

## **Use of Probiotics: Benefits of a Balanced Microbiome in the Intestinal Tract**

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Dr. Gail Czarnecki-Maulden said that 90% of all cells in the body are bacterial cells, with many residing in the intestinal tract, or gut. There are more than a billion bacteria in a gram of feces, and about half of fecal weight is made up of intestinal bacteria, or microflora. Beneficial varieties such as lactic acid bacteria coexist in the gut with potentially harmful bacteria. Dr. Czarnecki-Maulden defined microbiome as the state of equilibrium between the beneficial and harmful bacteria.

Potentially harmful bacteria in the system include those that produce pathogenic effects, and those that produce inflammatory enterotoxins, which may cause damage to the gastrointestinal (GI) tract. Enterotoxins can exacerbate arthritis in an affected dog, and decrease skin and coat quality, even though the animal does not present with diarrhea. These bacteria also increase the output of putrefactive substances that cause feces to smell. Many putrefactive substances are potentially harmful, Dr. Czarnecki-Maulden said; some have been linked to disease such as colon cancer.

However, beneficial forms of bacteria provide nutrients for intestinal cells by producing short-chain fatty acids, which are the main energy source for the intestine. These bacteria feed the dog's gut by consuming the food the dog eats. This process enhances nutrient absorption, Dr. Czarnecki-Maulden said. Short chain fatty acids have been linked to increases and improvements in mineral absorption. These bacteria also produce a significant amount of vitamins. For example, dogs get almost all of their Vitamin K from their gut microflora.

Dr. Czarnecki-Maulden said beneficial bacteria also promote a healthy immune system, keep the body primed and ready to fight infections, and block attachment of potential pathogens to the intestinal wall by producing toxins to kill the pathogens.

Animals that do not establish a normal microflora environment shortly after birth are much more susceptible to infection, and have poor immune function, more GI upset, poor reproduction, and a shorter lifespan.

Shifts in microflora balance can cause gut instability, resulting in diarrhea and a host of subclinical issues that may make the animal more susceptible to disease. Stress—whether good or bad—as well as travel, changes in environment, diet, or life style, poor nutrition, infection, long-term broad spectrum antibiotic therapy, and aging can all upset the normal balance of intestinal microflora.

Probiotics, which are live beneficial bacteria such as lactobacilli, bifidobacteria, and enterococcus, can restore a healthy, balanced microflora environment. Dr. Czarnecki-

Maulden said that to be effective, a probiotic must be able to survive in the GI tract, do its job safely, and remain stable until consumed.

Probiotics are highly strain-dependent. Researchers at Nestlé Purina Research Center in Switzerland studied 75 different strains of canine lactobacilli. Even though they were all very similar, she said, only 16 had potential probiotic activity. Each probiotic has specific antipathogenic effects, and target different diseases.

In humans, probiotics have been successful when used during or after antibiotic therapy, to prevent diarrhea in children, to treat travelers' diarrhea and inflammatory bowel disease, and, when taken by mothers prenatally, to decrease atopic dermatitis in infants. Unlike antibiotics, she said, probiotics do not produce immediate results, but they do alleviate symptoms over the course of a few days.

Numerous studies have proven the efficacy of the probiotic enterococcus faecium (SF68) in mice, humans, and dogs, Dr. Czarnecki-Maulden said. Researchers at the Nestlé Purina Research Center in Switzerland studied the ability of SF68 to improve the specific anti-giardia immune response in mice. The test group showed enhanced protection over the control group.

In another study, SF68 was tested on humans with diarrhea. After three days, 50% of those in the test group had no symptoms; after four days, 80% had no symptoms. Among the control group, 60% were symptomatic after four days.

From a clinical standpoint, Dr. Czarnecki-Maulden said, probiotics can be used to restore microflora balance in dogs with diarrhea, and to prevent or treat diarrhea associated with long-term antibiotic use. Success has been reported in cases where probiotics have been used with intermittent stress diarrhea and chronic diarrhea that is non-responsive to other therapies or which recurs after antibiotic removal. Probiotics also can be useful in non-clinical applications to help mitigate stress-induced diarrhea in sensitive animals, particularly prior to and during boarding or showing.

Dr. Czarnecki-Maulden cited data showing that bad bacteria tend to increase as a dog ages, while good bacteria decrease. Older dogs also tend to be more sensitive to dietary changes and other stressors.

Several studies conducted by Nestlé Purina have shown the benefits of probiotics, she said. In one, puppies fed a diet supplemented with SF68 had better fecal stability than those in the control group. Results showed that SF68 survives in the gastrointestinal tract, influences microflora balance, and enhances immune function and fecal quality in puppies.

Sources of probiotics include yogurt and supplements. However, not all products on the United States market contain the necessary probiotic cultures to work properly. Dr. Czarnecki-Maulden said a 2003 study of 19 commercial pet foods claiming to contain probiotics found that 75% had inaccurate labels, a number had one or more organisms missing, and several contained potentially pathogenic organisms. The study also found

that canned dog food often remains on the store shelf too long for probiotics to remain alive. Microencapsulation can be used to help bacteria withstand the moisture and temperature fluctuations in canned food.

Dr. Czarnecki-Maulden said product labels should include:

- A guaranteed analysis of the number of live probiotic bacteria at the end of the product's shelf life

- A "best if used by" date

- A list of ingredients that shows the probiotic strain, confirms that it has FDA approval, and states that it has proven efficacy in dogs