

**Brain & Cognitive Disorders**

STRESS-RELATED BEHAVIORAL DISORDERS



Stress in pets, as in people, can cause anxiety. Pets may become anxious from exposure to loud noises, separation from the owner (i.e., owner leaving pet alone), new people or pets in the household, or changes in routine.

Chronic stress and subsequent anxiety can affect behavior, as well as gastrointestinal and immune health, and (in cats) lower urinary tract health. Up to 70% of behavioral issues in dogs can be attributed to anxiety. Anxious behaviors in dogs include shaking, excessive barking, destructive behavior, pacing, and repeated lip licking or yawning. Anxious behaviors in cats include house soiling, aggression, and overgrooming.

The gut-brain axis refers to the bidirectional communication occurring between the intestinal tract and the brain. Research has shown that the gut microbiome influences development of the nervous system, brain biochemistry (e.g., neurotransmitter production), response to stressors, and behavior. Certain probiotics, in turn, can modify the gut microbiome, reduce anxiety, and influence behavior. Additional supplements, such as fish and milk-derived ingredients, may also influence behavior; their mechanisms of action are still being explored.

Key Messages

- A placebo-controlled, crossover Purina study showed that supplementing anxious dogs with a probiotic containing the proprietary strain *Bifidobacterium longum* NCC3001 (BL999) reduced anxiety.
 - When supplemented with this probiotic, 90% of dogs exhibited improvement in anxious behaviors in response to day-to-day stimuli, i.e., less barking, jumping, spinning, and pacing.
 - When supplemented with this probiotic, 83% of dogs had lower salivary levels of cortisol, and 75% had lower heart rates in response to anxiety-provoking stimuli, demonstrating less reactivity. Most (83%) supplemented dogs also had greater heart rate variability at this time, indicating a more positive affective state.

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Key Messages (continued)

- Another controlled, crossover Purina study showed that feeding anxious dogs a diet with increased levels of fish oil significantly reduced day-to-day anxious behaviors. When fed this diet, dogs were also less reactive and in a more positive state in response to anxiety-provoking stimuli.
- Supplementing anxious dogs with milk-derived alpha-casozepine or caseinate hydrolysate, fish hydrolysate, or L-theanine or other plant extracts may help reduce some anxious behaviors. However, modifying dietary protein levels and/or levels of the amino acid L-tryptophan to reduce anxiety in dogs is not consistently supported by research.
- In cats, nutritional management of anxiety has not been explored as extensively.
 - Early Purina research has shown the proprietary strain of *Bifidobacterium longum* reduced stress and associated behavior, e.g., pacing, in cats.
 - Other research suggests that alpha-casozepine and L-tryptophan may help reduce anxiety in cats.

Additional Resources

McGowan, R. T. S. (2016, March 31–April 2). "Oiling the brain" or "Cultivating the gut": Impact of diet on anxious behavior in dogs. *Proceedings of the Purina Companion Animal Nutrition Summit: Beyond essential*. Fort Lauderdale, FL, United States, 87–93.

Beata, C., Beaumont-Graff, E., Diaz, C., Marion, M., Massal, N., Marlois, N., Muller, G., & Lefranc, C. (2007). Effects of alpha-casozepine (Zylkene) versus selegiline hydrochloride (Selgian, Anipryl) on anxiety disorders in dogs. *Journal of Veterinary Behavior*, 2, 175–183.

Davis, H., & McGowan, R. T. S. (2021). Effect of *Bifidobacterium longum* 999 supplementation on stress associated findings in cats with FHV-1 infection. *Journal of Veterinary Internal Medicine*, 35(4), 116, NMO1.

The Purina Institute aims to help put nutrition at the forefront of pet health discussions by providing user-friendly, science-based information that helps pets live longer, healthier lives.