RESEARCH

REVIEW >

Supplementation of Purina® Omega Match™ Ahiflower® Oil Promotes Alterations in Circulating and Tissue Fatty Acid Profiles, Especially Eicosapentaenoic Acid

A SUMMARY OF RESEARCH CONDUCTED AT THE PURINA ANIMAL NUTRITION CENTER EVALUATING THE EFFECTS OF PURINA® OMEGA MATCH™ AHIFLOWER® OIL SUPPLEMENTATION ON WHOLE BLOOD AND MUSCLE FATTY ACID PROFILE.[1]

< INTRODUCTION >

Certain fatty acids are essential to the horse and must be supplied in the diet. Linoleic acid (LA), an omega-6 fatty acid, and alpha-linolenic acid (ALA), an omega-3 fatty acid, cannot be synthesized by the horse, and therefore must be supplied in the daily ration. Many of the plants and oils fed to horses are sources of these essential fatty acids. However, there are other beneficial fatty acids that elicit physiological benefits in the horse. Eicosapentaenoic acid (EPA) is an omega-3 fatty acid that is predominantly found in marine-derived fat sources such as algae and fish oil. Previous research indicates that horses supplemented with EPA showed improvements in metabolic health[2], joint health[3], and reduction in inflammatory profiles[4]. Previous research has indicated that in order to enrich tissues with EPA, this fatty acid must be supplied directly in the diet, as the horse has an extremely limited ability to convert ALA into EPA.[5-7]

Purina® Omega Match™ Ahiflower® Oil is a plant-derived fat supplement that is enriched with a unique fatty acid profile containing high levels of stearidonic acid (SDA), an omega-3 fatty acid, and gamma-linolenic acid (GLA), an omega-6 fatty acid. The objective of this trial was to evaluate the changes in tissue fatty acid profile of horses consuming a variety of fat sources, including Purina® Omega Match™ Ahiflower® Oil.

< MATERIALS AND METHODS >

Twenty mature horses were utilized in this trial. Horses were balanced by age, breed, starting body weight, and body condition, and they were assigned to one of four treatment groups:

Group A: 30 mL/1000 lb BW of Purina® Omega Match™ Ahiflower® Oil daily.
Group B: 60 mL/1000 lb BW of Purina® Omega Match™ Ahiflower® Oil daily.
Group C: Flaxseed pellet formulated to contain the same amount of omega-3 fatty acids as *Group A*.
Group D: Pasture. Horses allowed free-choice access to a mixed-grass pasture.

[1] Jacobs, RD et al., HR. 331. Ahiflower tissue incorporation. Internal research, PANC 2020.
[2] Hess, TM., et al. (2013). Effects of omega-3 (n-3) fatty acid supplementation on insulin sensitivity in horses. *Journal of Equine Veterinary Science.* 33:446-453
[3] Proudman, SM. et al. (2008). Dietary omega-3 fats for treatment of inflammatory joint disease: efficacy and utility. Rheumatic Disease Clinic of North America. 34:469-479
[4] Caron, JP., et al. (2019). Omega-3 fatty acids and docosahexaenoic acid oxymetabolites modulate the inflammatory response of equine recombinant interleukin1B-stimulated equine synoviocytes. Prostaglandins and Other Lipid Mediators. 142:1-8.
[5] Vineyard, KR., et al. (2010). Effect of dietary omega-3 fatty acid source on plasma and red blood cell membrane composition and immune function in yearling horses. *Journal of Animal Science.* 88(1):248-257.
[6] Hess, TM, et al. (2012). Effects of two different dietary sources of long chain omega-3, highly unsaturated fatty acids on incorporation into the plasma, red blood cell, and skeletal muscle in horses. *Journal of Animal Science.* 90(9):3023-3031.
[7] Jacobs, RD et al. (2018). Dietary supplementation of algae-derived omega-3 fatty acids influences endometrial and conceptus transcript profiles in mares. 62:66-75.

All horses received a basal diet of 4 lbs of Purina® Strategy GX® Horse Feed (Crude Protein=14%, Crude Fat=6%, Fiber=12.5%, ADF=15.5%, NDF=34%) twice daily (0300 and 1400). Horses in groups A-C received their treatments top-dressed on to their daily AM and PM feedings along with 2.0% BW as Timothy grass hay daily. Horses in the pasture group received concentrate, but no additional supplements or hay. All horses had free-choice access to white salt and clean water. Samples of all feed, supplements, hay, and pasture were collected and evaluated for nutrient composition.

