



# SHAPING THE INTESTINAL MICROBIOTA COULD HELP OPTIMIZE PETS WELL-BEING



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## INTRODUCTION

In the last decade pet food has experienced a shift toward premiumization and humanization. These strong trends are driven by pet owners which consider their pets to be family members. On the other side, pet food manufacturers, combining pet needs and pet owners' desires have rapidly transferred global food trends from human nutrition to pet food.

According to market research, over 80% of new petfood product launches bear some health-related claims, and 22% digestive claims (source: Innova Market research, Feb. 2017). In fact, gastrointestinal tract (GIT) disorders are some of the most common reasons for veterinary consultations. Beyond GIT disorders there are some other concerns such as optimal nutrition, obesity, immune defense, healthy aging and stress.

Overall, well-being can be described as the main concern of any pet owner. But what wellbeing means and how we can define pet well-being? There are four main principles commonly used to assess animal well-being:

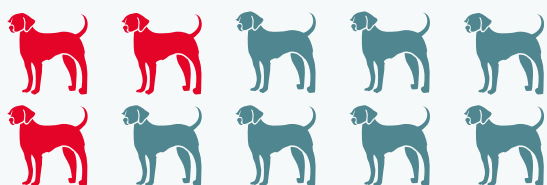
1) good feeding, 2) good housing, 3) good health 4) appropriate behavior.

Some of these parameters can be linked to a central organ which is often underestimated: the gut and its billions of inhabitants: **the microbiota**.

Is there a way to improve pets' well-being by shaping their gut microbiota with natural feed ingredients?



### Did you know?



**29%** of dogs suffer from at least one anxiety or fear issue

(Source: Denenberg et al., 2013. On-line survey of 1201 owners of 1960 dogs in the United States)



### CAUSES FOR ANXIETY IN DOGS

- Separation anxiety
- Noise phobias
- Fear of strangers
- Fear of novelty
- Fear – related aggression



### SIGNS OF GENERAL ANXIETY IN DOGS

- Hypervigilance
- Excessive barking/attention seeking
- Panting when not hot
- Repeated yawning
- Lip licking/body shaking
- House soiling
- Aggression

# 1. THE MICROBIOTA: A KEY PLAYER

The digestive tract of dogs and cats harbours a complex community of microorganisms, called the gut microbiota, that plays a crucial role on the host's overall health. Recent developments in the field of sequencing techniques, with the OMICS revolution, have considerably enlarged our understanding of the microbiota and its potential functions.

The gut microbiota is a dynamic system with great intra- and inter-individual variations. Its three main functions are keys to ensuring the maintenance of the overall health of the host's gastrointestinal tract (Figure 1):

- 1) metabolic function
- 2) protective function
- 3) structural function.

The complex interactions between the microbiota, the host immune system and the host's genetics influence the balance between health and disease. Genetics, age, environment, antibiotics and diet, are some of the factors recognized as affecting the microbiota.

For example, it was shown in dogs that a relatively small amount of dietary fiber was able to detectably change the structure of the gut microbiota.

In the same way, functional ingredients such as prebiotics and probiotics — well documented to influence the microbiota of many species — have shown effects on pets microbiota too as illustrated by a positive study in dogs with live yeast *S. cerevisiae* var. *bouardii* on the prevention of antibiotic-associated diarrhea (Aktas *et al.*, 2007).

Probiotics studies in pets are still scarce, but the amount of literature on the mode of action of many probiotic strains and effects in humans and other mammals are fairly good indicators of their potential for dogs and cats. One can only expect this area of study to grow.

Some GIT disorders, both acute and chronic, are well known to be

associated with alterations of the microbial communities, but it is now increasingly documented that disorders beyond the GIT such as obesity, atopic dermatitis or central nervous disorders, can also be linked to changes in the microbiota. In this context, functional ingredients that are known to influence the microbiota composition such as prebiotics, probiotics and other nutritional interventions could represent alternative approaches to tackle these issues.

