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Effect of Diet on CLA Production in Bovine Milk Fat and Exogenous FA on Expression of Acyltransferase Genes in Bovine Mammary Gland

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The CLA content and composition of bovine milk fat involves events in both the rumen and mammary gland. Cumulative effects on CLA in milk fat were studied through dietary supplementation with sunflower oil (SFO) and fish oil (FO), with and without monensin. A combination of GC, Ag⁺-TLC and Ag⁺-HPLC was required to identify and resolve more than 80 FA species in each sample. Supplementation with 1.5% SFO and 0.5% FO yielded the best *trans*-18:1 and CLA isomer profile with the least amount of undesirable FA in the resulting milk fat. Specific effects of CLA isomers and vaccenic acid, found in the duodenal outflow, were also tested for effects on enzyme activities and gene expression associated with TAG synthesis in mammary gland and cultured mammary gland epithelial (MAC-T) cells. The abundance of transcripts encoding two isoforms of diacylglycerol acyltransferase (DGAT1 and DGAT2) and lysophosphatidate acyltransferase (LPAAT) were examined. DGAT catalyzes the final step in the acyl-CoA-dependent synthesis of TAG, whereas LPAAT catalyzes the second acylation of the glycerol backbone within the *sn*-glycerol-3-phosphate (Kennedy) pathway. Although there were no significant effects of CLA isomers, or vaccenic acid, on the expression of *DGAT1*, all FA tested significantly increased the expression of *DGAT2* and *LPAAT*. As well, the patterns of expression of *DGAT2* and *LPAAT* were more closely related than that of the two DGAT genes.