal (GI) microbiome, as well as new findings about the benefits of probiotics and prebiotics, have led to an expansion of how and when I recommend these supplements in my practice.

Choosing research-backed options
In recent years, I have seen clients embrace the use of probiotics as a way to promote a healthy GI tract in their pets. A number of clients have volunteered to me that they have given their pets over-the-counter (OTC) probiotics on their own, based on their own positive experience with probiotic products. Knowing this, I have taken a proactive approach to asking clients about supplements they feed or administer to their pets. Most of the time, I discover something new. A surprising number of clients believe they are providing their pets with therapeutic levels of probiotics by feeding them yogurt. It’s important to help them understand that all probiotics and prebiotics are not created equally, and that over-the-counter and human products are no substitute for research-backed products for pets.

An evolving field
My recommendations for probiotics and prebiotics have evolved as new research findings have emerged about their benefits. At the time I graduated from veterinary school in 2011, my recommendations for probiotic administration were largely limited to dogs and cats with acute diarrhea and inflammatory bowel disease, or patients being administered powerful antibiotics. Today we know that the probiotic in Purina® Pro Plan® Veterinary Supplements FortiFlora® Canine and Feline Probiotic Supplements can also promote a strong immune system and enhance palatability. As a result, I use FortiFlora with many of my shelter/adoption cases.

Recently our clinic began recommending Purina® Pro Plan® Veterinary Supplements FortiFlora® SA Synbiotic Action, which contains not only probiotics but also prebiotics. The prebiotics in FortiFlora SA Synbiotic Action increase GI microbial diversity. I am constantly finding more ways that this product can help my patients, and clients have been very receptive to it.

Keep client education simple and straightforward
I keep client education about GI microbiome health simple and direct. I explain that when a pet has diarrhea, the balance of “good” and “bad” bacteria in the GI tract may be upset and that getting that good and bad bacteria back in balance as quickly as possible is an important component of managing the pet’s digestive issue. I explain how the synbiotic action of prebiotics and probiotics manage diarrhea and support a healthy intestinal microbiome, and that the ultimate result will be less mess in the house.

In my Florida practice, we are now able to have patients and clients back in our clinic on a limited basis. However, the need to limit our interactions with clients due to COVID-19 has forced our staff to look for new and effective ways to make the most of the time we have with them in the exam room. I use handouts that explain what we’ve discussed for clients to take home and I offer to email materials if clients prefer. I never want clients to feel rushed, so I always remind them that they can call or email with follow-up questions.

As veterinarians, we’re continually learning more about the importance of GI microbiome health and its relationship to pet health.
THE PROBIOTIC YOU TRUST.
NOW WITH A PREBIOTIC.

Introducing FortiFlora® SA Synbiotic Action, a veterinary-exclusive supplement with the power of FortiFlora® and the added benefit of psyllium.

- Synbiotic action of prebiotics and probiotics to manage diarrhea and support a healthy intestinal microbiome
- Contains the same probiotic strain found in FortiFlora®, proven to promote digestive health
- Contains prebiotic fiber (psyllium) to stimulate the growth of specific bacteria and support a healthy GI microbiome

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