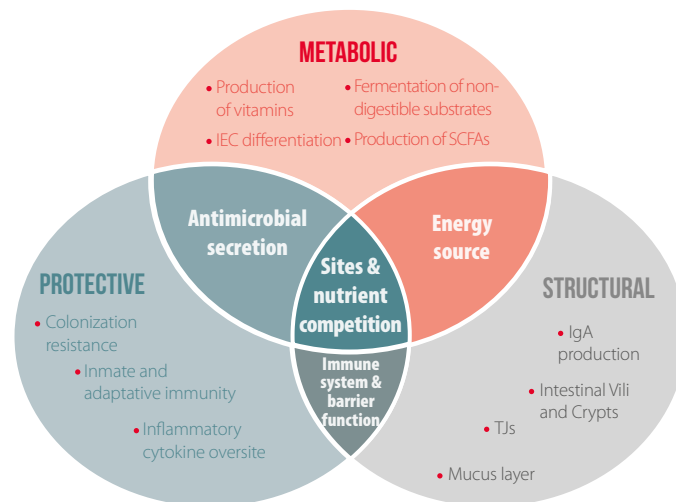
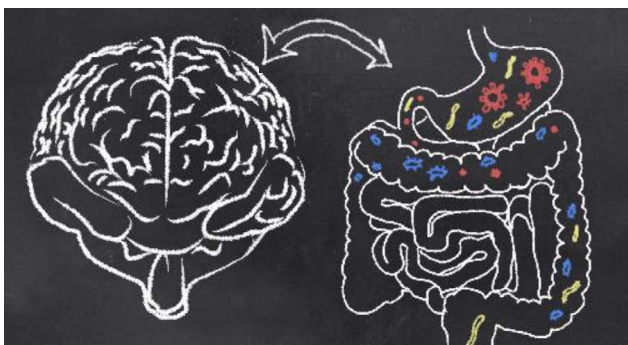


Figure 1  
The three main roles of the digestive microbiota (Grenham *et al.*, 2011)

# 2. THE SECOND BRAIN: CONTROL OF WELL-BEING

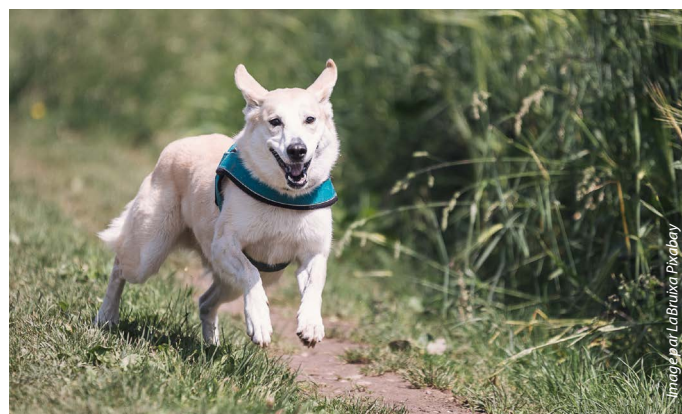


The brain-gut axis: this is certainly one of the newest and most promising areas of research in microbiota and probiotics. In 2013, the team of John Cryan coined the term “psychobiotics” to translate this idea, defining this new class of probiotics as a “live organism that, when ingested in adequate amounts, produces a health benefit in patients suffering from psychiatric illness” (Dinan *et al.*, 2013). In a world where an estimated 29% of pet dogs exhibit signs of anxiety (probably a gross underestimate), and where the great part of up to 70% of dogs' behavioral disorders can be attributed to some form of anxiety (Beata *et al.*, 2007), the psychobiotic approach certainly makes sense for pet well-being too.

The crucial role of the microbiota in the brain-gut communication axis has now been demonstrated, as well as its role in anxiety behavior, in human and rodents. The potential of probiotics to influence this brain-gut axis is a growing field of evidence with first animal study published in 2006 (Zareie *et al.*, 2006). Few years later the first human studies showed a probiotic supplement can effectively alleviate both physiological and psychological symptoms of chronic stress (Diop *et al.*, 2008; Messaoudi *et al.*, 2010). To date, **more than 50 published studies have evaluated the link between probiotics supplementation and the brain-gut axis**, including at least 17 human clinical studies.

A recent study in dogs indicates that 90% of dogs supplemented with the probiotic *Bifidobacterium longum* showed improvement in day-to-day anxious behavior including reduction of barking, jumping, spinning and pacing as compared to a placebo. In addition around 80% showed a decrease in heart rate and an increase in the heart rate variability, indicating a more positive response to

anxiety (McGowan, 2016). Such a preliminary study is very positive in showing a positive effect of probiotics on both behavioral and physiological signs of anxiety in dogs.




