



ThorneVet Probiotic Support Formula

formerly Bacillus CoagulansVET

ThorneVet's new Probiotic Support Formula combines two stable, soil-based probiotics — *Bacillus coagulans* and *Bacillus subtilis* — with *Saccharomyces boulardii*, the prebiotic fiber inulin, and the gut-friendly amino acid L-glutamine for effective broad-spectrum support of a healthy probiotic population in the gastrointestinal tract.

Provide a foundation for a companion animal's gut health that supports a robust microbiome, down-regulates the inflammatory response, maintains balanced immune function, boosts antioxidant capacity, and promotes the optimal digestion of nutrients.

Key Nutritional Support Features:

- | Two stable, spore-forming soil-based probiotics – *Bacillus coagulans* and *Bacillus subtilis*.
- | *Saccharomyces boulardii* is a non-pathogenic yeast that promotes healthy bacterial colonization and inhibits pathogen overgrowth.
- | The soluble dietary fiber – inulin – promotes the growth of healthy populations of probiotic organisms.
- | The amino acid L-glutamine – a key intestinal nutrient for maintaining a healthy bowel environment

Probiotic Support Formula – Special Nutrients

Foundational Support – Overview

An animal's healthy bowel terrain is of paramount importance in keeping their gastrointestinal tract functioning optimally. A healthy gastrointestinal tract is the foundation of immune system competence, in addition to playing a pivotal role in balancing the neurotransmitters that support good mental health. Unfortunately, many of the things our companion animals are exposed to on a daily basis can have negative impacts on the healthy microbes that reside in their intestine. Dysbiosis – a disruption of the balance of these beneficial organisms – can be caused by processed pet foods, prescription meds, vaccines, pesticides, herbicides, and even electromagnetic field (EMF) pollution. These toxic influences can have both short-term and long-term detrimental effects on the balance of the trillions of healthy microbes – or probiotics – that reside in the animal's intestinal tract.

Either replenishing or maintaining the probiotic population in the intestinal tract supports the healthy balance of these beneficial organisms, while simultaneously preventing the overgrowth of undesirable and even harmful organisms.

Providing probiotic organisms in stable and viable forms is crucial for two reasons. First, it ensures that the probiotic organisms being introduced will survive their pre-administration storage process – while the bugs are in the bottle! Second, it ensures that, once ingested, the probiotic strains will make it past the harsh environment of the animal's stomach acid so they can arrive at the lower intestine, begin to flourish, and exert their beneficial activity there.

In addition, providing a food source – a prebiotic – for the probiotic organisms stimulates, supports, and maintains the vitality of this population. **Inulin**, a polysaccharide-based fiber, is an excellent food source for beneficial probiotic organisms. Finally, providing an amino acid – like **L-glutamine** – helps maintain a healthy bowel terrain that allows for the continuing optimal functioning of a healthy microbiome.

Bacillus coagulans* and *Bacillus subtilis

The bacterial species ***Bacillus coagulans*** and ***Bacillus subtilis*** are probably the most widely studied spore-forming probiotics. The several bacterial species in the Bacillus family are found prevalently in nature (in the soil – hence the common term – soil born organisms or SBOs), and they have found their way beneficially into our food supply and into our bodies. Importantly, sporulated probiotics, such as these two beneficial organisms, are resistant to gastric acid – so they can pass through the stomach intact before entering the intestine in the same concentrations as when they were ingested.¹

After they reach the gut, the Bacillus spores will germinate – predominantly in the jejunum and the ileum – where they can begin to proliferate, grow, and resporulate.² ***B. subtilis*** and ***B. coagulans***, when acting as probiotics, cause a beneficial increase in the total aerobic, lactic acid, and bacteria and spore counts, as well as an accompanying positive decrease in anaerobe and coliform count.³ In the intestine, the presence of these valuable Bacillus species can reduce an out-of-balance inflammatory response by increasing the level of the very helpful short-chain fatty acid, butyric acid, as well as other useful short-chain fatty acids and enzymes.⁴

The two Bacillus strains in **Probiotic Support Formula** also help reduce intestinal permeability – a condition known as “leaky gut.” The gut is meant to be semi-permeable – the mucous lining of the intestines is designed to allow the water and nutrients absorbed from food to pass into the bloodstream. But animals – and people – can have too much intestinal permeability, which means their gut is letting more than just water and nutrients through – they “leak”. Studies have shown that animals who have gastrointestinal problems – both acute problems and chronic problems – can have a leaky gut that lets larger molecules through – including toxic and harmful ones. Part of the job of the intestinal lining is to act as a barrier – to keep these undesirable toxic agents inside the gut, which makes the gut lining an important part of the animal's immune system.

