

Probiotics: why vets should carefully assess strain and preparation evidence

PURINA® technical affairs manager, Dr Libby Sheridan MVB MRCVS, takes a look at the benefits of probiotic supplementation for dogs and cats



Probiotics are live microorganisms that, when administered in adequate amounts, confer a health benefit on the host¹, and they can be an additional useful nutritional aid in maintaining gut health in dogs and cats. Some probiotics have also shown a benefit in supporting immune function²⁻⁵.

Probiotics are thought to work via several different modes of action. These include direct competition with pathogenic bacteria in the gut for binding sites or essential nutrients, creation of a hostile environment in the GI lumen for pathogens to grow and immune modulation and enhancement⁶.

Characteristics of beneficial probiotics

Probiotics must have proven efficacy and safety. They must be given in adequate amounts to confer benefits and also be safe in the environment. Beneficial characteristics of a chosen probiotic should include:

- Survival during processing and storage, so that the product on the shelf is fit for purpose
- Resistance to digestion up to the expected action site
- Ability to grow in the GI tract

- Conferring benefits to the host
- Non-pathogenic to the host or other animals/humans

In the veterinary environment, most commercially available probiotics use the lactic acid bacterium *Enterococcus faecium*. However, efficacy of probiotics is thought to be strain specific⁷. Therefore, the clinician should critically assess the evidence for the particular strain and preparation of any probiotic before use, as quality and efficacy can vary. Some probiotics have strong evidence for efficacy in the targeted species, and for others, the evidence is scant. Vitally, the probiotic must be able to reach the expected site of action – the large intestine – intact, and resist digestion up until this point, so there are sufficient numbers of healthy bacteria in place to exert an action. Studies carried out on diets claiming to contain probiotics generally did not meet the label claim when evaluated^{8,9}.

We summarise here recent relevant papers that highlight the efficacy of SF68 in the nutritional support of the immune system and gastrointestinal health in cats and dogs.

STUDIES WITH SF68 FOCUSING ON SUPPORT FOR THE IMMUNE SYSTEM²⁻⁵

Benyacoub J et al (2005). *Enterococcus faecium* SF68 enhances the immune response to *Giardia intestinalis* in mice, *J Nutr* 135(5): 1,171-1,176.

- **Method:** Mice were given either placebo or *E faecium* SF68 for seven days before they were inoculated with *Giardia*.
- **Results:** Mice in the SF68 group had both enhanced humoral immune response (increased production of specific anti-*Giardia* intestinal IgA and blood IgG) and enhanced cellular immune response (increased percentage of CD4+ T cells in Peyer's patches and spleen). The SF68 group also exhibited a significant reduction in active trophozoite numbers in the small intestine as well as decreased shedding of faecal *Giardia* antigens.
- **Conclusion:** The ability of *E faecium* SF68 to stimulate the immune system at both mucosal and systemic levels in this study highlights the mechanisms by which this probiotic antagonises pathogens in vivo and demonstrates the strong potential of strain SF68 to prevent protozoa from causing intestinal infections.

Benyacoub J et al (2003). Supplementation of food with *Enterococcus faecium* (SF68) stimulates immune functions in young dogs, *J Nutr* 133(4): 1,158-1,162.

Time (weeks)	SF68* (OD 450 nm)	Control (OD 450 nm)
0	0.0	0.0
10	0.85	0.65
20	0.80	0.55
30	0.85	0.55
40	0.80	0.45
50	0.75	0.40

Figure 1. Immune response in puppies supplemented or not with SF68

- **Method:** Puppies were fed a daily dose of placebo or *E faecium* SF68 probiotic from weaning to one year of age. They were vaccinated using a live attenuated canine distemper virus (CDV) vaccine at nine and 12 weeks of age. Faecal and blood samples collected at regular intervals were analysed for faecal IgA, circulating IgG and IgA and proportions of lymphoid cell subsets.
- **Results:** Faecal IgA and CDV vaccine-specific circulating IgG and IgA were higher in the probiotic versus the control group. The proportion of mature B cells (CD21+/major histocompatibility complex (MHC) class II+) was also greater in the probiotic group.
- **Conclusion:** These results confirm a supportive effect of *E faecium* SF68 at both mucosal and systemic levels in puppies, which may help improve protective immune responses against various pathogens during the critical weaning period, as well as in later life (Figure 1).

