

Why Fat?

Benefits of Fat Supplementation for Horses



Meredith Kahn

Equine Nutrition Consultant, Sales Representative

O|3 Animal Health, LLC.

Essential Fatty Acids

- Fat in the diet provides essential fatty acids that cannot be made by the body
 - Horses lack the enzymes to make ω -6 and ω -3 fatty acids that are essential for a healthy, functioning system
 - Traditionally, the equine diet tends to provide a skewed ratio of ω -6 and ω -3 fatty acids, minimizing the supply of ω -3's and oversupplying ω -6's
 - As herbivores and nomadic grazers, horses are naturally adapted to a diet rich in ω -3 fatty acids compared to ω -6 fatty acids
 - The small amount of fat found in forages, particularly fresh pasture, is naturally high in the ω -3 α -linolenic acid (ALA) whereas oils from grains and seeds tend to be higher in the ω -6 linoleic acid (LA)
 - Optimal levels of ω -3 fatty acids have been shown to provide an array of health benefits



Cell Development and Function

- Omega-3 fatty acids play an integral role by incorporating into many parts of the body
 - They are part of cell membranes and play a role in anti-inflammatory processes and in the viscosity of cell membranes
 - As part of the cell membrane, ω -3 fatty acids increase fluidity, flexibility, permeability and the activity of enzymes that bind to the membrane
 - DHA is a key component of all cell membranes and is found in abundance in the brain and retina
 - EPA and DHA are also precursors of several metabolites that are considered beneficial in the prevention or treatment of several diseases
- Omega-3 fatty acids have a key function in the formation, growth and regeneration of cells and in the transmission of cell signals throughout life



Increased Caloric Density

- Fat has 2.25 times as much energy as the same amount of starch
 - Fat is a great energy source for working horses that does not make them hot, unlike what can happen when we increase their starch intake to provide additional energy
- Fat provides a great amount of energy in a small volume that does not overwhelm the horse's small stomach
 - Their small stomach only has a capacity of 2 to 4 gallons for an average-sized 1000 lb horse, which limits the amount of feed a horse can take in at one time



Alternative Energy Source

- Fat serves as an alternative energy source that is particularly useful for working horses with nutritional diseases
- Horses with Equine Metabolic Syndrome (EMS) or insulin resistance, especially working horses, still need a fuel source beyond what their hay provides



Reduces Joint and Tissue Inflammation

- Omega-3 and ω -6 fatty acids, once in the body, act like hormones
- The addition of ω -3 fatty acids in the diet reduces overall production of pro-inflammatory molecules while encouraging production of anti-inflammatory molecules
 - This reduces the overall inflammatory status
- EPA competitively inhibits the enzyme responsible for producing pro-inflammatory molecules



Reduces Joint and Tissue Inflammation

- While some studies have shown promising results, there is still no definitive evidence that ω -3 fatty acids can reverse inflammatory conditions like osteoarthritis
- Human studies have shown a decrease in the number of painful joints and the duration of morning stiffness in patients with rheumatoid arthritis increasing intake of ω -3 fatty acids
 - There was a reduction in the dosage of anti-inflammatory drugs necessary to control symptoms of arthritis
 - Since chronic degenerative joint disease and long-term administration of NSAIDs are common in equine practice, dietary supplementation of ω -3 fatty acids may be reasonable in horses with chronic arthritic conditions



Alteration of Behavior and Stress

- Inadequate fat intake contributes to unstable blood sugar patterns that stress the horse's metabolism by causing an increase in the release of the hormones cortisol, adrenalin and insulin
- Increased hormone release affects mood, performance, immune function and injury prevention
- Since fats are digested more slowly, blood sugar levels are maintained, reducing the amount and frequency of stress hormones



Immune System Function

- Omega-6's are pro-inflammatory and are beneficial during infection and sickness
- Omega-6 fatty acids promote blood clotting, inflammation and immune system responses, however if these processes get carried away, they can actually become more harmful than helpful
 - The diet must therefore contain ω -3 fatty acids to keep these processes in check



