



Conclusion

Bio-Sponge™, an intestinal protectant composed of DTO smectite, may help create an intestinal environment that protects against the harmful effects of microbial overgrowth and toxin production. Bio-Sponge™ may be beneficial in small animals with endotoxemia, enteritis, small intestinal bacterial overgrowth, acute and chronic diarrhea, Parvo virus infection, and food allergies.

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Putting it Into Practice

- Supplement dogs and cats affected by diarrhea with Bio-Sponge™ to help support gastrointestinal health.
- Include Bio-Sponge™ supplementation in the veterinary care of dogs and cats with intestinal disturbances or pathogenic microbial overgrowth.

Bio-Sponge™ for the Intestinal Health and Well-Being of Companion Animals

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Under normal circumstances, a delicate balance exists between the nonpathogenic microflora that normally reside in the intestinal tract and the pathogenic microbes that release toxins and cause clinical disease. Some of the pathogenic organisms that are of concern in small animals are *Clostridium difficile*, *Clostridium perfringens*, *Salmonella* spp., and *Campylobacter* spp.¹⁻³ These microbes have been associated with various conditions, including gastroenteritis, hemorrhagic enteritis, endotoxemia, reproductive disturbances, small intestinal bacterial overgrowth, and chronic and acute diarrhea.^{1,2,4-9} For example, the results of a survey conducted at a small animal hospital indicated that clostridial bacteria were the most commonly identified microbes in dogs and cats admitted with infectious diseases.⁵ Of clostridial isolates, *Clostridium perfringens* is identified most commonly, and the prognosis for survival decreases when *Clostridium perfringens* toxins become systemic.¹⁰⁻¹²

The Pathogenic Bacteria Link

Diarrhea is the predominant clinical feature of most intestinal infections in small animals presented at clinics or hospitals.^{2,3,13} The association between bacterial overgrowth and diarrhea is evident. For example, *Clostridium perfringens* enterotoxin was detected in 45.2% of dogs with diarrhea but in only 25.2% of dogs without diarrhea.¹³ Weese et al. described two dogs with diarrhea due to *Clostridium perfringens* that responded to treatment with antibiotics but then relapsed.¹⁴ *Clostridium perfringens* enterotoxin was only identified in the dog's feces when diarrhea was

present. In a prospective study performed to determine the prevalence of clostridial toxins and enterotoxins among dogs with or without diarrhea,⁶ the same group reported that *Clostridium perfringens* enterotoxin was present in 28% of the dogs with diarrhea but in only 5% of dogs without diarrhea.

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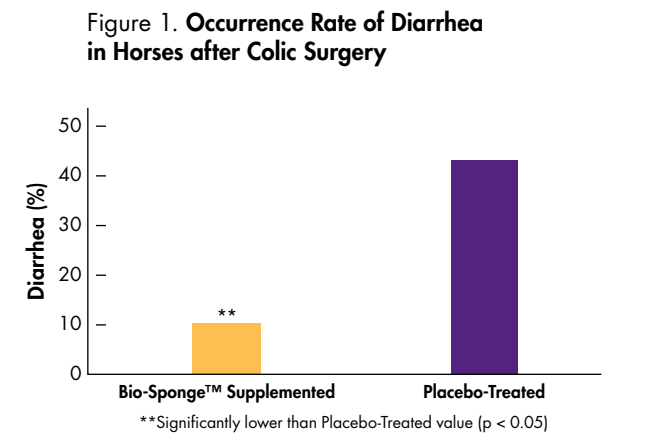
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In addition, *Clostridium difficile* toxin was identified in a significantly larger number of dogs with diarrhea than without. Although the role of *Clostridium difficile* in diarrhea among cats is less well identified, some reports suggest that an association exists between detection of *Clostridium difficile* toxins in fecal samples and the occurrence of diarrhea.⁷ *Clostridium perfringens* has also been implicated in diarrhea among cats.¹⁵ In fact, *Clostridium perfringens* has proven fatal, causing diarrhea and vomiting due to enterotoxemia.¹²

Effective Intestinal Protectant

A variety of intestinal protectants, including the naturally occurring organomaterial, smectite, have been used in an attempt to reduce or prevent the toxic effects of pathogenic microbial overgrowth. Bio-Sponge™, the commercially available Di-Tri-Octahedral (DTO) smectite product manufactured by Platinum Performance Inc., has been reported to bind 99% of *Clostridium difficile* toxins A and B and *Clostridium perfringens* enterotoxins in one *in vitro* study¹⁶ and effectively neutralized *Clostridium*

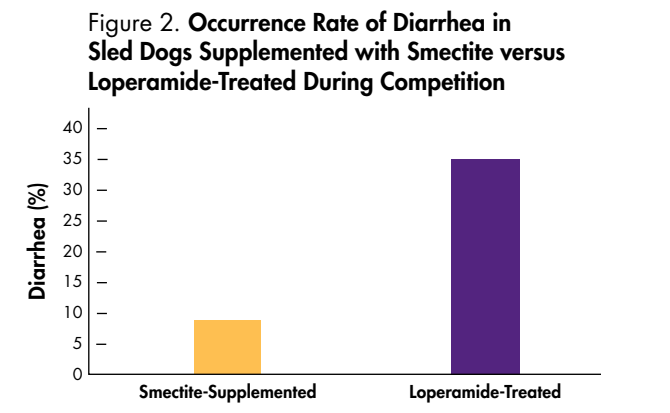


perfringens alpha, beta, and beta-2 toxins in another study.¹⁷ It has been suggested that Bio-Sponge™ is effective because its ionic charge allows it to bind to various toxins,¹⁶ it creates an environment that is not favorable to the growth of clostridial bacteria,¹⁸ or it directly prevents the absorption of toxins by coating the intestinal wall.¹⁸ Due to its ability to bind and neutralize clostridial toxins, Bio-Sponge™ may be particularly useful in animals with intestinal disturbances caused by clostridial organisms.

An *in vivo* study demonstrated Bio-Sponge™ treatment significantly decreased the incidence of diarrhea in adult horses after colic surgery when compared with horses receiving a placebo (Figure 1; adapted from Hassel et al).¹⁹

Consistent Results with Other Animals

Beneficial effects of smectite also have been reported in humans and other animals. For example, in several studies treatment of affected humans has been shown to reduce the duration and severity of diarrhea.²⁰⁻²³ Similarly, administration of smectite to rabbits reduced the destruction of intestinal membrane enzymes that generally occurs in the presence of pathogenic bacteria.²⁴ In addition, treatment with smectite reduced excretion of electrolytes, suggesting administration of smectite would favor water absorption and prevent dehydration commonly seen with pathogenic microbial overgrowth. In guinea pigs, smectite helped maintain normal colonic transit time, fecal moisture, and intestinal permeability after administration of an oral antigen that normally induces digestive



disturbances.²⁵ These findings suggest that smectite may help prevent food allergies. Additionally, smectite significantly reduces colonic inflammation in rats with experimentally-induced colitis, as evidenced by reduced production of the inflammatory marker IL-1beta.²⁶ Smectite treatment also attenuated intestinal disturbances in dogs induced by either cholera toxin or infusion of mannitol.²⁷ Finally, smectite was more efficacious in treating stress-induced diarrhea in sled dogs than the commonly utilized drug, loperamide (Figure 2; adapted from Grandjean et al).²⁸