Research: The Impact of Digestive Shield™ on Digestive Health, Immune Health, and Inflammation

Digestive Shield™ is a proprietary dietary blend of pre-, pro-, and postbiotics, marine calcite, and controlled starch to support a horse's gut and immune health. Each of these components can individually support gut and/or immune health, and when combined, these ingredients work synergistically to promote gut and immune health as well as reduce whole body inflammation in healthy horses.

Background

Prebiotics are types of fibers that beneficial bacteria in the digestive tract preferentially ferment. Fructooligosaccharides (FOS), including inulin, help stabilize the intestinal microflora in horses, especially during dietary changes [1], indicating that FOS can mitigate microbial disturbances in the hindgut. Additionally, FOS can buffer the effects of starch overload, thereby reducing the risk of digestive disturbances by maintaining a stable microbial environment and pH balance in the hindgut [1, 2]. FOS has also been associated with increased levels of immunoglobulins in blood [3] and in the intestines [4], indicating an enhanced immune response and readiness.

Probiotics are living microorganisms that can be added to a horse's diet that impart benefits on gastrointestinal and immune health. In general, probiotics help stabilize the microbiome, helping maintain cecal pH even when horses are fed high-concentrate diets [5]. Probiotics like *Enterococcus faecium* can improve fiber digestibility [6], and a combination of *Lactobacillus casei, Bifidobacterium bifidum,* and *E. faecium* improved mineral and fat digestibility when fed to mature geldings [7]. Additionally, *Lactobacillus acidophilus* combined with other probiotic strains can help maintain mucosal integrity and modulate local immune responses [8].

A postbiotic is the combination of inanimate microorganisms, both intact and cell well fragments/structures, and their metabolites that when fed back to an animal confer a health benefit. A particular postbiotic known as *Saccharomyces cerevisiae* fermentation products (SCFP) can positively impact the horse's digestive tract by improving fiber digestibility and stabilizing the gut microbiota [9, 10] and modulate early immune responses [11, 12]. Additionally, SCFP can reduce markers of inflammation in horses after an inflammatory challenge [13, 14] and mitigate exercise-induced stress by reducing cortisol levels and inflammatory cytokines post-exercise [15].

Marine-derived calcite buffers the pH of the equine stomach and hindgut [16, 17], thereby reducing the risk and severity of gastric ulceration [18]. When compared to traditional sources of calcium, it has over twice the buffering capacity [16]. In an internal study, horses fed a pellet containing marine-sourced calcite exhibited higher gastric juice pH levels at 2 and 4 hours post-feeding compared to baseline [19], indicating effective buffering of stomach acid.

High-starch diets alter hindgut microbial populations, shifting bacterial populations away from fiber fermenters [20-23], and increase risk for equine gastric ulcer syndrome (EGUS) [24-26]. Controlling starch and other non-structural carbohydrates to less than 25% of the feed lowers the risk of hindgut acidosis and can reduce gastric ulcer numbers and severity [25, 27].

Digestive Shield™ and Inflammation

Recently, research on Digestive Shield™ was published indicating that it influences inflammatory and immune pathways as well as oxidative stress. In these studies, twenty 2-year-old horses were divided into two groups (n=10 per group) to receive either a control diet (CON) or a diet with Digestive Shield™, and researchers were blinded to diet. One study [28] found that in healthy horses Digestive Shield™ reduced inflammatory mediator tumor necrosis factor (TNF)-α by 34% ($P < 0.05$) and tended to reduce inflammatory mediator interleukin (IL)-6 by 26% ($P < 0.10$) in blood following a submaximal exercise test. The same study found that other key immune mediators IL-8 and IL-18 were greater by 13% and 29% ($P < 0.01$), respectively, in Digestive Shield™-fed horses when compared to controls (Figure 1).