Prior to the start of the trial all horses were on a similar daily diet consisting of 1.8 kg of Purina® Strategy GX® Horse Feed offered twice daily along with 2.0% BW as Timothy grass hay. On d 0 prior to any dietary transition, blood samples were collected via jugular venipuncture along with a muscle sample obtained from the mid-gluteal muscle via a needle biopsy. Whole blood samples were collected into sodium heparin containing tubes and immediately aliquoted into 2 mL vials and frozen. Muscle tissue (~1g) was rinsed in cold, sterile phosphate-buffered saline and flash frozen in liquid nitrogen. Identical samples were obtained 30 d and 60 d post dietary transition. All tissue samples underwent fat extraction and fatty acid analysis at the University of Florida Analytical Toxicology Core Laboratory. Data were analyzed via ANOVA using SAS 9.4 with significance at $P \leq 0.05$.

< RESULTS >

All horses readily consumed their assigned rations. Data below is displayed as percent changes from baseline since starting values were different across treatments for measured variables.

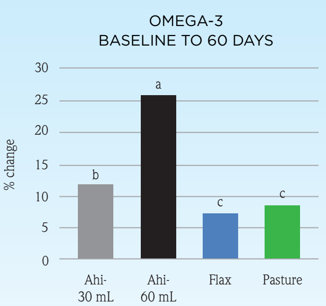
Figure 1 below displays the percent change in total omega-3 fatty acids in whole blood of horses after 60 d of supplementation. Horses in ***Group A*** had elevated levels of total omega-3 fatty acids compared to ***Group C*** and ***D***, while horses in ***Group B*** had the greatest overall increase in omega-3 fatty acids. **Figure 2** illustrates the change in EPA in whole blood following 60 d of supplementation. Horses in ***Group A*** had a greater increase in EPA in whole blood than horses in ***Group C*** and ***D***. Horses in ***Group B*** had the largest overall increase in whole blood EPA. **Figure 3** shows the change in GLA over the 60-d supplementation period. These data follow the same pattern as the omega-3 and EPA data with ***Group A*** showing a significant increase in GLA over ***Groups C*** and ***D***, and ***Group B*** displaying the greatest percent change over time.

Figure 4 shows the change in muscle tissue of EPA and Docosahexaenoic acid (DHA) after 60 d of supplementation. ***Group B*** shows the greatest overall percent change in EPA + DHA levels compared to the other treatment groups.

< IMPLICATIONS >

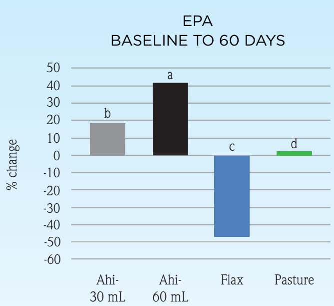
Previous research has highlighted the inability of horses to readily convert the fatty acids in typical plant-derived fat sources into the more biologically relevant fatty acid, EPA. Purina® Omega Match™ Ahiflower® Oil contains a unique fatty acid profile that is demonstrated in this study to be converted into other beneficial fatty acids. Altering the fatty acid composition of tissues provides the horse with the substrates necessary to support performance and overall health. When fed as directed, Purina® Omega Match™ Ahiflower® Oil is a source of highly bioavailable fat with a specialized and unique fatty acid profile for the horse.

FIGURE 1 Percent change in omega-3 fatty acids in whole blood.



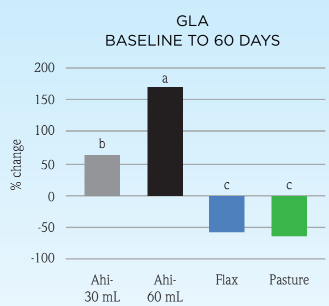
Differing superscripts indicate significance at $P < 0.05$

FIGURE 2 Percent change in EPA whole blood.



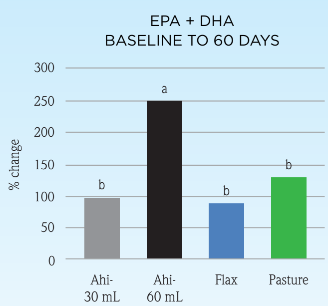
Differing superscripts indicate significance at $P < 0.05$

FIGURE 3 Percent change in GLA in whole blood.



Differing superscripts indicate significance at $P < 0.05$

FIGURE 4 Percent change in EPA + DHA in muscle.



Differing superscripts indicate significance at $P < 0.05$

< **FOR MORE INFORMATION** > Contact your local Purina representative if you would like more information about this study.

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