Veir JK et al (2007). Effect of supplementation with *Enterococcus faecium* (SF68) on immune functions in cats, *Veterinary Therapeutics* 8(4): 229-238.

- **Method:** Kittens were given either *E faecium* SF68 with a palatability enhancer or just a palatability enhancer (placebo) daily from age seven-weeks-old for 20 weeks. Response to modified live combination vaccine (for FHV-1, calicivirus and FPV virus) given at nine and 12 weeks of age was monitored.
- **Results:** The percentage of CD4+ lymphocytes was significantly higher in the SF68 group.
- **Conclusion:** The increase in CD4+ lymphocytes demonstrates systemic immune-modulating effects by *E faecium* SF68 probiotic in kittens.

Lappin M et al (2008). Pilot study to evaluate the effect of oral supplementation of *Enterococcus faecium* SF68 on cats with latent feline herpesvirus 1, *J Fel Med Surg* 11(8): 650-654.

- **Method:** 12 cats with chronic FHV-1 infection were administered either *E faecium* SF68 or a placebo daily for 20 weeks. During this period they were group and individually housed and neutered to assess the response to commonly encountered stressors. Cats were monitored for clinical signs of disease, FHV-1 shedding and FHV-1 specific humoral and cell-mediated immune responses and faecal microbiome stability.
- **Results:** Administration of *E faecium* SF68 lessened morbidity associated with chronic FHV-1 infection in some cats and also helped maintain faecal microbial diversity (which declined in cats fed placebo – probably due to mild stress caused by neutering and housing relocation). Detection of numerically or statistically decreased percentage conjunctivitis in two *E faecium* SF68 supplemented cats during the supplementation period when compared to the equilibration period and the detection of significantly less percentage conjunctivitis in the *E faecium* SF68 supplemented cats compared to placebo-supplemented cats within the supplementation

period – but not within the equilibration period – suggest that *E faecium* SF68 exerted a treatment effect.

- **Conclusion:** *E faecium* SF68 probiotic may be beneficial in the management of cats with chronic FHV-1 infection.

Period of supplementation	Control (% incidents of conjunctivitis)	SF68* (% incidents of conjunctivitis)
Period of supplementation	35	22

Figure 2. Incidents of conjunctivitis during the period of supplementation

STUDIES WITH SF68 FOCUSING ON SUPPORT FOR THE GASTROINTESTINAL TRACT

Bybee SN et al (2011). Effect of the probiotic *Enterococcus faecium* SF68 on presence of diarrhea in cats and dogs housed in an animal shelter, *J Vet Intern Med* 25(4): 856-860.

- **Method:** 217 cats and 182 dogs in an animal shelter split into two groups. For four weeks, one group was fed *E faecium* SF68 and the other group was given placebo. After a one week washout, the groups were switched. Faeces from every individual were scored daily.
- **Results:** The percentage of cats with diarrhoea $\geq$ two days in the *E faecium* SF68 group was significantly lower than those in the control groups. Statistical differences between the groups of dogs were not detected, but diarrhoea was uncommon in both groups of dogs.
- **Conclusion:** Results suggest *E faecium* SF68 probiotic may have a beneficial effect on the GI tract of cats with non-specific diarrhoea.

Fenimore A et al (2012). Evaluation of *Enterococcus faecium* SF68 supplementation with metronidazole for the treatment of non-specific diarrhoea in dogs housed in animal shelters, *ACVIM Forum Abstracts* 793.

- **Method:** Shelter dogs with non-specific diarrhoea were split into two groups. All dogs were given metronidazole but dogs in one group were given *E faecium* SF68 and dogs in the other were given a placebo. Treatment was continued for seven days and faeces were scored using a standardised method.
- **Results:** A greater proportion of the *E faecium* SF68 group had faecal scores <3 by day seven (50 per cent versus 29.4 per cent of placebo group). Speed of improvement was quicker for *E faecium* SF68 group (mean 2.8 days versus mean 4.4 days for placebo group).
- **Conclusion:** Supplementation with *E faecium* SF68 probiotic may help speed recovery in dogs with non-specific diarrhoea.

