EUCLORIS

Feed supplement in powder form for cats and dogs intended to restore gastrointestinal balance

***EUCLORIS <U-CLŎ-RIS**
The name is inspired by the Greek word «εὖ», which means «good» and the Latin word « chlōrĭs » which means « flora »
Liddell HG, Scott R. *An Intermediate Greek-English Lexicon.* Oxford: Clarendon Press; 1889 & Andrews EA, Freund W, Lewis CT, Short C. *A Latin dictionary*. Oxford: Clarendon Press; 1879.

A palatable powder, based on probiotics, prebiotics and plant extracts to be used during acute and chronic gastrointestinal disturbances. *Enterococcus faecium* is a safe and registered probiotic for use in feed with proven effect as gut flora stabilizer. Fructo-oligosaccharides (FOS) display beneficial effects on the large bowel microbial ecology in cats and dogs. Lion's mane mushroom (*Hericium erinaceus*) is a source of immunoregulatory polysaccharides with positive effects on the gut microbiota. Brewer's yeast (*Saccharomyces cerevisiae*) acts as a functional ingredient with potentially positive effects on gut health and immune function. Chamomile has been traditionally used as an antispasmodic, while fennel both as antispasmodic and appetite stimulant. Eucloris may be most beneficial to weaning puppies, geriatric dogs, or those with inflammatory conditions because these populations may have unstable, or undesirable gut microbiota populations and/or compromised immune systems.

Enterococcus faecium

Probiotics have been defined as live microorganisms that when administered in adequate amounts confer a health effect on the host. These health effects are exerted by a direct inhibition to colonization of pathogenic microorganisms or by immune-enhancing effects on gut associated lymphoid tissue, thereby increasing immunomodulating substances.

Enterococcus faecium is a PO-administered probiotic with many proven beneficial effects. For example, in studies of dogs, *Enterococcus faecium* reduced the fecal concentrations of *C. perfringens* but increased levels of the potentially beneficial *Bifidobacteria spp.* and *Lactobacilli* spp[1,2]. In another study, cats fed a placebo had decreased fecal microbiota diversity while cats fed *E. faecium* maintained their diversity when they were subjected to stress[3].

In a double blinded and placebo-controlled study[4] on two hundred and seventeen cats in a shelter, the percentage of cats with diarrhea ≥2 days was significantly lower in the probiotic group (7.4%) when compared with the placebo group (20.7%). The maximum amount of time an individual cat in the study fed the probiotic was 6 days.

The decreased diarrhea rate in the *E. faecium* group was attributed to colonization inhibition effects of the probiotic on the gastrointestinal tract rather than systemic immune enhancing effects.

When administered chronically, this probiotic has been shown to have potential immunomodulating activity in both dogs and cats. Statistically significant increases in mean serum IgA concentrations have been detected in dogs fed *E. faecium* over time when compared with a placebo group[5,6].

Fructooligosaccharides

Fructooligosaccharides (FOS) are a type of prebiotics, along with pectins, inulins, resistant starches, β-glucans, and various others. Prebiotics are ingredients selectively fermented in the gastrointestinal tract to allow specific changes, in the composition, activity, or both in the gastrointestinal microbiota, conferring benefits upon host well-being and health.

Fructooligosaccharides (FOS) display beneficial effects on the composition and metabolism of canine intestinal microbiota, by favoring a shift from putrefactive to saccharolytic fermentations[7]. Indeed, the intake of prebiotics can significantly modulate the colonic microbiota by increasing the number of specific bacteria and thus changing the composition of the microbiota[8]. Prebiotics are metabolized by the resident microbiota of the colon, which, depending on fermentability, will result in the production of the short-chain fatty acids butyrate, propionate, and acetate[8]. These metabolites will diffuse through gut enterocytes and provide either local effects (e.g., enhance the intestinal epithelial barrier, decrease pro-inflammatory cytokines, regulate intestinal motility) or systemic effects (e.g., provide energy for the host)[9,10].

