

Probios® Intelliflora®: A New Paradigm in Probiotics



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Good gut health is the gateway to overall health for companion animals, especially during times of stress. Stress can come in many forms, from overt disease to less obvious challenges, such as kenneling and diet changes. However, the outcome of these stresses typically challenges the gastrointestinal (GI) tract first. A typical result of that stress can be gastroenteritis for the animal. The challenge that industry now faces is creating novel formulations that consider the various components of gut health, thereby helping overall animal health in times of stress.

The GI tract constitutes the major site through which molecules can either be absorbed or secreted and is the largest residence of immune cells as well as microorganisms (GI microbiota) in the body. But the GI tract is also the major physical & immune barrier to pathogens. The GI microbiota has long been of interest because of its involvement in multiple physiological processes in the host, influencing health or disease. The intestine harbors abundant numbers and diverse types of microbiota with at least 10 bacterial phyla identified. Lactobacillus, Bifidobacterium, Enterococcus, and Streptococcus are among the typical Genus found in companion animals.

One approach involved in the wellbeing of cats and dogs is by manipulating the gut microbiota which can be accomplished by using probiotics. Animals evolved a symbiotic relationship with bacteria in which bacteria got food and suitable environment for growth while the host animal also acquired protection against some forms of disease and help with digestive processes. The benefits of probiotics could fall into 2 broad categories: digestive and fighting pathogens. Digestive benefits include mineral absorption, protein and carbohydrate digestion. They produce lactic acid that helps colon pH balance. Probiotics produce required enzymes and B vitamins, especially folic acid and biotin, and vitamin K. All these digestive benefits help the animal maintain appropriate bowel transit time. Probiotics also help the body fight pathogens. Normally there is a delicate balance between pathogenic microbes in the gut and beneficial microbes. Probiotics help maintain the pet's ideal "good" to "bad" bacteria ratio by promoting the optimal environment for the growth of good bacteria and by stimulating the immune system for the host animal.

The use of probiotics in companion animals to reap their benefits has resulted in a wide range of commercial probiotics on the market that are single strain to multiple strain products and with a wide range of concentrations of the probiotics in them. The argument for selling single strain products are that bacteria are inherently competitive and multi-strain will make each other less effective. The companies selling multi-strain products indicate that it is important to take a variety of strains to cover a wide range of possible functions, and single-strain create a detrimental dominance of one species.

While there are elements of truth on both sides, most of the scientific evidence indicate that using multiple strains is better. The inhibitory effect of single bacteria on others has been seen under controlled testing and has helped show how probiotics work to limit pathogenic bacteria. However, the concept has limitation in the complex microbiota of animals. Meta-analysis has shown that multiple strains probiotics seemed to be the most feasible method and the most effective way to prevent necrotizing enterocolitis and mortality rather than a single strain approach (Chang 2016). Multi-strain probiotics are still more effective at dealing with pathogens than single-strain probiotic supplements (Chapman 2011, 2012). Another important point is that multi-strain mixtures can provide synergistic effects. For example, it was demonstrated that the adhesion properties of *B. lactis* were more than doubled when coupled with either *L. rhamnosus* or *L. bulgaricus*. The results of this study suggest that combinations of probiotic strains can have synergistic effects (Ouweland 2000).

One challenge of probiotic administration is that stomach acids can destroy the probiotic before it reaches the intestinal tract. The pH in the stomach is 1.5 – 3.5 depending on the number of hours post feeding. These acidic conditions can be detrimental to the survival of the probiotic that thrive in the intestinal tract (pH 6-7). For example, the efficacious probiotic *Enterococcus faecium* that promotes balanced gut environment survives at a pH of 4.5 and above. Some 30% to 40 % are destroyed in the stomach acids prior to reaching the intestines. *Lactobacillus casei* is another highly efficacious probiotic with anti-diarrheal properties with similar limitation. To compensate for this issue, having sufficient colony forming units (CFU) of these probiotics in the product will help enough of these acid sensitive probiotics get past the stomach acids.

Although there are differences between species and strains, organisms generally exhibit increased sensitivity at pH values below 3.0. Therefore, another strategy used to maximize efficacy is to incorporate a mixture of strains of probiotics in the product that are inherently more resistant to acidic pH. Acid tolerance is accepted as one of the desirable properties used to select potentially probiotic strains. For example, the probiotic *Lactobacillus plantarum* can inherently survive the acidic conditions of the stomach and be very efficacious in the animal. *L. plantarum* helps to ensure that vitamins are getting absorbed by the animal. *Lactobacillus acidophilus* is the most commonly used probiotic and has an acid tolerance. When *L. acidophilus* breaks down food in the intestine, several substances are formed such as lactic acid and hydrogen peroxide that create an unfriendly environment for "bad" bacteria.

An excellent example of a multi strain probiotic for companion animals with sufficient CFU/g of probiotic and with acid resistant strains is Probios® Intelliflora®. It was created keeping in mind the idea that multiple strain probiotic products are going to be more efficacious than single strain probiotic products for companion animals. Probios® Intelliflora® has total lactic acid bacteria of 200 Million CFU/g with beneficial strains of *Enterococcus faecium*, *Lactobacillus acidophilus*, *Lactobacillus plantarum*, *Lactobacillus casei*. Additionally, gastroenteritis results in malabsorption of vitamins and minerals. Probios® Intelliflora® contains vitamins (C and E), beta-carotene, calcium, copper, iron, manganese and zinc. Probios® Intelliflora® helps maintain intestinal health and microbial balance while helping to support a healthy immune system. It is used as a daily supplement to help support proper digestion and to maintain normal stool consistency in dogs and cats. It can be used during diet changes or when boarding the animal and during other times of stress such as traveling.

Besides the traditional uses of probiotics for GI health, a wide range of uses will occur for skin applications, oral health, immune health and even modifying animal behavior via the brain-gut axis. Regardless of the use, multi strain probiotic products like Probios® Intelliflora® will be paving the way.

References.

Chang H-Y, Chen J-H, Chang J-H, Lin H-C, Lin C-Y, Peng C-C (2017) Multiple strains probiotics appear to be the most effective probiotics in the prevention of necrotizing enterocolitis and mortality: An updated meta-analysis. PLoS ONE 12(2): e0171579. <https://doi.org/10.1371/journal.pone.0171579>.

Chapman CM, Gibson GR, Rowland I. Health benefits of probiotics: are mixtures more effective than single strains? Eur. J Nutr. 2011 Feb;50(1):1-17.

Chapman CM, Gibson GR, Rowland I. In vitro evaluation of single- and multi-strain probiotics: Inter-species inhibition between probiotic strains, and inhibition of pathogens. Anaerobe. 2012 Aug;18(4):405-13.

Ouwehand AC1, Isolauri E, Kirjavainen PV, Tölkö S, Salminen SJ. The mucus binding of *Bifidobacterium lactis* Bb12 is enhanced in the presence of *Lactobacillus GG* and *Lact. delbrueckii* subsp. *bulgaricus*. Lett Appl Microbiol. 2000 Jan;30(1):10-3.