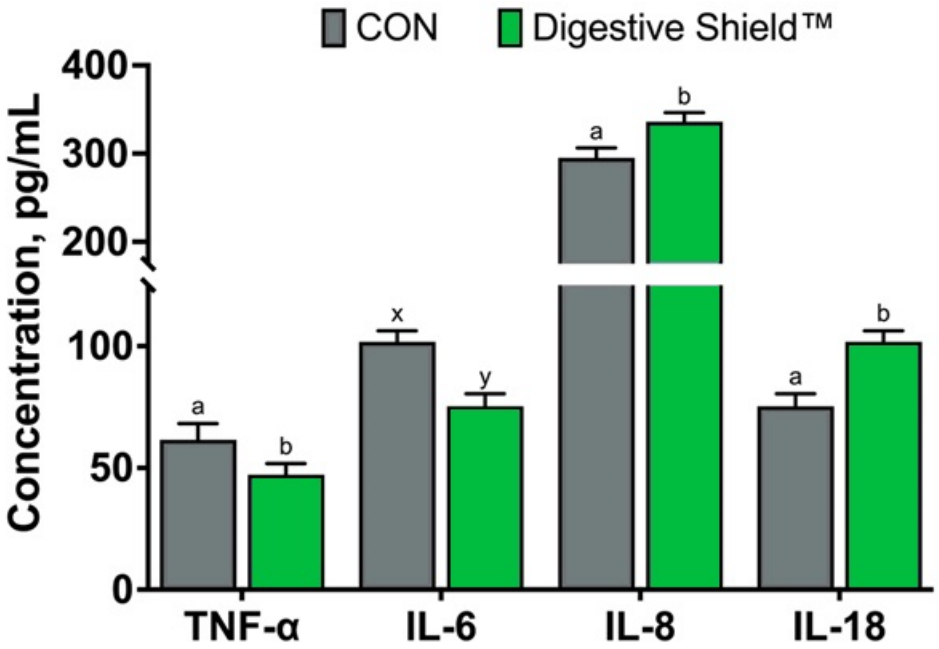

Figure 1. Whole-body inflammation markers in control (CON) and Digestive Shield™-fed horses following a submaximal exercise test [28]. [ab]Means differ ($P < 0.05$) and [xy]means tend to differ ($0.05 < P < 0.10$).

Another study also determined the systemic inflammatory response in healthy horses fed Digestive Shield™ after an antibiotic challenge [29]. In this study, Digestive Shield™-fed horses again had lower inflammatory mediators TNF-α by 49% and IL-10 by 46% ($P < 0.05$ for both) in circulation than controls and did not lower any key immune messengers (Figure 2). TNF-α and IL-6 promote inflammatory processes throughout the body while IL-8 and IL-18 promote immune responses and activation. IL-10 is considered anti-inflammatory but is produced in response to inflammation, indicating that Digestive Shield™ horses had less inflammation in both studies.