Brewer's yeast (*Saccharomyces cerevisiae* fermentation product)

These yeast cultures produced through yeast fermentation contain fermentation by-products that are not dependent on live organisms for their physiological effects, by definition cannot be catalogued as probiotics and are generally known as yeast fermentation products in the literature.

In one study[11], a *S. cerevisiae* fermentation product (SCFP) was investigated as a dietary supplement for adult dogs and found to act as a functional ingredient, with positive effects on gut health and immune function. SCFP slightly modulated fecal microbiota composition and activity by increasing Bifidobacterium, decreasing Fusobacterium, and decreasing phenol and indole concentrations. Supplementation of SCFP enhanced Th1 responses, but decreased TLR responses and thus, may decrease inflammation. Inclusion of SCFP may also enhance diet palatability.

In a study on fecal characteristics and oxidative stress of dogs undergoing transport stress[12], it was suggested that the benefits of feeding a SCFP during transport may be mediated through suppression of innate immune cell activation. In horses, treatment with SCFP resulted in more robust and stable microbial profiles in horses after stress challenge[13].

Fennel

Fennel based on long tradition has long been used for the relief of pain associated with intestinal spasm in animals[14]. Fennel extract has been shown to increase gastric acid secretion[15] and regulate the intestinal smooth muscle motility[16]. It also improves barrier function of the gastrointestinal tract[17].

Adding fennel seed powder to the diet of many farm animals (goats, calves, pigs, etc.) improved the feed intake and weight gain[18,19].

Chamomile extract

The internal administration of Chamomile to treat gastrointestinal diseases in animals has been documented in Switzerland, Austria, Spain and other countries[20]. In *in vitro* studies, the antidiarrheal, antisecretory and antispasmodic activities that Chamomile possesses are mediated predominantly through K+-channels activation along with weak Ca++ antagonist effect[21].

Lion mane's powder

Hericium erinaceus (HE) or commonly called Lion's mane is one of the well-known medicinal mushrooms. *In vivo* studies[22] suggested that the supplementation of HE could influence the relative abundance of beneficial gut microbiota composition.

Although *H. erinaceus* has various beneficial properties, there are only a few studies on its effects on the health of dogs. The results of a study[23] on the changes in gut microbial abundance induced by diet with *H. erinaceus* in aged dogs support that the intake of *H. erinaceus* improves the immunity of aged dogs and helps body weight control by regulating the gut microbial environment.

References

1. Vahjen W, Manner K. The effect of a probiotic *Enterococcus faecium* product in diets of healthy dogs on bacteriological counts of Salmonella spp. *Campylobacter* spp. and *Clostridium* spp. in faeces. *Arch Anim Nutr* 2003;57:229–233.
2. G.L. Czarnecki-Maulden and C. Cavadini, unpublished data, 2010
3. Lappin MR, Veir JK, Satyaraj E, et al. Pilot study to evaluate the effect of oral supplementation of *Enterococcus faecium* SF68 on cats with latent feline herpesvirus-1. *J Fel Med Surg* 2009;11:650–654.

