Seleno-compounds Affected the Fatty Acid Profile in *in vitro* Incubated Ovine Ruminal Fluid containing Linoleic Acid

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The effect of adding selenite (SeIV) or selenate (SeVI) to ovine ruminal fluid containing linoleic acid (LA) on the profile of fatty acids, especially conjugated linoleic acid (CLA) isomers and their metabolites was investigated. Dietary LA is accumulated by rumen bacteria, isomerized to other geometric and positional isomers, metabolized into CLA isomers, biohydrogenated to *trans*-vaccenic acid (TVA) and finally to C18:0. Considering the above, ovine ruminal fluid was incubated *in vitro* at 39°C under CO2 either alone (the control ruminal fluid) or with a combination of LA (1.67 mg/ml), a low (0.167 µg/ml) or high (1.67 µg/ml) level of selenium as SeIV or SeVI. Tubes with examined ruminal fluid were removed after 0, 6, 12, 18, and 24 hrs of incubation and then submitted for determination of fatty acids (FA). FA, as methyl esters, were determined using capillary gas chromatography and flame-ionization detection. Both concentrations of SeIV added to the ruminal fluid with LA usually decreased the concentrations of individual CLA isomers, especially *cis9trans11*CLA (*c9t11*CLA) and the sum of all CLA isomers in the ovine ruminal fluid in comparison with the fluid containing only LA. Our studies documented that SeIV reduced the capacity of bacterial isomerase, which turns the *cis9*-bond into a *trans10*-bond. The addition of SeIV to the ruminal fluid with LA decreased the concentration of TVA compared with the fluid with only LA; a decrease in the loss of TVA was observed with increasing concentrations of SeIV. The presence of SeIV in the ovine fluid with LA stimulated the biohydrogenation of TVA to C18:0. The addition of LA to the incubated fluid, irrespectively of the presence of SeIV, increased the concentration of C20:5n-3. SeVI in the ruminal fluid with LA usually more efficiently increased the concentration of *c9t11*CLA, *t10c12*CLA, *c9c11*CLA and *t9t11*CLA, from 6 until 24 hrs of incubation compared with the fluid containing LA, regardless of the presence of SeIV. The concentration of TVA in the fluid containing SeVI and LA is higher than in the fluid with SeIV and LA. SeVI in the fluid increased the concentration of C18:0. As a consequence, SeVI added to the fluid increased the yield of final biohydrogenation to C18:0 compared with the fluid with LA, irrespective of the presence of SeVI.

In conclusion, selenate elevated the concentration of CLA isomers and the precursor of *c9t11CLA* in incubated ruminal fluid with linoleic acid (LA), therefore, we could hypothesize that feeding this chemical form of selenium with addition of free LA will improve the nutritive value of products derived from ruminants. In particular, meat, milk and dairy products should contain a higher concentration of CLA isomers derived directly from ruminal digesta, as well as from endogenous synthesis of conjugated dienes from *t11*C18:1 or *t7*C18:1. Moreover, our recent studies documented that feeding a diet enriched in selenate resulted in a substantial increase of other health-promoting-components like Se and Zn (essential elements) in the liver and muscles of sheep. Therefore, this is another possibility of improving the healthfulness of ruminant meat and milk by increasing the concentration of Se-cysteine (an essential component of 22 seleno-proteins like glutathione peroxidase) and consequently by protecting PUFA from per-oxidation damage.

Further studies are required to clarify the effects of other Se-compounds and fatty acids on concentrations of fatty acids, especially CLA isomers and their precursors, in the ruminal fluid, the body of ruminants and to optimize doses to be used.