Probiotics are live microorganisms that, when administered in adequate amounts, confer a health benefit on the host. The biologic effects of individual probiotics vary and each should be rigorously evaluated in a controlled fashion to define potential clinical utility. The mechanisms of action vary from probiotic to probiotic. Many probiotics help balance the intestinal microflora. Some can inhibit replication of pathogenic bacteria by binding with the organism, producing inhibitory substances, and competing for essential nutrients or receptor sites. Some probiotics can also beneficially influence systemic innate and acquired immunity by inducing cytokine production and natural killer cell activity as well as generating specific and nonspecific immunoglobulin production.

*Enterococcus faecium* SF68 (FortiFlora®, purinaveterinarydiets.com) is one of the most widely studied veterinary probiotic products. In contrast to many products claiming to...
contain probiotics, FortiFlora is one of the few to consistently meet label claims. The following information summarizes several studies completed using this product.

**Immune-Stimulating Effects of FortiFlora**

Feeding FortiFlora to puppies and kittens around the time of their initial vaccinations has been shown to provide a systemic immune-modulating effect. In a study of the response to vaccination in puppies, long-term supplementation with FortiFlora led to increased serum and fecal total IgA concentrations, increased canine distemper virus–specific IgG and IgA serum concentrations, and increased percentage of circulating B lymphocytes. In a study of healthy research cats, increased percentages of T-helper lymphocytes (CD4+) were detected over time in cats supplemented with FortiFlora as compared with untreated controls. These two studies suggested that FortiFlora has an immune-enhancing effect that could be beneficial in the treatment or prevention of infectious diseases.

**Benefits of SF68 for Managing Infectious Diseases**

A number of studies have evaluated Forti-Flora supplementation for management of cats or dogs with infectious diseases:

- **Chronic feline herpesvirus 1 (FHV-1) infection.** FHV-1 is extremely common in cats and is frequently associated with morbidity from recurrent ocular and respiratory disease. In addition, no known drug therapy consistently eliminates the carrier state and vaccination does not provide sterilizing immunity. In a published study, 12 cats with chronic FHV-1 infection were administered either FortiFlora or a placebo. Cats were monitored for clinical signs of disease and FHV-1 shedding, FHV-1–specific humoral and cell-mediated immune responses, and fecal microbiome stability. After an equilibration period, mild stress was induced by changing the housing of the cats from cages to group housing multiple times over a 5-month period. Fecal microbial diversity was maintained throughout the study in cats supplemented with FortiFlora but decreased in cats fed the placebo, indicating a more stable microbiome in cats fed FortiFlora. Cats that received FortiFlora had fewer episodes of conjunctivitis than the placebo group, suggesting that the probiotic lessened morbidity associated with chronic FHV-1 infection exacerbated by stress (Figure 1). It is possible that this finding is related to the T-helper lymphocyte enhancement noted previously.

- **Acute Giardia infection in mice.** Mice administered SF68 and then infected with *Giardia intestinalis* shed fewer trophozoites and less *Giardia* antigen in feces than the placebo group. In addition, supplemented mice had increased CD4+ cells in Peyer’s patches and the spleen as well as increased anti-*Giardia* intestinal IgA and serum IgG as compared with untreated mice.

- **Subclinical Giardia infection in dogs.** When FortiFlora was administered to 10 adult dogs with chronic subclinical *Giardia* infection, they showed no differences in cyst shedding, fecal antigen testing, or fecal IgA concentra-
tions as compared with 10 placebo-treated dogs. In contrast to studied mice, the dogs had been previously infected by *Giardia*, which may have affected the results. In addition, the study lasted only 6 weeks; in the previously discussed puppy study, some of the significant immune-modulating effects were not seen until later in the supplementation period. The results suggest that FortiFlora alone cannot eliminate *Giardia* infection, but the clinical effects of FortiFlora on diarrhea or concurrent administration of targeted drugs were not evaluated.

* Metronidazole with or without FortiFlora for management of nonspecific diarrhea. Dogs housed in animal shelters commonly have diarrhea due to *Giardia* or stress-associated *Clostridium perfringens* overgrowth. Thus, metronidazole is often administered without determining the underlying cause of the diarrhea. In this study, *Enterococcus faecium* SF68 was shown to be resistant to metronidazole; the two products can be administered at the same time. Otherwise healthy stray dogs with diarrhea were all administered a standardized diet and metronidazole (~25 mg/kg q12h x 7d PO). The dogs were randomized into two subgroups; one was administered FortiFlora and the other the placebo. The speed to resolution for FortiFlora-treated dogs was numerically faster than that recorded for placebo-treated dogs (mean = 5.1 d +/- 1.9 d), but the difference was not statistically different ($p = 0.19$). However, FortiFlora-treated dogs had statistically higher percentages of fecal scores of 4 or above than placebo-treated dogs when days 6 and 7 ($p = 0.04$) and days 4 through 7 ($p = 0.025$) were combined (MR Lappin, personal communication, 2013).

* Nonspecific diarrhea in shelter cats. In a recent double-blind study, all cats in one room of a shelter were fed FortiFlora and those in a similar room were fed a placebo for 1 month. After a 1-week washout period, the treatments for the rooms were switched and the study continued for another 1 month. A standardized diet was fed for the duration of the study and a fecal score was determined for every cat housed in the rooms every day. The percentages of cats with diarrhea lasting more than 2 days over the course of the study were calculated; the average was 7.7% for the probiotic group and 20.7% for the placebo group ($p = 0.0297$), which was significantly different (Figure 2).

**Figure 2.** Proportions of cats with diarrhea of more than 2 days’ duration when housed in an animal shelter and supplemented with either FortiFlora or a placebo.

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**Enterococcus faecium** SF68 was shown to be resistant to metronidazole; the two products can be administered at the same time.

**References**