

Analysis of Fatty Acid Composition of Sheep Rumen Microbial Populations after Selenium and Sunflower Oil Supplementation

Svetlana Kišidayová, Zora Váradyová, Katarína Mihaliková, Tomáš Laho,

Ľubomír Leng, Dušan Jalč

Institute of Animal Physiology, Slovak Academy of Sciences, Košice, Slovak Republic

The effects of three month daily application of selenium (0.4 mg/kg of feed) and sunflower oil (SO; 60 g/animal) on rumen fatty acids contents were the objective of the study. The bacteria (BF), ciliate protozoa (PF) and total rumen contents (TRC) of sheep were analyzed. Three groups of sheep (average 40 kg) were fed with hay (1.5 kg) and ground barley (0.5 kg) and daily supplemented with: Inorganic selenium (Na_2SeO_3) plus SO (ISe+SO), organic selenium (selenium yeast) plus SO (OSe+SO), and unsupplemented one (Control). Dominant FA in control group (g/kg FA) were stearic (BF, 340; PF 175; TRC 333), palmitic (BF, 184; PF 294; TRC 217), and docosenoic (*cis*-13 $\text{C}_{22:1-n9}$) acids (BF, 273; PF 147; TRC 222). Decreased contents of short-chain FA and medium-chain FA in both rumen microbial populations in supplemented animals resulted in decrease of the FA in TRC ($\text{C}_{4:0}$ - $\text{C}_{13:0}$, ISe+SO by 39 %; OSe+SO by 43 %; $\text{C}_{14:0}$ - $\text{C}_{17:1}$, ISe+SO by 14 %, OSe+SO by 31 %) in comparison to control. Long-chain FA ($>\text{C}_{18:1}$) were increased; ISe+SO by 5% and OSe+SO by 11 % in TRC owing mainly to bacterial fraction. In spite of depressed growth of ciliates in supplemented sheep (ISe+SO by 39 %; OSe+SO by 29 %), the great-enhanced contents of *trans*-vaccenic acid (TVA, *trans*11- $\text{C}_{18:1}$) in TRC was observed because of high contents of TVA in BF. Consequently, TVA contents in TRC were increased by 370 % in ISe+SO group and by 431 % in OSe+SO group in comparison to control (36 g/kg FA). We can conclude that rumen bacterial population played dominant role in the production of TVA under both supplement regimes in contrast to control group where ciliates had higher content of TVA (10 vs. 83 g/kg FA of BF vs. PF). As rumen TVA is important precursor for synthesis of conjugated linoleic acid isomers in sheep tissues, especially *cis*9,*trans*11- $\text{C}_{18:2}$, the high rumen concentration of TVA points to probably higher concentration of CLA in sheep tissues.

This work was supported by the Slovak Research and Development Agency (contract numbers: APVV-0043-07, APVV-0399-07) and Grant Agency of Ministry of Education of Slovak Republic and the Slovak Academy of Sciences VEGA (2/0009/08).