4. Bybee SN, Scorza AV, Lappin MR. Effect of the probiotic *Enterococcus faecium* SF68 on presence of diarrhea in cats and dogs housed in an animal shelter. *J Vet Intern Med.* 2011; 25(4):856-60.
5. Benyacoub J, Czarnecki-Maulden GL, Cavadini C, et al. Supplementation of food with *Enterococcus faecium* (SF68) stimulates immune functions in young dogs. *J Nutr* 2003;133:1158–1162.
6. Veir JK, Knorr R, Cavadini C, et al. Effect of supplementation with *Enterococcus faecium* (SF68) on immune function in cats. *Vet Ther* 2007;8:229–238.
7. Patra AK. Responses of feeding prebiotics on nutrient digestibility, faecal microbiota composition and short-chain fatty acid concentrations in dogs: a meta-analysis. *Animal.* 2011;5:1743–50.
8. Hussein HS, Flickinger EA, Fahey GC, Jr. Petfood applications of inulin and oligofructose. *J Nutr* 1999;129(7 Suppl):1454S-1456S.
9. Barry KA, Middelbos IS, Vester Boler BM, et al. Effects of dietary fiber on the feline gastrointestinal metagenome. *J Proteom Res* 2012;11(12):5924-5933.
10. Swanson KS, Grieshop CM, Flickinger EA, et al. Supplemental fructooligosaccharides and mannanoligosaccharides influence immune function, ileal and total tract nutrient digestibilities, microbial populations and concentrations of protein catabolites in the large bowel of dogs. *J Nutr* 2002;132(5):980-989.
11. Lin CY, Alexander C, Steelman AJ, Warzecha CM, de Godoy MRC, Swanson KS. Effects of a *Saccharomyces cerevisiae* fermentation product on fecal characteristics, nutrient digestibility, fecal fermentative end-products, fecal microbial populations, immune function, and diet palatability in adult dogs*. J Anim Sci.* 2019;97(4):1586-1599.
12. Wilson SM, Oba PM, Applegate CC, Koziol SA, Panasevich MR, Norton SA, Swanson KS. Effects of a *Saccharomyces cerevisiae* fermentation product-supplemented diet on fecal characteristics, oxidative stress, and blood gene expression of adult dogs undergoing transport stress*. J Anim Sci.* 2023;101:skac378.
13. Ganda E, Chakrabarti A, Sardi MI, Tench M, Kozlowicz BK, Norton SA, Warren LK, Khafipour E*. Saccharomyces cerevisiae* fermentation product improves robustness of equine gut microbiome upon stress. *Front Vet Sci.* 2023;10:1134092.
14. Wynn SG, Fougère B. *Veterinary Herbal Medicine*. Mosby Elsevier; 2007.
15. Vasudevan K, Vembar S, Veeraraghavan K, Haranath PS. Influence of intragastric perfusion of aqueous spice extracts on acid secretion in anesthetized albino rats. *Indian J Gastroenterol.* 2000;19(2):53-6.
16. Forster H. [Spasmolytic effect of plant carminatives. Animal experiment studies]. *ZFA (Stuttgart)*. 1983;59(24):1327-1333.

17. Das B, Rabalais J, Kozan P, et al. The effect of a fennel seed extract on the STAT signaling and intestinal barrier function. Boone DL, ed. *PLoS ONE*. 2022;17(7):e0271045.
18. Kargar S., Nowroozinia F., Kanani M. Feeding fennel (*Foeniculum vulgare)* seed as potential appetite stimulant to newborn Holstein dairy calves: Effects on meal pattern, ingestive behavior, oro-sensorial preference, and feed sorting. *Anim. Feed Sci. Technol.* 2021; 278115009
19. Schöne F, Vetter A, Hartung H, Bergmann H, Biertümpfel A, Richter G, Müller S, Breitschuh G. Effects of essential oils from fennel (*Foeniculi aetheroleum*) and caraway (*Carvi aetheroleum*) in pigs. *J Anim Physiol Anim Nutr (Berl).* 2006 Dec;90(11-12):500-10.
20. Schmid K, Ivemeyer S, Vogl C, Klarer F, Meier B, Hamburger M, Walkenhorst M. Traditional Use of Herbal Remedies in Livestock by Farmers in 3 Swiss Cantons (Aargau, Zurich, Schaffhausen). *Forsch Komplmed / Res Compl Med* 2012; 19 (3): 125–136
21. Mehmood MH, Munir S, Khalid UA, Asrar M, Gilani AH. Antidiarrhoeal, antisecretory and antispasmodic activities of *Matricaria chamomilla* are mediated predominantly through K(+)-channels activation. *BMC Complement Altern Med.* 2015;15:75
22. Yang Y, Ye H, Zhao C, Ren L, Wang C, Georgiev MI, et al. Value added immunoregulatory polysaccharides of *Hericium erinaceus* and their effect on the gut microbiota. *Carbohydr Polym.* 2021;262:117668
23. Cho H-W, Choi S, Seo K, Kim K H, Jeon J-H, Kim C H, Lim S, Jeong S, Chun J L. Gut microbiota profiling in aged dogs after feeding pet food contained *Hericium erinaceus*. *J Anim Sci Technol* 2022;64(5):937-949.