

# Omega-3s offer health benefits

*Studies have been undertaken to investigate the potential benefits of omega-3 fatty acid supplementation in horse feeds.*

By **JOE D. PAGAN\***

**T**HE benefits of fat as a source of energy to horses are now widely accepted. Fat is scarce in forages and is, therefore, a seemingly unnatural feedstuff for horses, but its nutritional advantages are irrefutable.

Substitution of starch with fat can help relieve painful muscle conditions, modify behavior and control metabolic conditions such as insulin resistance. Now that the advantages of fat are accepted almost universally by horsemen, scientists are further exploring how certain fats help horses.

Researchers have focused their attention on two distinct families of fatty acids: the omega-3 family and the omega-6 family. The omega-3 family stems from alpha-linolenic acid (ALA), while the omega-6 family originates from linoleic acid (LA).

ALA and LA are considered "essential fatty acids" because they are instrumental in the lifecycle, yet they cannot be manufactured in the body and must be obtained from dietary sources.

Other significant members of the omega-3 family are the longer-chain-length fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Horses can convert ALA to EPA and DHA when sufficient quantities of ALA are consumed, although this process is not entirely efficient.

## Balancing act

Omega-3 and omega-6 fatty acids must be balanced within the body in order for both to be effective. Each class of fatty

acid is necessary for the production and distribution of a diverse group of hormones called eicosanoids.

Eicosanoids include thromboxanes, prostaglandins and leukotrienes that have diverse physiological effects, including inflammatory response, maintenance of cell membrane stability, development and function of central nervous system tissue, oxygen transfer and immune functions. An imbalance between omega-3 and omega-6 derived eicosanoids may lead to serious problems in horses.

Scientists have not pinpointed the optimal ratio of omega-3 to omega-6 fatty acids for horses. Even without an exact ratio, general knowledge of omega-3 and omega-6 fatty acids and typical equine management practices uncover some potentially undesirable trends.

The natural diet of horses — primarily fresh and dried forages — contains more omega-3 fatty acids than omega-6 fatty acids. Domesticated horses are often fed concentrated sources of energy in the form of cereal grain and added vegetable oil. Most grains and vegetable oils contain

much higher levels of omega-6 fatty acids than omega-3 fats, thus creating a balance of omega-3 to omega-6 fatty acids that may be inappropriate.

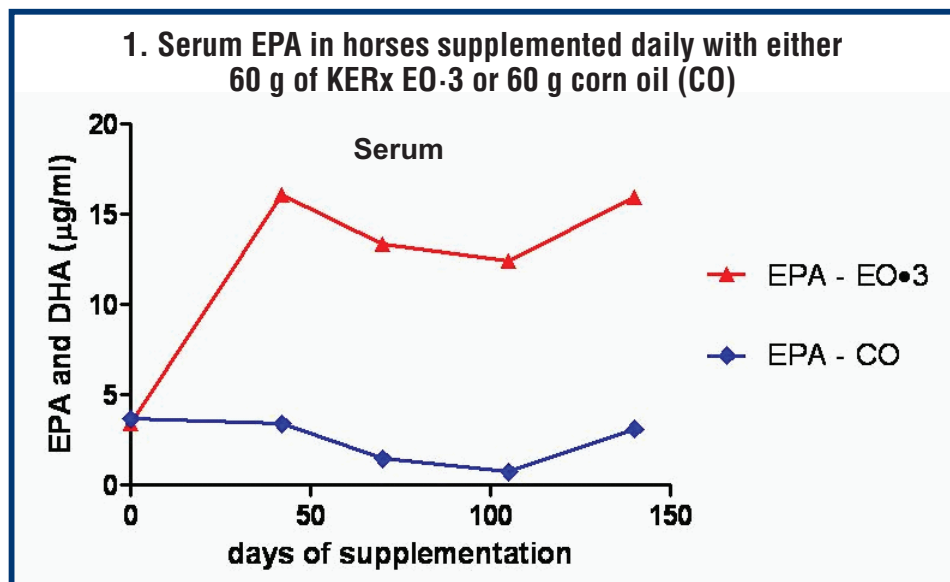
## Benefits

Interest in omega-3 fatty acids for all species has heightened in recent years, and equine researchers have begun to study their effectiveness in horses. Many studies have been undertaken by scientists to investigate the potential benefits of supplementation with omega-3 fatty acids, and promising results have come to light, including:

- Recent research carried out at Kentucky Equine Research (KER) has shown that supplementation with omega-3-rich fish oil (EO•3) elevates EPA and DHA concentrations in equine serum and red blood cells.

Thoroughbreds fed 60 g of fish oil per day showed rapid increases in the levels of EPA and DHA in serum compared to horses fed 60 g of corn oil (Figure 1).

Red blood cell (RBC) DHA and EPA also increased with fish oil supplementation, but there was a decrease in EPA after prolonged corn oil supplementation, suggesting that higher levels of omega-6 supplementation (as with corn oil) may deplete RBC membranes of EPA (Figure 2).