It is now well known that a combination of multiple strains of sporulated probiotic organisms can enhance the treatment efficacy for leaky gut compared to only a single strain. A recent study reported that when participants in a clinical trial with dietary endotoxemia took a probiotic supplement for 30 days that contained five spore-forming species of Bacillus – ***Bacillus indicus*** HU36, ***B. subtilis*** HU58, ***B. coagulans***, ***Bacillus licheniformis***, and ***Bacillus clausii*** – the participants experienced a significant reduction in intestinal permeability as evidenced by significant reductions in their levels of endotoxins, triglycerides, and proinflammatory cytokines.^{5,6}

Supplementation with Bacillus species has been found to increase the immune system's antibacterial, antiviral, and antioxidant activity by down-regulating pro-inflammatory cytokines, potentiating beneficial phagocytosis, and suppressing undesirable reactive oxygen species.⁷ Bacillus species also enhance nutrient digestibility, an advantageous effect probably being influenced by maintaining both a healthy inflammatory response and optimal intestinal permeability – both of which result in a healthy bowel environment and a more optimally functioning digestive tract.⁸

Saccharomyces boulardii

Saccharomyces boulardii (***S. boulardii***) is a strain of yeast that also acts as a probiotic, and it has been found to be safe to use in dogs and cats. ***S. boulardii*** is an ideal probiotic because it can also withstand the stresses of gastrointestinal transit from stomach acid, and it is resistant to all known antibacterial antibiotics, therefore making it effective when given concurrently with an antibiotic treatment.⁹ Randomized, placebo-controlled, double-blinded studies have been reproduced to claim support from meta-analysis reviews that ***S. boulardii*** is an effective biotherapeutic agent for the treatment of antibiotic-associated diarrhea, *C. difficile*-associated illness, and other causes of acute diarrhea in laboratory, human, and veterinary settings.¹⁰ ***S. boulardii*** has been found to reduce the effects of clostridium endotoxins in the intestine, alter cytokines away from a pro-inflammatory state, and to beneficially modulate the immune response.¹¹⁻¹³ Supplementing with ***S. boulardii*** also boosts short-chain fatty acid production (like butyrate), which has a trophic effect (meaning it creates another food source for them) on the other microbes in the intestine that support a healthy probiotic population.¹⁴

L-Glutamine

L-Glutamine is one of the most abundant free-form amino acids in the body and is a major source of nourishment used by intestinal cells.¹⁵ In gut physiology, **L-glutamine** promotes enterocyte proliferation (the cells that facilitate water and nutrient uptake), regulates tight junction proteins (to inhibit leaky gut), suppresses pro-inflammatory signaling pathways, and protects cells against cellular stresses during normal and pathologic conditions.¹⁶ As **L-glutamine** stores become depleted due to metabolic stress, particularly during inflammatory bowel issues, supplementation with **L-glutamine** has been shown to improve clinical outcomes.¹⁶


Inulin

One current definition of a prebiotic is: “a non-digestible compound that, through its metabolization by microorganisms in the gut, modulates composition and/or activity of the gut microbiota, thus conferring a beneficial physiologic effect on the host”.¹⁷ A prebiotic dietary fiber – like **inulin** – acts as a carbon source for primary and secondary fermentation pathways in the colon, and supports digestive health in many ways.¹⁸ Some of the health benefits of a prebiotic fiber like **inulin** range from the production of beneficial metabolites, a reduction in pathogenic bacterial populations, improved immune system function, and beneficial effects on intestinal permeability.¹⁸ **Inulin** as a fiber source can be found in many different foods, especially in artichokes and chicory, as well as in dandelion root and burdock.

By combining the potent, stable, soil-based probiotics **Bacillus coagulans** and **Bacillus subtilis** with the antibiotic-resistant yeast probiotic **Saccharomyces boulardii**, the intestinal amino acid **L-glutamine**, and an effective prebiotic fiber – **inulin** – ThorneVet’s new **Probiotic Support Formula** provides comprehensive support for a healthy bowel terrain and microbiome.



Probiotic Support Formula B. coagulans, B. subtilis, and S. boulardii with prebiotics for a healthy gut


.....
 1 soft chew per 25 pounds body weight daily,
one to two times daily

VSF758-SC / 60 Soft Chews

PRODUCT FACTS	
Active Ingredients per 3-gram Soft Chew:	
Inulin	500 mg
L-Glutamine	200 mg
Total Microorganisms	5 billion CFUs per soft chew
<i>Bacillus coagulans</i>	2 billion CFU's
<i>Bacillus subtilis</i>	2 billion CFU's
<i>Saccharomyces boulardii</i>	1 billion CFU's
Inactive ingredients (soft chew matrix):	
Arabic gum, buffered white distilled vinegar, chick pea flour, chicory root, citric acid, coconut glycerin, coconut oil, guar gum, natural hickory smoke flavor, rosemary extract, sunflower lecithin, sunflower oil, tapioca starch.	



