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59 Late gestation supplementation of long chain fatty acids increases foal docosahexaenoic acid concentrations at birth

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Maternal supplementation of omega-3 fatty acids during gestation has a variety of benefits on the dam and resulting offspring in several species, including reduced latency to stand and suckle. The objective of the study is to test the hypothesis that foals born to mares supplemented with marine-derived algae during late gestation will have greater plasma DHA concentrations than foals born to either control mares or mares supplemented with flaxseed-derived ALA. The current study utilized 13 American Quarter Horse mares and their foals, assigned to one of 3 dietary treatments: a control basal diet (CON, n=5), the basal diet plus 242.4 g of a supplement providing marine-derived omega-3 fatty acids (DigestaWell® Omega; MAR, n=5), or the basal diet with the addition of 190 g of a flaxseed supplement (Smartpak Simple Flax; FLAX, n=3). Supplements were fed twice daily and were designed to deliver 40 g of omega-3 fatty acids. Mares began treatments 30 d before expected foaling dates and continued through d 5 post-parturition (PP). Plasma was collected from mares before supplementation, and on d 0, 5, and 30 PP. Milk samples were collected from mares at d 0 and 5 PP. Plasma samples were collected from foals at birth, and on d 5 and 30 PP. Fatty acid compositions of samples were determined using lipid extraction and gas chro-

matography. Data were analyzed using MIXED procedure of SAS, using repeated measures for milk and plasma. Simple effect differences were detected via Tukey test, and $\alpha=0.05$. The CON diet provided 29 g of α -linolenic acid (ALA), 0 g of eicosapentaenoic acid (EPA), and 4.5 g of docosahexaenoic acid (DHA), the MAR and FLAX diets provided 27 and 34 g of ALA, 0 and 0.03 g of EPA, and 17.4 and 4.5 g of DHA to mares, daily. Fatty acids are represented as g of fatty acid per 100 g of lipid. DHA (1.9 ± 0.2 g/100g) and EPA (0.3 ± 0.1 g/100g) contributed to a greater percent of plasma lipids in foals born to MAR supplemented mares compared with CON foals (DHA= 0.6 ± 0.2 ; EPA=0 g/100g; $P < 0.05$). These fatty acids were not different between FLAX and CON foals ($P > 0.1$). Samples obtained from foals at birth before nursing had the highest DHA levels (1.90 ± 0.18 g/100g), compared with all other samples, and DHA declined at d 5 (0.6 ± 0.2 g/100g) and 30 (0.1 ± 0.2 g/100g; $P < 0.001$) PP. No differences were observed in mare plasma or milk. Maternal supplementation of marine-derived omega-3 fatty acids in late gestation increased foal plasma DHA concentrations more so than that of foals from mares fed flax.

Keywords: Docosahexaenoic Acid, Foal, Omega-3