\*Dr. Joe D. Pagan is president and founder of Kentucky Equine Research Inc., which, through consultation and research, aims to bridge the gap that may exist between basic research and horse production.

- Reproductive specialists have obtained encouraging results in studies carried out on stallions: a significant boost in the number of normally shaped sperm and a rise in the concentration of spermatozoa in the semen.

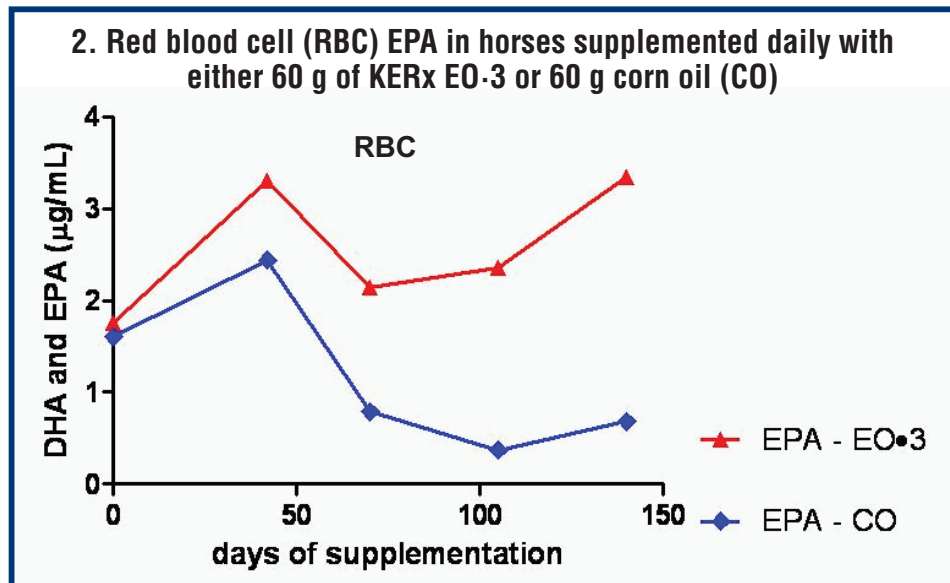
- Nutritionists have also demonstrated that omega-3 fatty acids benefit pregnant mares and their foals. The mares passed along the fatty acids to their foals in their milk. These foals seemed to have a stronger immune system than foals suckling mares not fed omega-3 fatty acids.

- Omega-3 fatty acids play a role in the flexibility of cell walls. Increased flexibility of the RBC membranes is crucial, especially during exercise, when heart rates increase, blood thickens and packed cell volume rises. Increased elasticity of RBCs allows easier passage through narrow blood vessels in the lungs and muscles, thereby improving blood supply and oxygen delivery.

Improved elasticity of RBCs may reduce the incidence of exercise-induced pulmonary hemorrhage (EIPH) or bleeding. Promising results in human medicine have led researchers to explore the effects of a combined dose of DHA and EPA on reducing signs of EIPH and pulmonary inflammation in horses. Scientists at Kansas State University reported a reduction of EIPH (bleeders) in Thoroughbreds after being fed a diet enriched with fish oil for 83 days.

Other studies have reported increased RBC membrane fluidity during exercise in horses fed a diet enriched with DHA and EPA for four weeks, indicating that a diet high in omega-3 fatty acids may reduce the incidence or severity of EIPH.

- Scientists at Texas A&M University have reported that supplementation with omega-3 fatty acids reduced joint inflammation in both yearlings and older, arthritic horses. Horses fed the omega-3 supplement had lower synovial fluid white blood cell counts than those in the control group. Raised white blood cell counts are indicative of local



inflammation, and arthritic horses will typically have a much higher number of white blood cells than non-arthritic horses. Increased mobility in the supplemented arthritic horses was not reported.

- Researchers are studying the effects of omega-3 fatty acids on estrous cycles and pregnancy rates of mares, with a possible connection to reproductive function. Recent results in cattle show that supplementation with fish oil may increase embryonic survival and pregnancy rates.

## Sources

Fish oils (cold-water species) and flaxseed (linseed) oil are rich in omega-3 fatty acids. Fish oil is a direct source of EPA and DHA. Flaxseed oil, on the other hand, yields ALA, which then must be converted to EPA and DHA.

Fish oils are typically not as palatable as vegetable oils to horses. However, new deodorization and flavoring technology

has made some fish oils more palatable. In two choice preference studies with Thoroughbreds, KER compared its EO•3 deodorized fish oil to soybean oil. The horses showed no significant preference for either type of oil after four days of side-by-side supplementation. When given only one choice of oils, the horses had similar rates of grain intake.

## Time to work

It is important to realize that rapidity of response to supplementation of omega-3 fatty acids is dependent on their pathway of action. Elevated plasma levels and endocrine and cytokine actions are more rapid than enhanced semen or RBC characteristics. It takes around 57 days for spermatogenesis to occur and approximately 150 days for the complete formation of RBC. Therefore, a longer period of supplementation will be necessary to affect semen quality or RBC fluidity.