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**Effects of feeding rumen-protected methionine and calcium salts enriched in omega-3 fatty acids on measures of liver function in periparturient cows.**

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The objective of this study was to investigate the effects of feeding rumen-protected (RP)-methionine (Met) and calcium salts (CS) of fatty acids (FA) enriched without or with C20:5 and C22:6 (i.e., n3FA) on liver function in periparturient cows. In a study with a randomized complete-block design, 79 multiparous Holstein cows were assigned to 1 of 4 treatments (n = 19–20/diet): 1) Met unsupplemented (-Met) with CS palm oil not enriched in n3FA (-n3FA; 0% n3FA; EnerGII; Virtus Nutrition, USA), 2) Met supplemented (+Met; Smartamine M; Adisseo Inc., France) with – n3FA, 3) -Met with CS enriched in n3FA (+n3FA; 4% n3FA; EnerG-3; Virtus Nutrition], or 4) +Met with +n3FA from wk –4 before expected calving through wk 4 of lactation. Cows were fed corn silage-based total mixed rations, pre- and postpartum, which were formulated to provide Met at  $\leq 0.96$  or  $\geq 1.13$  g /Mcal metabolizable energy for -Met and +Met, respectively. CS were fed at 1.5% FA (% ration dry matter). Blood was collected twice weekly before feeding. Data were analyzed using a mixed model including the fixed effects of treatment, day, and their interaction. Pre-planned contrasts included: 1) effect of Met (-Met vs. +Met), 2) effect of n3FA (-n3FA vs. +n3FA), and 3) effect of co-supplementation (+Met/+n3FA vs. +Met/-n3FA and -Met/+n3FA). Circulating creatinine, globulin, total FA, aspartate transaminase and total cholesterol concentrations were modified by day ( $P < 0.01$ ) but not treatment. At calving, -Met/-n3FA had greater plasma TG concentrations, relative to rest ( $P < 0.01$ ), whereas, +Met/+n3FA tended to have greater plasma glucose concentrations, relative to rest ( $P = 0.09$ ). Serum total protein and albumin concentrations were greater in +Met/+n3FA, relative to +Met/-n3FA and -Met/+n3FA ( $P = 0.03$  and  $0.06$ , respectively). Prepartum plasma insulin concentrations were greater in -Met/-n3FA, relative to rest (treatment  $\times$  day;  $P < 0.05$ ). Direct bilirubin concentrations were lower in +n3FA, relative to -n3FA ( $P = 0.03$ ). Postpartum liver functionality index values tended to be greater for +Met/+n3FA, relative to rest ( $P = 0.08$ ). In conclusion, feeding transition cows RP-Met and CS enriched in n3FA improved liver function.

**Keywords:** methionine, omega-3, liver.