

allergic diseases. For example, vitamin E is a natural, potent, fat-soluble antioxidant that stabilizes cell membranes and protects against oxidative damage. This antioxidant effect of vitamin E also preserves other vitamins, including the fat-soluble vitamins and the B vitamins. Vitamins A and D decrease the expression of proteins implicated in inflammatory conditions of the skin.²² B vitamins help prevent dull coats, hair loss, ulcers around the mouth, and certain pruritic conditions.²³ In tissues with rapidly dividing cells, such as the skin, zinc has a critical role, in part, because it acts as a cofactor in DNA synthesis and also because it participates in growth and repair of the skin.²⁴ Zinc also has been reported to have anti-inflammatory and immune-enhancing activities.²⁵

Summary

Allergic reactions are characterized by immune-mediated inflammatory responses to allergens that may be ubiquitous in nature. Consequently, allergic reactions can be more than just a nuisance to the horse. While providing a balanced diet is critical, especially as the skin regenerates rapidly and provides the “first line” defense against environmental factors, supplementation of the diet with omega-3 fatty acids, antioxidants, vitamins, trace minerals and immune-enhancing nutrients can provide further protection for the health and well-being of the horse.

Putting it into Practice

- Reduce the intake of feeds having an imbalance between omega-3 and omega-6 fatty acids.
- As a preventive measure against skin and other allergic problems, supplement the horse’s diet with omega-3 fatty acids, trace minerals, vitamins and antioxidants, such as those provided in Platinum Performance™ Equine Wellness and Performance formula.
- During times of high allergen exposure or allergic reactions, supplement the diet with Platinum Vet™ Skin and Allergy formula to provide additional DHA and the immune-enhancing nutrients: purified calf thymus extract and quercetin.

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PLATINUM PERFORMANCE™ EQUINE HEALTH SERIES

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Supplementation for Allergy Support & Coat Health

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An allergy is an immune disorder characterized by hypersensitivity to external substances (allergens) that results in an excessive inflammatory response. Most commonly, allergic reactions affect the skin and respiratory airways in horses and generally result from exposure to molds, spores, insect bites, and certain proteins present in pasture grasses. Due to the ubiquitous nature of allergens, maintaining a healthy immune system is a critical factor in reducing the incidence of allergic reactions in horses. In addition to a balanced diet, supplementation with specific nutrients can help support the immune system and, thereby, reduce the occurrence of common allergies and other immune-related reactions. Platinum Performance’s™ Equine Wellness and Performance and Platinum Vet™ Skin and Allergy formulas are designed to provide essential fatty acids, antioxidants, trace minerals, vitamins, and other ingredients that support normal immune function.

Omega-3 and Omega-6 Fatty Acids

Fatty acids are major constituents of lipid membranes and nervous tissues and are also essential for normal skin structure and function. While there are several different classes of fatty acids, currently there is much interest in the polyunsaturated omega-6 and omega-3 families. Metabolites of the omega-6 fatty acids induce pro-inflammatory responses, which have been linked to various chronic disorders. In contrast, metabolites of omega-3 fatty acids act as anti-inflammatory or “low inflammatory” agents and protect against inflammatory diseases. Although the horse’s fatty acid intake may be adequate to meet its requirements, very often dietary polyunsaturated fatty acids are oxidized and become rancid. These rancid fats lose their nutritional value, impair the absorption of fat-soluble vitamins, adversely

affect feed palatability, and induce additional oxidative stress in the animal. These changes could result in a dull or dry coat, hair loss, scaly skin, a predisposition to infections, allergic reactions such as urticaria or heaves, as well as a myriad of other disorders.

Supplementation with omega-3 fatty acids is currently considered an aid in controlling allergic and other associated immune responses.¹ Omega-3 fatty acids, such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), moderate the immune



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and inflammatory state.² DHA inhibits the lipoxygenase enzyme that synthesizes pro-inflammatory and immune-suppressing leukotrienes, such as LTB_4 -- a key player in skin allergic reactions and bronchial asthma.³⁻⁵ Furthermore, EPA competes with the pro-inflammatory omega-6 fatty acid, arachidonic acid, as a substrate for lipoxygenase, resulting in the production of the anti-inflammatory and immune-enhancing leukotriene, LTB_5 . In fact, dietary supplementation with flaxseed, a plant-based source of omega-3 fatty acids and precursor to both DHA and EPA, decreases LTB_4 and increases LTB_5 .⁶ As evidence of the positive effects of these omega-3 fatty acids, in one study allergic skin reactions to the extract of *culicoides* sp. were reduced in horses after 42 days of flaxseed supplementation.⁷

In addition to regulating leukotriene synthesis, fatty acids control the synthesis and activities of inflammatory-modulating proteins, or cytokines. Several of these cytokines have been implicated in the severity and prevalence of allergic reactions. For example, tumor necrosis factor-alpha ($TNF-\alpha$) has been identified as a factor in the persistence of the inflammatory response in heaves-affected horses.⁸ Furthermore, there is a higher prevalence of increased concentrations of $TNF-\alpha$ and interferon-gamma ($IFN-\gamma$) in horses with heaves when compared to control horses.⁹ Lastly, in a model simulating exercise-induced asthma in people, bronchoalveolar lavage fluid concentrations of interleukin-6 (IL-6) increase 3-fold higher when horses were exercised in the cold than when they were exercised in a warm environment.¹⁰

