Feeding Rumen-Protected Echium Oil Increases the n-3 Fatty Acid Content of Milk Fat.

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Echium oil is a terrestrial source of the n-3 FA stearidonic acid (SDA; 18:4 6c,9c,12c,15c) which bypasses the rate limiting step of delta-6-desaturase in conversion to eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The objective of this study was to evaluate the impact of feeding a lipid-encapsulated echium oil (EO) supplement on animal production and milk fatty acid concentrations. Twelve Holstein dairy cattle (229 ± 62 days in milk) were assigned randomly to treatment sequence in a 3x3 Latin Square design. Treatments were a control diet (CON; no added EO), 1.5% EO (1.5% EO), or 3.0% diet dry matter (DM) added EO (3.0% EO). Treatment periods were 14 days with the final 4 days used for sample and data collection. The statistical model included the random effect of cow nested within square and the fixed effects of treatment and period. EO supplementation had no effect on dry matter intake (26.6 kg/day; \( P=0.93 \)), milk yield (30.5 kg/day; \( P=0.34 \)), or milk protein yield (1.1 kg/day; \( P=0.84 \)). Compared with CON, EO treatments demonstrated higher milk fat concentration (4.1, 4.2, 4.3%; \( P<0.05 \)) and fat yield (1.24, 1.27, 1.32 kg/day; \( P<0.05 \)). EO supplementation increased milk fat concentration of total n-3 FA (0.49, 0.65, 0.81 g/100 g FA, \( P<0.0001 \)), \( \alpha \)-Linolenic acid (18:3 n-3) (0.38, 0.47, 0.58 g/100 g FA, \( P<0.0001 \)), and SDA (0.02, 0.06, 0.09 g/100g FA, \( P<0.001 \)) for CON, 1.5% EO, 3.0% EO, respectively. For 1.5% EO and 3.0% EO milk fat concentration of EPA was 0.05 g/100 g FA vs. 0.03 g/100 g FA for CON (\( P<0.001 \)). Transfer of SDA from the EO supplement into milk fat was 3.4% and 3.2% for the 1.5% and 3% EO treatments, respectively. In conclusion, supplementation with a lipid-encapsulated EO had no impact lactational responses and increased the concentration of n-3 FA in milk fat.