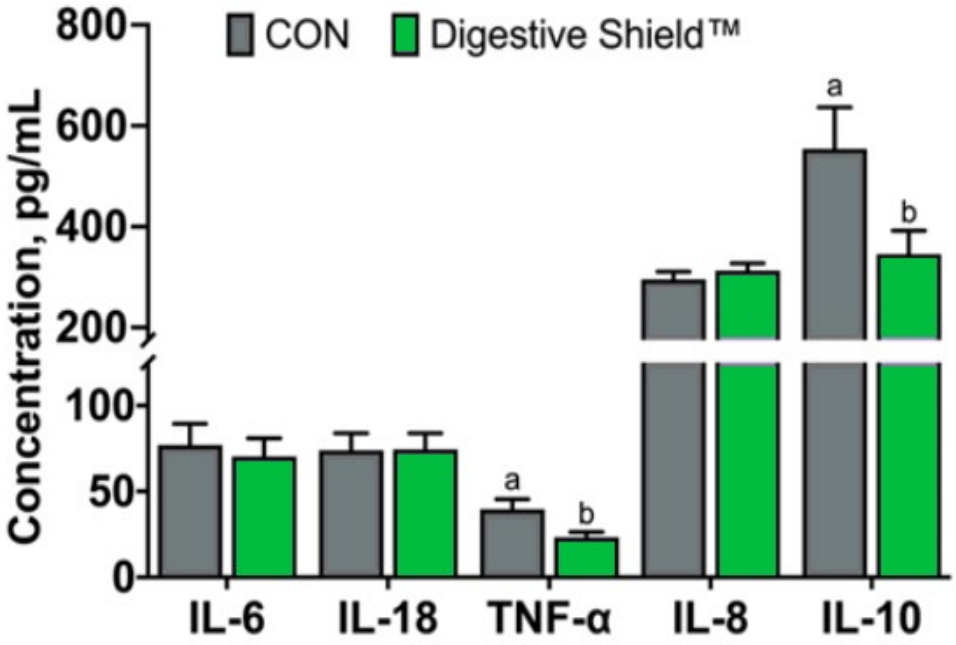

Figure 2. Whole-body inflammation markers in control (CON) and Digestive Shield™-fed horses following an antibiotic challenge [29]. [ab]Means differ ($P < 0.05$).

The reduction in whole-body inflammation is further demonstrated by a reduction in malondialdehyde, a marker for oxidative stress, in healthy, exercised horses fed Digestive Shield™ compared to controls ($P < 0.05$) [30] since less inflammation can help lead to less oxidative stress. While some inflammation can be important in triggering the body's immune response, results from [28] indicate that healthy horses fed Digestive Shield™ may have their immune systems more primed and ready even with a reduction in inflammation. Both studies demonstrate that Digestive Shield™ may help healthy horses reduce whole body inflammation. Since inflammatory markers were reduced in both studies by at least 25% without negatively impacting key immune signaling markers, these results indicate an improved inflammatory response in healthy horses fed Digestive Shield™.

