Ahiflower® Oil as a Source of Omega-3 Fatty Acids for Racing Horses

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Horses evolved as forage eaters, grazing for upwards of 16 to 17 hours per day and moving extensively as they grazed. The horse's digestive system is well suited to this feeding behaviour — the stomach and small intestine are designed to cope with the almost continual entry of small amounts of food while the large intestine is geared toward the extraction of maximum nutritional value from the fibrous feeds. This primarily forage diet supplied, among other nutrients, sufficient omega-3 fatty acids to the horse. Fresh grass is high in omega-3 fatty acids, with levels peaking in the spring and then declining as the growing season passes.

Continual access to pasture is but a dream for most horses today, and many racing or athletic horses spend most of their days in a stall. In addition, many horses are fed a restricted forage diet with high levels of grain in order to supply the amount of energy needed for performance or reproduction. High grain diets have altered the delivery of fatty acids to the horse, delivering high levels of omega-6 fatty acids at the expense of the omega-3s. These less than optimal feeding conditions may leave the performance horse in a situation where it has less than adequate omega-3 fatty acids.

Arthritis is the most significant cause of lameness in horses and can lead to the early retirement of otherwise healthy animals. Previous research in a variety of species has shown that omega-3 and certain omega-6 polyunsaturated fatty acids (PUFA) have the potential to mitigate the pain and inflammation caused by arthritis, as well as possibly slowing down joint degradation. The long-chain omega-3 PUFAs, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are metabolized to anti-inflammatory eicosanoids while some omega-6 PUFAs (such as arachidonic acid) form the inflammatory eicosanoids.

In arthritic horses, EPA and DHA supplementation from fish oil are known to result in an increased stride length and reduced inflammatory markers. Incorporation of omega-3 long-chain PUFA to circulating cells and muscle tissues could potentially improve chronic inflammatory conditions in horses. Because EPA and DHA are normally only available commercially from marine forage fish sources which can be expensive, are generally not sustainable, can be unpalatable to herbivorous horses, and raise questions about feeding fish oil to horses, precursor omega-3 fatty acids from plant sources represent a more compelling alternative.

Ahiflower: A uniquely balanced SDA & GLA source

Ahiflower oil is unique in that it contains the omega-3 precursor fatty acid, stearidonic acid (SDA), which human and animal studies have shown will convert metabolically to EPA and DHA more directly than the precursor fatty acids in other oils such as canola, camelina, or flax (which contain only ALA (alpha-linolenic acid)). The conversion of ALA to SDA is known as the rate-limiting step in the omega-3 metabolic pathway in the production of EPA and DHA and therefore animals may not benefit as significantly from the ALA found in oils such as flax, as they may from ingesting oils containing high levels of dietary SDA directly.

Research has shown that horses convert ALA to longer chain EPA inefficiently, and typically not through to DHA. Horses consuming only canola, flaxseed, or camelina oil as their omega-3 supplement, therefore may not gain the full omega-3 nutritional benefits they require because these oils contain only omega-3 ALA. Yet research has shown that horses convert SDA to longer-chain omega-3 PUFA more efficiently than ALA, because SDA bypasses the rate-limiting step in ALA metabolism, allowing for more efficient absorption, conversion, and synthesis of longer-chain omega-3 fatty acids that are known to serve as substrates in the formation of natural anti-inflammatory compounds that reduce chronic inflammatory states.

In addition, unlike either fish oil or flax oil, Ahiflower oil contains gamma-linolenic acid (GLA), an omega-6 fatty acid that is the equivalent fatty acid to SDA in the omega-6 pathway. GLA is metabolized to produce anti-inflammatory compounds and helps to inhibit the release of pro-inflammatory arachidonic acid (AA, C20:4n-6) from tissues.

Ahiflower Oil in Equine Clinical Trials

We have investigated the benefits of using Ahiflower oil as a supplement for Standardbred and Thoroughbred racehorses. The great stresses that these animals undergo during training and racing could lead to the development of arthritis and other inflammatory processes and may be alleviated by the use of Ahiflower to deliver omega-3 precursors and fatty acids.

In our first trial, we compared supplementation with Ahiflower oil to supplementation with flax oil (omega-3 precursor) or corn oil (omega-6 precursor) to racing Standardbred horses for 70 days. Although the horses were not fed a standard basal diet (other than the requirement of no additional oils), major changes in the whole blood levels of fatty acids were found.

Most of the long-chain omega-3 fatty acid levels in the blood were increased significantly for the Ahiflower-fed group compared with the flax or corn oil-fed groups. The total long-chain

omega-3 level was more than twice the level for the flax oil-fed animals and three times the level for the corn oil-fed animals. The inflammatory index ((total blood protein - fibrinogen)/fibrinogen) was reduced significantly over the 70 day trial for the Ahiflower oil-fed horses while there was no change for the flax or corn-oil fed horses.

We can conclude that Ahiflower-fed horses had a higher conversion rate to long-chain omega-3 fatty acids compared with the flax or corn oil-fed horses. The presence of anti-inflammatory fatty acids in the blood of Ahiflower oil-fed horses may have beneficial effects on joint and overall health. Further, the equestrian and veterinarian teams that conducted the study could, over time, visually identify which horses were receiving the Ahiflower diet. Their coat condition, general conformation, and ease/fluidity of movement was apparent.

In the second trial, we compared supplementation with Ahiflower oil to supplementation with a commercial fish oil product in young Thoroughbred race horses in training. After 120 days on trial, the blood from each horse was sampled and separated into plasma and whole cells. Overall, the total omega-3 and omega-6 levels in the cells and plasma were not different between the oil supplements and neither was the omega-3 to omega-6 ratio, suggesting that Ahiflower oil was as effective as fish oil in maintaining a higher omega-3:6 ratio.

As expected, the long-chain EPA and DHA omega-3 fatty acid levels were significantly higher ($P<0.01$) in the fish oil-supplemented group for blood cells and plasma, because Ahiflower oil is not a direct dietary source of EPA and DHA. Yet even so, levels of AA, a precursor of compounds involved in pro-inflammatory activity, were lower ($P<0.05$), and levels of dihomo gamma-linolenic acid (DGLA, C20:3n-6), another anti-inflammatory compound, were higher ($P<0.05$) for the Ahiflower oil-fed group for both blood cells and plasma.

Conclusion

Providing horses with more complete omega-3 and omega-6 fatty acids derived from plants aligns with their evolution and history as grazing foragers. Performance horses receiving high-grain diets are more likely to consume high levels of omega-6 fatty acids manifesting in elevated AA levels. Clinical studies with performance horses demonstrate~~s~~ that Ahiflower oil — due to its high SDA and GLA content — achieves not only superior long-chain PUFA conversion vs. flaxseed oil, but also enriches tissues with omega-3 and -6 substrates with potential anti-inflammatory actions. Because omega-3 and -6 fatty acids are also essential for all-around health, particularly skin condition, supplementing equine diets with Ahiflower also delivered noticeable improvements in coat condition.