Probiotic Support Formula B. coagulans, B. subtilis, and S. boulardii with prebiotics for a healthy gut

.....
 1 scoop per 25 pounds body weight daily,
one to two times daily

VSF758-P / 60 Scoops

PRODUCT FACTS	
Active Ingredients per 3-cc Scoop:	
Inulin	500 mg
L-Glutamine	200 mg
Total Microorganisms	5 billion CFUs per scoop
<i>Bacillus coagulans</i>	2 billion CFU's
<i>Bacillus subtilis</i>	2 billion CFU's
<i>Saccharomyces boulardii</i>	1 billion CFU's
Inactive ingredients:	
Flaxseed, silicon dioxide.	

THORNEVET

Probiotic_Support_Formula_V01.07.26.23| Copyright 2019, ThorneVet Companion Animal Health Products, LLC, Inc. All rights reserved

References

1. Spinosa MR, Braccini T, et al. On the fate of ingested Bacillus spores. *Res Microbiol* 2000;151:361-368.
2. Casula G, Cutting SM. Bacillus probiotics: Spore germination in the gastrointestinal tract. *Appl Environ Microbiol* 2002;68:2344-2352.
3. Tam NK, Uyen NQ, Hong HA, et al. The intestinal life cycle of Bacillus subtilis and close relatives. *J Bacteriol* 2006;188:2692-2700.
4. Vinolo MAR, Rodrigues HG, et al. Regulation of inflammation by short-chain fatty acids. *Nutrients* 2011;3:858-876. doi: 10.3390/nu3100858.
5. McFarlin BK, Henning AL, Bowman EM, et al. Oral spore-based probiotic supplementation was associated with reduced incidence of post-prandial dietary endotoxin, triglycerides, and disease risk biomarkers. *World J Gastrointest Pathophysiol* 2017;8:117-126. doi: 10.4291/wjgp.v8.i3.117.
6. Marzorati M, Abbeele PVD, et al. Bacillus subtilis HU58 and Bacillus coagulans SC208 probiotics reduced the effects of antibiotic-induced gut microbiome dysbiosis in an M-SHIME model. *Microorganisms* 2020 Jul 11;8(7):1028. doi: 10.3390/microorganisms8071028. PMID: 32664604; PMCID: PMC7409217.
7. Dolin BJ. Effects of a proprietary Bacillus coagulans preparation on symptoms of diarrhea-predominant irritable bowel syndrome. *Methods Find Exp Clin Pharmacol* 2009;31:655-659.
8. Acuff HL, Aldrich CG. Evaluation of graded levels of Bacillus coagulans GBI-30, 6086 on apparent nutrient digestibility, stool quality, and intestinal health indicators in healthy adult dogs. *J Anim Sci* 2021 May 1;99(5):skab137. doi: 10.1093/jas/skab137. PMID: 33940614; PMCID: PMC8158428.
9. Buts JP. Mechanisms of action of biotherapeutic agents. In: Elmer GW, McFarland LV, Suawicz CM, eds. *Biotherapeutic Agents and Infectious Diseases*. Totowa, NJ: Humana Press, 1999;27-46.
10. Buts JP. Twenty-five years of research on Saccharomyces boulardii trophic effects: updates and perspectives. *Dig Dis Sci* 2009 Jan;54(1):15-18.
11. Buts JP, Dekeyser N, Stilmant C, et al. Saccharomyces boulardii produces in rat small intestine a novel protein phosphatase that inhibits Escherichia coli endotoxin by dephosphorylation. *Pediatr Res* 2006 Jul;60(1):24-29.
12. Czerucka D, Dahan S, et al. Saccharomyces boulardii preserves the barrier function and modulates the signal transduction pathway induced in enteropathogenic Escherichia coli-infected T84 cells. *Infect Immun* 2000 Oct;68(10):5998-6004.
13. Dahan S, Dalmaso G, Imbert V, et al. Saccharomyces boulardii interferes with enterohemorrhagic Escherichia coli-induced signaling pathways in T84 cells. *Infect Immun* 2003 Feb;71(2):766-773.
14. More MI, Vandenplas Y. 2018. Saccharomyces boulardii CNCM I-745 improves intestinal enzyme function: a trophic effects review. *Clin Med Insights Gastroenterol* 11:1-14. doi: 10.1177/1179552217752679.
15. Calder P. Glutamine and the immune system. *Clin Nutr* 1994;13:2-8. doi: 10.1016/0261-5614(94)90003-5.
16. Kim MH, Kim H. The roles of glutamine in the intestine and its implication in intestinal diseases. *Int J Mol Sci* 2017 May 12;18(5):1051. doi: 10.3390/ijms18051051. PMID: 28498331; PMCID: PMC5454963.
17. Bindels LB, Delzenne NM, Cani PD, Walter J. Toward a more comprehensive concept for prebiotics. *Nat Rev Gastroenterol Hepatol* 2015;12(5):303-310.
18. Carlson JL, Erickson JM, Lloyd BB, Slavin JL. Health effects and sources of prebiotic dietary fiber. *Curr Dev Nutr* 2018 Jan 29;2(3):nzy005. doi: 10.1093/cdn/nzy005. PMID: 30019028; PMCID: PMC6041804.