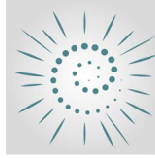




## CONCLUSION

Such studies pave the way for new holistic approaches to modern pets well-being issues by targeting the gut microbiota. Shaping the intestinal microbiota through supplementation with specific functional ingredients could be a way to optimize pets' overall health and, consequently, improve their well-being. Lallemand, an expert in the development of microbial based solutions for animal and human nutrition has developed a platform of natural, research-backed pet nutrition solutions to support immunity, alleviate oxidative stress and support digestive comfort targeting pets well-being (see table below).

The company offers specific technical support and expertise in functional ingredients to help manufacturers formulating pet food and pet supplements to address the growing market demand for pets well-being.

CATEGORIES OF NATURAL MICROBIAL BASED SOLUTIONS AND THEIR POTENTIAL TO TARGET DIFFERENT BENEFITS IN PET NUTRITION					
		DIGESTIVE CARE	IMMUNITY SUPPORT	ANTIOXIDANT OPTIMIZATION	WELL-BEING
Yeast derivatives (e.g. yeast cell walls)		■	■		■
Antioxidants			■	■	■
Heat treated bacteria (also called para-probiotics)		■	■		■
Probiotics	Yeast	■	■		■
	Bacteria	■	■		■

For more information about Lallemand's portfolio of microbial-based solutions for pet nutrition, visit <https://lallemandanimalnutrition.com/en/europe/our-products/species/pet-nutrition/>

### REFERENCES

- Aktas MS, Borku MK, Ozhanlar Y (2007). "Efficacy of *Saccharomyces boulardii* as a probiotic in dogs with lincomycin induced diarrhoea." *Bulletin of the Veterinary Institute in Pulawy* 51, 65-369
- Beata C, Beaumont-Graff E, Diaz C, et al. (2007) "Effects of Alpha-Casozepine (Zylkene) versus selegiline hydrochloride (Selgian, Anipryl) on anxiety disorders in dogs." *J Vet Behav* 2:175-183
- Denenberg S., Landsberg G. M., Blizard T. (2013). Prevalence of fearful and anxious behaviors in dogs in the United States. *Proc. Of the ACVB/AVSAB Veterinary Behavior Symposium*. Chicago, 50-51
- Dinan TG, Stanton C, Cryan JF. (2013) "Psychobiotics: a novel class of psychotropic." *Biol Psychiatry*. 15;74(10):720-6.
- Diop L, Guillou S, Durand H (2008). "Probiotic food supplement reduces stress-induced gastrointestinal symptoms in volunteers: A double-blind, placebo-controlled, randomized trial". *Nutr Res* 28(1) 1-5
- Grenham S, Clarke G, Cryan JF and Dinan TG (2011) Brain-gut-microbe communication in health and disease. *Front. Physio*. 2:94. doi: 10.3389/fphys.2011.00094
- Messaoudi, M., et al. (2010). "Assessment of psychotropic-like properties of a probiotic formulation (*Lactobacillus helveticus* R0052 and *Bifidobacterium longum* R0175) in rats and human subjects." *Br J Nutr* 105(5): 755-764.
- Ragen T.S. Mc Gowan. "Oiling the Brain' or 'Cultivating the Gut': impact of diet on anxious behaviour in dogs." *Nestlé Purina Companion Animal Nutrition Summit 2016*
- Zareie, M., et al. (2006). "Probiotics prevent bacterial translocation and improve intestinal barrier function in rats following chronic psychological stress." *Gut* 55(11): 1553-1560.

**Lallemand Animal Nutrition** is committed to optimizing animal performance and well-being with specific natural microbial product and service solutions. Using sound science, proven results and knowledge, Lallemand Animal Nutrition develops, produces and markets high value yeast and bacteria products - including probiotics, forage inoculants and yeast derivatives. These innovative solutions positively benefit animal nutrition and well-being, forage management and animal environment. Lallemand offers a higher level of expertise, leadership and industry commitment with long-term and profitable solutions to move our partners Forward. Lallemand Animal Nutrition is *Specific for your Success*.

*Not all products are available in all markets nor associated claims allowed in all regions.*