1. Respondek, F., A.G. Goachet, and V. Julliand, *Effects of dietary short-chain fructooligosaccharides on the intestinal microflora of horses subjected to a sudden change in diet.* Journal of Animal Science, 2008. **86**(2): p. 316-23.
2. Berg, E.L., et al., *Fructooligosaccharide supplementation in the yearling horse: effects on fecal pH, microbial content, and volatile fatty acid concentrations.* Journal of Animal Science, 2005. **83**(7): p. 1549-53.
3. Saeidi, E., et al., *Effect of feeding fructooligosaccharides and Enterococcus faecium and their Interaction on Digestibility, blood, and Immune parameters of adult horses.* Journal of Equine Veterinary Science, 2021. **99**: p. 103410.
4. Gürbüz, E., et al., *Effects of supplemental fructo-oligosaccharide and mannan-oligosaccharide on nutrient digestibilities, volatile fatty acid concentrations, and immune function in horses.* Turkish Journal of Veterinary & Animal Sciences, 2010. **34**(1): p. 39-44.
5. Coverdale, J., *HORSE SPECIES SYMPOSIUM: Can the microbiome of the horse be altered to improve digestion?* Journal of animal science, 2016. **94**(6): p. 2275-2281.
6. Coverdale, J., et al., *Influence of prebiotic and probiotic supplementation on apparent digestibility in mature geldings at maintenance.* J. Anim. Sci, 2013. **91**: p. 565.
7. Swyers, K.L., et al., *Effects of direct-fed microbial supplementation on digestibility and fermentation end-products in horses fed low-and high-starch concentrates.* Journal of Animal Science, 2008. **86**(10): p. 2596-2608.
8. Collinet, A., et al., *Multidimensional approach for investigating the effects of an antibiotic–probiotic combination on the equine hindgut ecosystem and microbial fibrolysis.* Frontiers in microbiology, 2021. **12**: p. 646294.
9. Morgan, L., et al., *Effect of yeast culture supplementation on digestibility of varying forage quality in mature horses.* Journal of Equine Veterinary Science, 2007. **27**(6): p. 260-265.
10. Ganda, E., et al., *Saccharomyces cerevisiae fermentation product improves robustness of equine gut microbiome upon stress.* Frontiers in Veterinary Science, 2023. **10**: p. 1134092.
11. Lucassen, A., C. Finkler-Schade, and H.-J. Schuberth, *A Saccharomyces cerevisiae fermentation product (Olimond BB) alters the early response after influenza vaccination in racehorses.* Animals, 2021. **11**(9): p. 2726.
12. Lucassen, A., et al., *Feeding a Saccharomyces cerevisiae fermentation product (Olimond BB) does not alter the fecal microbiota of thoroughbred racehorses.* Animals, 2022. **12**(12): p. 1496.
13. Martinez, R.E., et al., *Responses to an intra-articular lipopolysaccharide challenge following dietary supplementation of Saccharomyces cerevisiae fermentation product in young horses.* Journal of animal science, 2021. **99**(10): p. skab272.
14. Moore, G.E., et al., *Influence of dietary Saccharomyces cerevisiae fermentation product on markers of inflammation and cartilage metabolism in young exercising horses challenged with intra-articular lipopolysaccharide.* Translational Animal Science, 2025. **9**: p. txaf042.
15. Valigura, H.C., et al., *Dietary supplementation of a Saccharomyces cerevisiae fermentation product attenuates exercise-induced stress markers in young horses.* Journal of Animal Science, 2021. **99**(8): p. skab199.
16. Moore-Colyer, M., D.M. O'Gorman, and K. Wakefield, *An in vitro investigation into the effects of a marine-derived, multimineral supplement in simulated equine stomach and hindgut environments.* Journal of Equine Veterinary Science, 2014. **34**(3): p. 391-397.
17. Liburt, N., et al., *68 Effect of a marine-sourced calcium on fecal pH in horses.* Journal of Equine Veterinary Science, 2021. **100**: p. 103531.
18. Moir, T., et al., *The influence of feeding a high calcium, algae supplement on gastric ulceration in adult horses.* Journal of Applied Animal Nutrition, 2016. **4**: p. e8.
19. Cargill, *Digestive pellet effects on gastric ulcer scores and stomach acid buffering: A field trial*. 2021, Cargill Animal Nutrition.
20. Raspa, F., et al., *Microbiota characterization throughout the digestive tract of horses fed a high-fiber vs. a high-starch diet.* Frontiers in Veterinary Science, 2024. **11**: p. 1386135.
21. Grimm, P., C. Philippeau, and V. Julliand, *Faecal parameters as biomarkers of the equine hindgut microbial ecosystem under dietary change.* Animal, 2017. **11**(7): p. 1136-1145.
22. De Fombelle, A., et al., *Characterization of the microbial and biochemical profile of the different segments of the digestive tract in horses given two distinct diets.* Animal Science, 2003. **77**(2): p. 293-304.
23. Julliand, V., et al., *Feeding and microbial disorders in horses: Part 3 - Effects of three hay:Grain ratios on microbial profile and activities.* Journal of Equine Veterinary Science, 2001. **21**(11): p. 543-546.
24. Reese, R.E. and F.M. Andrews, *Nutrition and dietary management of equine gastric ulcer syndrome.* Veterinary Clinics of North America: Equine Practice, 2009. **25**(1): p. 79-92.

25. Colombino, E., et al., *Gut health of horses: effects of high fibre vs high starch diet on histological and morphometrical parameters.* BMC veterinary research, 2022. **18**(1): p. 338.
26. Sykes, B., et al., *European College of Equine Internal Medicine Consensus Statement—equine gastric ulcer syndrome in adult horses.* Journal of Veterinary Internal Medicine, 2015. **29**(5): p. 1288.
27. Irving, J., et al., *Impact of Low-Starch Dietary Modifications on Faecal Microbiota Composition and Gastric Disease Scores in Performance Horses.* Animals, 2025. **15**(13): p. 1908.
28. Lykins, H., et al., *Effects of digestive aid on systemic stress and inflammation in response to exercise in young horses.* Journal of Equine Veterinary Science, 2025. **148**: p. 105454.
29. Brooks, T., et al., *Effect of dietary aid during a 5-day course of antibiotics on systemic and synovial inflammation in young horses.* Journal of Equine Veterinary Science, 2025. **148**: p. 105460.
30. Reiter, A., et al., *Effects of dietary aid on lipid peroxidation and antioxidant capacity after exercise in young horses.* Journal of Equine Veterinary Science, 2025. **148**: p. 105429.