Can Nutrition Be Used to Boost the Immune System?

Lori K. Warren, Ph.D., PAS
University of Florida, Gainesville, FL 32643

Nutrition plays a supportive role in immunity; thus, a balanced diet is critical to mount an appropriate immune response to infection or trauma. Many nutrients have widely-recognized roles in host defense; however, nutrient requirements for horses who are stressed or immunocompromised are not fully known. Owners and farm managers are increasingly interested in holistic approaches to maintaining the health of horses in their care, which has encouraged research on the impact of various nutrients and dietary supplements on immune function. Investigations have typically targeted three populations: performance horses, foals, and horses with compromised or inappropriate immune responses (e.g., senior horses, equine asthma syndrome). Sport horses face many immunosuppressive stressors, including strenuous exercise training, frequent competition, and transport over long distances, including international shipping. This group also has increased exposure to pathogens via contact with outside horses at competition venues. Foals present a different set of challenges which center on delayed onset of adaptive immune responses. Protection against pathogens are provided to the foal through the ingestion of immunoglobulins in colostrum soon after birth; thus, investigations often focus on the diet of the mare as a means to improve colostrum quality. Immuno-nutrition research in horses has typically been inspired by positive outcomes observed in other species. Although a comparatively small body of research has been conducted in horses, several nutrients have been explored, including vitamins (E, C), trace minerals (Zn, Se), amino acids (arginine), and fatty acids (omega-3, omega-6, conjugated linoleic acid). Additionally, prebiotic fibers (oligosaccharides, beta-glucans), probiotics (lactic acid bacteria, live yeast cultures), and non-nutritive dietary supplements (resveratrol, various herbs) have received some attention in equine research. Collectively, the impact of these nutrients and supplements on the status and functional capacity of the immune system have been variable. Differences in study outcomes may be due to high variability in responses among horses, health status, dosage, length and timing of supplementation, basal diet composition, type of immune system challenge evaluated, and immunological variables measured. The latter is often more limited in scope in equine compared to other livestock research, where tissues can be harvested postmortem for more detailed evaluation of response to diet. Instead, equine studies routinely examine changes in “markers” of immunity (e.g., inflammatory cytokines, antibody titers) after a period of supplementation; however, such findings may not directly translate into improved disease resistance, alleviation of clinical signs, or improved health. Ultimately, the study of nutrition’s impact on immunity in horses is in its infancy, with many nutrients and compounds to explore and much to learn.