

Maternal and fetal fatty acid composition in ovine muscle tissues

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ABSTRACT

In species characterized by a cotyledonary placenta, as sheep, the relative contribution of maternally derived and placenta synthesized fatty acids is not fully understood. For this reason, the FA composition of mother muscle and the deposition of FA in the fetal muscle were studied by gas-chromatography. Five pregnant Sarda ewes were slaughtered at approximately 145 days of pregnancy. Semitendinosus, semimembranosus and femoral biceps muscles were immediately removed from ewes and fetuses. Data were analyzed by a paired t-test, to detect differences in FA composition between fetus and mother tissues. Results showed that FA profile of fat muscle differed markedly between fetus and mother. The intramuscular fat content were 6.38% and 11.79% on DM basis in fetus and mother muscle, respectively. Linoleic (LA; 18:2n-6), and linolenic (ALA; 18:3n-3) acid were found at smaller concentrations in fetus (0.77 and 0.01 mg/100 mg total FA for LA and ALA, respectively) than in maternal muscle (5.55 and 1.04 for LA and ALA, respectively). On the contrary, a higher proportion of their long-chain polyunsaturated metabolites, like arachidonic (AA; 20:4n-6) and docoexadienoic (DHA; 22:6n-3) acid in fetus compared to mother tissue (AA, 2.32 vs 1.30; DHA, 0.83 vs 0.09 mg/100 mg total FA) indicates a preferential fetal accumulation of those FA which are important for fetuses growth and central nervous system development. The c9,t11 Conjugated linoleic acid (CLA) isomer concentration in mother tissue was 0.72 mg/100 mg FA. It was found also in fetus muscle (0.11 mg/100 mg total FA) suggesting a transplacental fatty acid passage to fetal tissues or a desaturation activity on vaccenic acid (VA; 18:1 t11) in the placental or in the fetal tissue. Surprisingly, the c9,t11-CLA was not the most abundant CLA isomer found in fetus fat. Others CLA isomers, separated but not identified, were found in concentration of 0.17, 0.15 and 0.53 mg/100 mg of FA. Concentrations of these CLA isomers were lower in mother tissue (0.12, 0.05 and 0.10 mg/100 mg of FA). The concentration of VA was 0.46 and 0.90 in fetus and mother muscle, respectively. Correlation analysis between FA profile of mothers and fetuses evidenced a close relationship only for odd-numbered long-chain fatty ($r = -0.72$ for C15:0 and $r = -0.88$ for C17:0). The results suggested a different FA metabolism in the muscle tissue of mother and fetus in dairy sheep.

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