Gore AM and Reynolds A (2012). Effects of *Enterococcus faecium* on stress diarrhea. *ACVIM Forum Proceedings* 453.

- **Method:** Working Alaskan sled dogs (for whom stress diarrhoea is common) were either given *E faecium* SF68 or placebo for seven days upon the occurrence of diarrhoea. Faeces quality was scored.
- **Results:** Diarrhoea improved more quickly in dogs given *E faecium* SF68 versus control and dogs given *E faecium* SF68 had less diarrhoea from day three onwards than the control group. Dogs given *E faecium* SF68 also had significantly fewer days with diarrhoea – improving on average two days sooner than the placebo group. By day four, 92 per cent of the *E faecium* SF68 group had normal stools with 100 per cent resolution by day five, whereas the placebo dogs had slower resolution of clinical signs and none reached 100 per cent resolution within seven days.
- **Conclusion:** *E faecium* SF68 probiotic may be beneficial in the management of stress-related diarrhoea in dogs.

PURINA® Pro Plan® FortiFlora®



PURINA® PRO PLAN® FortiFlora® contains a strain of *E faecium* (SF68) (4b1705) – a lactic acid bacterium that is recognised as a safe, 'friendly' bacteria, and valuable probiotic

FortiFlora® is simple to use – just sprinkle over the pet's food daily



FortiFlora® is available for dogs and cats to help support the nutritional management of:

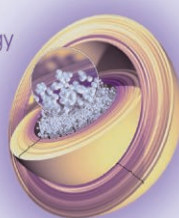
- Gastrointestinal disturbance and loose stools associated with microflora imbalance
- Loose stools associated with stress, antibiotic use or diet change
- Poor faecal quality in dogs and cats of all lifestyles
- Due to its highly palatable formula, FortiFlora® is a great palatability enhancer, helping to encourage fussy or poor eaters

Key Benefits of FortiFlora®

- SF68** Contains a guaranteed level of proprietary microencapsulated strain of viable probiotic (*Enterococcus faecium* SF68) (5 x 10⁸ CFU*/g). The microencapsulation process enhances stability, guaranteeing levels of live beneficial bacteria entering the gastrointestinal (GI) tract.
- PROBIOTIC** Proven to help promote intestinal health and microflora balance. Contains the lactic acid bacteria *Enterococcus faecium* SF68, at levels proven to help support intestinal health and microflora balance in cats and dogs.
- IMMUNE SYSTEM** Helps support a healthy immune system

FortiFlora® Using microencapsulation technology

FortiFlora® uses a proprietary microencapsulation process to conserve and protect the biologically active *E. faecium* SF68. This coating dissolves in the gut, releasing the probiotic where it is needed.



FortiFlora® – Easy to give

FortiFlora® is packaged in single-use sachets each containing *E. faecium* SF68 designed to be sprinkled over the dog or cat's food once daily. Various examples of feeding guidelines are given here.

FEEDING GUIDELINES

One sachet of FortiFlora can be used daily on a long-term basis.

Give 1 sachet of FortiFlora every day, sprinkled on top of the regular food, until at least 1 week after the return to normal stool quality.

To reduce flatulence in cats and dogs, give 1 sachet of FortiFlora every day for at least 2 weeks.

Helps support a healthy immune system, give 1 sachet of FortiFlora every day.

When feeding to restore intestinal microflora balance due to antibiotic use, give 1 sachet of FortiFlora every day during the antibiotic course and for 1 week after the last dose of antibiotic. Ideally, FortiFlora should be given at least 2 hours apart from any antibiotics.

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FortiFlora® table top display units are available (while stocks last). For more information, contact your PURINA® Veterinary Nutrition Partner or telephone the PURINA® Veterinary Nutrition Team on 0800 212161 quoting VETTIMES.