Across breed and country validation of mid-infrared calibration equations to predict milk fat composition

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The aim of this study was to investigate the accuracy to predict detailed fatty acid (FA) composition of milk, from a population with different characteristics like country and breed, using calibration equations. Calibration equations for predicting FA composition using mid-infrared spectrometry were developed in the European project RobustMilk and based on 1236 milk samples from multiple breeds from Ireland, Scotland, and the Walloon Region of Belgium. The validation data set contained 190 milk samples from cows in the Netherlands across 4 breeds: Dutch Friesian, Meuse-Rhine-Yssel (MRY), Groningen White Headed, and Jersey (JER). Gas-liquid chromatography (GC) was used as golden standard to measure FA composition. The capillary column of the GC was different as the one used to develop the calibration equations, therefore some groups of FA were not considered due to differences in definition. Over all breeds calibration equations gave highly accurate predictions (R^2>0.80) for 8 individual FA and 7 groups of FA. Calibration equations for 3 individual FA were moderately accurate (R^2 0.60-0.80) and for 4 individual and 2 groups of FA predictions were less accurate (R^2<0.60). Comparing the different Dutch breeds FA composition in milk from MRY was predicted most accurately and from JER with the lowest accuracy. Generally, FA with lower concentrations in milk were predicted with lower accuracy. In conclusion, the RobustMilk calibration equations are robust and can be used to predict most FA in milk from the 4 breeds in the Netherlands with only a minor loss of accuracy.