A. Steinwidder, E. Scherzer, W. Zollitsch (2020): **Mid-infrared results on fatty acid pattern of milk from dairy farms** (in German). Die Bodenkultur: Journal of Land Management, Food and Environment, 71 (1), 41-53.

Summary
The composition of milk fat is gaining importance in the dairy industry. In addition to classical analytical methods – such as gas chromatography (GC) – more time- and cost-effective rapid methods are now available for determining the milk fat composition. In the present study, the accuracy of fatty acid concentrations determined by mid-infrared spectroscopy (MIR) was evaluated with the "MilkoScan FT6000 Software Package". The fatty acid contents determined with the GC were considered as "gold standard". For this purpose, selected milk samples from individual farms or tank milk samples of farms in Carinthia (dairy "Karntnermilch") were used. Three times a year (November 2017, March 2018, June 2018), delivery milk samples were taken from five farms (2 organic and 3 conventional farms) of Karntnermilch and from three milk collection rounds (tank milk samples from 2 organic and 1 conventional round). All organic farms followed the production guidelines of "Bio-Wiesenmilch". Based on the GC-dataset and an additional comprehensive MIR data set of farms in Carinthia (January 2019 and June 2019), the effects of the management (organic "Bio-Wiesenmilch" versus conventional "GMO-free") and period (summer versus winter feeding situation) on the milk fatty acid concentrations were investigated. Since the "Bio-Wiesenmilch" production scheme of the Karntnermilch aims at grassland and pasture-based feeding systems, the possibilities for checking the ration composition via MIR fatty acid data sets had also been evaluated. The proportions of relevant fatty acid groups in milk were significantly different between the production systems (organic versus conventional) and periods (summer versus winter feeding situation). In the milk samples of the organic farms, the proportions of polyunsaturated fatty acids (PUFA), conjugated linoleic acids (CLA) and omega-3-acids (ω-3-FA) were significantly higher than in those of the conventional farms. Regardless of the production system, the CLA, monounsaturated fatty acids (MUFA) and unsaturated fatty acids (UFA) concentrations in the summer milk samples were higher than those in the winter milk samples. The seasonal effects were more pronounced in the organic system than in the conventional system. The MIR analysis results were highly correlated ($r = 0.95$) with the results of the GC analysis for the concentrations of UFA, saturated fatty acids (SFA) and MUFA. However, there were systematic deviations that have to be taken into account when interpreting the results. For the PUFA only a moderate correlation ($r = 0.57$) was found between the two methods. Additionally, a substantial variance was found, 95 of the MIR results for PUFA differed between −9.5 % and −40.4 % from the GC results. From the results of the study and from the literature it can be derived that MIR fatty acid results alone allow no clear and direct conclusions on the feeding strategy (e. g. dietary proportion of pasture, concentrated feed or maize silage). However, the MIR results could be used as a rough screening tool for farm advisory concepts.

Keywords: milk, fatty acids, mid-infrared spectroscopy, organic