A Healthy Digestive System

- Adding fat to the diet allows for smaller meal size without reducing the amount of calories
 - This lowers the risk of digestive disorders by allowing the concentrate portion of the meal to be fully digested before it passes into the hindgut
 - Improperly or partially digested concentrates can ferment in the hindgut, disturbing the delicately balanced population of bacteria



A Healthy Digestive System

- The ω -6 linoleic acid (LA) is a precursor for arachidonic acid (AA)
 - Both of these ω -6's are precursors for molecules that enhance the production of mucus which acts to protect the gastric lining from corrosive acid
 - Horses are natural grazers and because of this are constantly producing hydrochloric acid to aid in the digestive process
 - They cannot turn off this acid production
 - Meal-fed horses are prone to developing ulcers when the gastrointestinal lining is exposed to corrosive acid in the absence of any food to digest
 - NSAIDs like bute work to block the production of pro-inflammatory molecules, but can also block production of mucus
 - This is why horses can develop ulcers when exposed to large, consistent amounts of NSAIDs



A Healthy Respiratory System

- Horses' sensitive respiratory systems are constantly exposed to allergens like dust, mold, pollen and air pollution
- Omega-3 fatty acid supplementation provides an additional benefit to a low-dust diet
- The ω -3 DHA has been shown to support lung function in horses
 - Studies have shown improvement in horses with recurrent airway obstruction (RAO) and inflammatory airway disease (IAD)



Athletic Performance Enhancement

- Glycogen sparing
 - Glycogen stores in the muscle and liver are used during hard workouts
 - Supplemented fat can be used as an alternative, sustainable energy source, saving stored glycogen
 - Horses are very efficient in utilizing and digesting fat as a source of fuel
 - A morning meal with supplemented fat is slowly metabolized and utilized throughout the day
- Reduction in muscle lactic acid build-up
 - The accumulation of lactic acid in the muscle leads to muscle fatigue and soreness
 - Horses utilizing fat as an energy source for long-term work often show increased stamina and tend to recover faster after work



Thermal Load

- Fat is often referred to as a “cool” energy source
 - Fat produces less body heat when metabolized and is a great source of energy for working horses, especially those that live in warmer climates
 - Horses engaged in long-term work or those working in hot conditions benefit from the reduced heat production by using less sweat to cool down their bodies



Body Condition and Hair Coat

- Fatty acids
 - Essential fatty acids promote health of skin and hair cells
- Amino Acids
 - Sulfur-containing amino acids are particularly important for hair growth and production
- Vitamin E deficiency, as well as vitamin A deficiency or excess can cause a long, scruffy hair coat



Hoof Health

- Research has shown that amino acids, the building blocks of protein, are key ingredients to promote the growth of healthy hooves
 - If protein requirements are not met, hoof quality and growth will be compromised
 - The composition of the hoof wall is predominantly a protein called keratin, which is made up of a chain of amino acids
 - Sulfur-containing amino acids like cysteine and methionine form strong cross-links between collagen fibers during hoof formation – the more cross-links formed, the stronger the resulting hoof wall
- Fatty acids also play a role
 - Fatty acids are used to protect the outside of the hoof from moisture damage. Present in correct amounts, they work to seal moisture into the deeper hoof structures and seal out water



A Healthy Reproductive System Stallions

- Sperm cell membranes have a high DHA content, which is associated with membrane fluidity and sperm quality
 - Semen from stallions supplemented with DHA for 14 weeks showed a 3 fold increase in DHA concentration and a 50% increase in the ratio of DHA to the ω -6 fatty acid docosapentanoic acid (DPA)
- Preliminary studies indicate that supplementation with EOC increases semen quality, quantity and mobility



A Healthy Reproductive System

Mares

- Mares produce foals with a healthy immune system
- The mare estrous cycle
 - Omega 3's enhance production of important molecules called prostaglandins that are involved in cervical maturation
 - Increased levels of prostaglandins reduce premature births
- Omega 3's can increase birth weight and gestation – money saving
- DHA for brain and retinal development
 - DHA promotes cellular membrane and neurological development
 - Part of the retina is made of DHA



Bone Density

- Vitamins K
 - Naturally found in soybeans
 - Important for bone health
- Minerals found in the soybean
 - Calcium and Phosphorus
 - Bone structure and formation
 - Requirements increase for growth, lactation, gestation and work

