

## Standardization of goat milk MIR spectra and fatty acid prediction equations

Calmels Marion<sup>[1]</sup>, Grelet Clément<sup>[2]</sup>, Dehareng Frédéric<sup>[2]</sup>, Davière Jean-Bernard<sup>[1]</sup>, Lecomte Christophe<sup>[3]</sup>

[1] Seenovia, [2] CRA-W, [3] Eliance

Through the European Milk Recording (EMR), routine standardization of cow milk spectra is now largely implemented in Europe (Grelet et al., 2017). To assess whether this approach could be applied to goat milk, two standardization sets were compared. In addition, two sets of existing fatty acid (FA) prediction models were evaluated: one specific to cow's milk developed within the EMR network (updated from Soyeurt et al., 2011, by CRA-W/ULiège), and a second set derived from the French PhénoFinlait program (Ferrand-Calmels et al., 2014). A new set of goat specific equations was also developed.

Four different prediction models on 20 goat milk samples, analysed with seven instruments and standardized using either cow or goat coefficients were used to evaluate standardization. Differences in prediction accuracy (root means square error - RMSE) between the reference instrument (master) and standardized instruments (slaves) were calculated. 100 goat milk samples were analyzed by gas chromatography (reference method) and used to evaluate existing equations by comparing predicted and reference values. Mean bias, RMSE, and  $R^2$  were calculated. Finally, a new set of equations was developed based on 250 reference analyses covering a wide range of feeding systems and lactation stages. Models were built using partial least squares (PLS) regression and support vector machine (SVM) methods, and their performance was evaluated on an independent validation set.

Results showed that standardization using cow milk provided similar performance to goat milk standardization. Therefore, cow-based standardization coefficients can be used for routine goat milk analysis without loss of accuracy. Significant deviations were observed for most FA with existing sets of equations. For the new set, performances were very good, with 12 equations showing  $R^2$  values above 0.9 (short- and medium-chain saturated FA, total C18:1, C18:1 cis-9, MUFA) and 15 equations with  $R^2$  above 0.8 (C15, C16, C17, individual MUFA, PUFA). In conclusion, goat milk spectra can be routinely standardized using cow milk standardization sets distributed by the EMR/CRA-W and a specific MIR equations for FA composition in goat milk is now available through the Optimir network.