To evaluate the effects of supplementation with Platinum Performance™ Equine Wellness and Performance on cytokine production, researchers at the University of California at Davis compared cytokine gene expression in horses fed a mixed-grain and hay diet to horses fed a hay diet supplemented for 6 weeks with Platinum Performance. Expression of genes for $TNF-\alpha$ (Figure 1) and IL-6 (Figure 2) were lower by 69% and 85%, respectively, in the Platinum Performance-supplemented horses when compared with the non-supplemented horses. In addition, an observational study conducted by this same group demonstrated that horses consuming a hay diet supplemented with Platinum Performance had lower $IFN-\gamma$ and $TNF-\alpha$ gene expression when compared to horses eating other feeds (data not shown).

Figure 1. **$TNF-\alpha$ gene expression among horses consuming a hay diet supplemented with Platinum Performance™ vs. horses consuming a mixed-grain and hay diet**

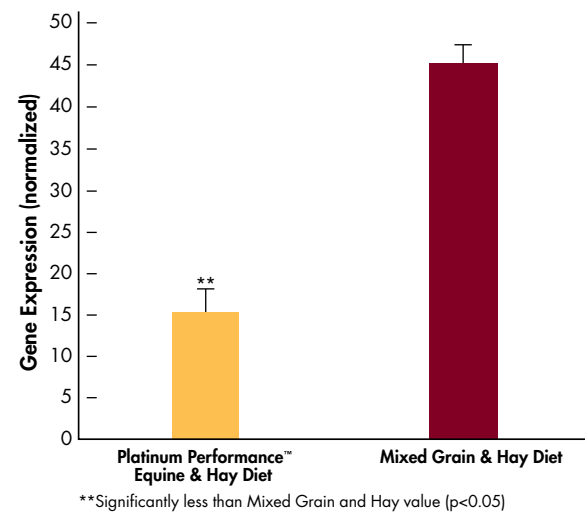
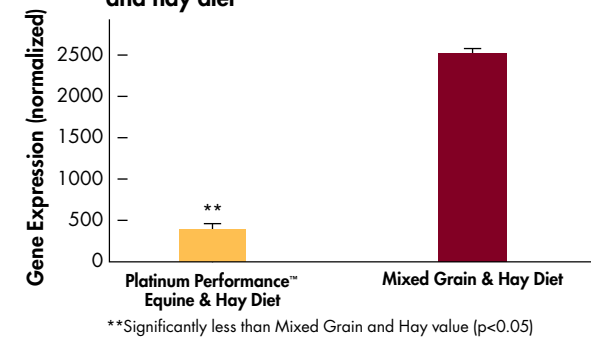


Figure 2. **IL-6 gene expression among horses consuming a hay diet supplemented with Platinum Performance™ vs. horses consuming a mixed-grain and hay diet**



These differences in cytokine gene expression could impact inflammatory and immune-related conditions, further supporting the benefits of the omega-3 fatty acids in the Platinum Performance™ Equine Wellness and Performance and Platinum Vet™ Skin and Allergy formulas.

Thymus Extract

Platinum Vet™ Skin and Allergy Formula contains an extract purified from the calf thymus gland, an organ that plays a major role in activating the immune system. This extract promotes the maturation and subsequent functioning of specific immune cells that help control allergic responses, infections and certain cancers.¹¹⁻¹³ This extract also has clinically beneficial effects in patients with allergic rhinitis and bronchial asthma.^{12,14,15} Although the mechanisms responsible for improvements in immune function after supplementation with thymus extract remain unknown, it has been proposed that these beneficial effects may be due to decreases in

concentrations of IgE, an immunoglobulin associated with allergic reactions, and increases in IgA, an immunoglobulin that helps prevent recurrent infections and allergies.¹⁶ Although immuno-therapy with thymus extract is most prevalent among humans, administration of a supplement containing thymus extract to horses with heaves for 30 days has been reported to reduce both pulmonary pressure and airway resistance.¹⁷ Therefore, supplementation with purified calf thymus extract, such as that provided in the Platinum Vet™ Skin and Allergy Formula, may modulate hyper-responsive allergic reactions known to commonly occur in the horse.

Quercetin

Quercetin is a naturally-occurring polyphenolic plant compound that is widely used for its antioxidant and anti-inflammatory properties. Quercetin not only inhibits lipoxygenase,¹⁸ but it also inhibits cyclooxygenase,¹⁸ the enzyme that converts arachidonic acid into the pro-inflammatory prostaglandin, PGE_2 . Quercetin's benefits are demonstrated by its strong antioxidant activity, the prevention of cell membrane lipid oxidation, the stabilization of cell membranes, and the prevention of the production of histamine,¹⁹⁻²¹ all of which make it an important component of the Platinum Vet™ Skin and Allergies formula.

Other Vitamins and Minerals

Platinum Performance™ Equine Wellness and Performance formula contains several vitamins and minerals that can positively impact equine skin and