

Ingredient Spotlight: Probiotics

What are Probiotic Bacteria?

These are orally administered non-pathogenic bacteria that support the gastrointestinal tract. Probiotic bacteria enhance the microbiome, a complex population of bacteria, viruses, and fungal organisms that reside within the gut.

What do they do?

Remove Pathogens: Probiotics promote intestinal health by competing with pathogenic bacteria for resources and receptor sites. This prevents pathogens from gaining access to the enterocytes. By introducing “good” bacteria into the system there is competition for resources and the pathogenic population has less opportunity to increase rapidly. This gives the body the opportunity to mount a defense. Decreasing the population of pathogens which secrete enterotoxins helps keep these toxins in check.

Immune Support: One way that the immune system is stimulated by the microbiome is through toll like receptors. These receptors are found in the cell membranes of monocytes, macrophages, dendritic cells, neutrophils, B cells, T cells, fibroblasts, endothelial cells, and epithelial cells. They function by detecting foreign material or gastrointestinal imbalance and initiate an immune response to counter it. [1]

The gut is an important mediator for the immune response. Immune modulation by probiotics may be thru exposure of the intestinal epithelial cells to the bacterial cell walls, their metabolic output or their DNA. Good bacteria help to shore up the tight junctions between enterocytes helping to prevent unwanted material from passing into the blood stream. Bacterial metabolites also support the host immune response. Short chain fatty acids, such as butyrate, induce T cell maturation and reproduction resulting in higher levels of IgA through immune system’s toll-like receptors on dendritic cells. Studies have shown that pregnant dogs who are given probiotics have puppies with fewer episodes of gastroenteritis. [2]

Short chain fatty acid production: Probiotics also interact with host cells via their metabolites. Short chained fatty acids are produced by bacterial fermentation of fiber in the colon. Probiotics assist in the production of numerous compounds that are useful to the host. These include short chain fatty acids such as acetate, lactate, propionate and butyrate. Butyrate in particular is important since it is the major fuel source for colonocytes. It also inhibits pro-inflammatory cytokines and affects GI motility. Lactic acid producing bacteria have several benefits.

Butyric acid also lowers colonic pH making it less hospitable to pathogens. Lactic acid serves as a food source for anaerobic butyric acid producing bacteria, resulting in large amounts of butyric acid. This mechanism of cross-feeding may explain why giving lactic acid producing bacteria can be advantageous. Butyric acid has well documented benefits in supporting a healthy inflammatory response. It also reinforces the colonic defense barrier by increasing production of mucins and antimicrobial peptides.

Aid in digestion: Another proposed mechanism for probiotic function is that they support the digestive process. Microbiota organisms produce enzymes that help to breakdown complex sugars to facilitate

uptake in the bowel. Lactobacilli synthesize B vitamins including B3, B5, B6, B7, B9 as well as digestive enzymes, which improves digestibility of food components. Lactobacilli and other enterobacteria also synthesize folate coenzymes. [3] Although the body can often make many of these vitamins, when patient health is compromised they may be less efficient in their production. GI organisms help to support this production making it easier for the body to return to homeostasis.

Produce secondary bile acids: Secondary bile acids are created in the colon when primary bile acids are acted on by colonic bacteria. This transformation of the bile acids helps to manage inflammatory response by downregulating the expression of pro-inflammatory cytokines. There is a lot of interest in how bile acid metabolism affects the body as research shows that dogs with IBD have lower levels of secondary bile acids. [4]

Produce bacteriocins: These are proteins that inhibit closely related bacterial species. Since most pathogens are present as normal commensals in the healthy microbiome, but are not at a level where they cause clinical signs, controlling the population is important. Bacteriocins allow the good bacteria to inhibit proliferation of the pathogens, as well as giving the probiotic bacteria a better opportunity to secure their location by inhibiting competitors. [5]

In summary, probiotics have a positive impact on the immune system, compete for nutrients and other resources with pathogens to help limit proliferation, help to exclude pathogens from receptor site, diminish production of enterotoxins and help to normalize the microbiome.

Adverse effects: Generally considered safe. When the gut is open, there may be bacterial translocation. There is the potential for *Enterococcus faecium* to revert to wild type, but this is generally not recognized.

Potential drug interactions: Separate administration from antibiotics by two hours.

Products with Probiotics: Entero Flora Pro, GI Balance Pro, Fast Balance GI Pro, Canine Multi Pro, Feline Senior Vitality Pro, Perio Support Pro, UT Strength Canine Pro, UT Strength Feline Pro, Acetylator, Fast Balance GI, Perio Plus Feline Bites, Perio Plus Stix, Pinchers, Probiotic Everyday, UT Strength Feline, Vetri Mega Probiotic, Vetri Probiotic BD

References:

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