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Effect of conjugated linoleic acid on the activity and expression of diacylglycerol acyltransferase in bovine mammary gland

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Certain isomers of conjugated linoleic acid (CLA), a naturally occurring milk fat, have demonstrated nutraceutical properties. While it is possible to increase the CLA content of milk fat in dairy cattle, the overall fat content of milk is affected. The *trans*-10, *cis*-12 isomer of CLA has been linked to milk fat depression and has recently been shown to elicit a decrease in the expression of several lipogenic enzymes in the mammary gland. This isomer may also affect the activity and/or expression of diacylglycerol acyltransferase (DGAT, EC 2.3.1.20), which catalyzes the final step of milk fat synthesis. An allele of bovine *DGAT1* is associated with low milk fat content and inactivation of the equivalent gene in mice can lead to impaired development of the mammary gland. Competition assays of microsomal DGAT activity from mammary gland tissue were conducted using a mixture of [1-¹⁴C]oleoyl (18:1)-CoA (5 μM) and varying concentrations (0-20 μM) of unlabeled oleoyl-CoA, linoleoyl (*cis*-9, *cis*-12 18:2)-CoA, *cis*-9, *trans*-11 CLA-CoA, and *trans*-10, *cis*-12 CLA-CoA. The results suggested that microsomal DGAT had a greater preference for oleoyl-CoA compared to the other fatty acyl-CoAs. Linoleoyl-CoA and *trans*-10, *cis*-12 CLA-CoA exhibited similar competition effects whereas *cis*-9, *trans*-11 CLA-CoA was the least effective in competing with oleoyl-CoA as substrate. An assay was adapted to assess DGAT activity in digitonin-permeabilized bovine mammary gland epithelial (MAC-T) cells. Current experiments with these cells are focusing on monitoring DGAT activity and the expression of *DGAT1* and *DGAT2* as affected by exogenous application of various CLA isomers.