10. Data Analytics What Can New Analyses Techniques Bring for Better Farm Results 2

Title presentation

Enhancing metabolic monitoring during early lactation using NEFA in blood as additional reference indicator

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Abstract

Monitoring the metabolic situation of cows during early lactation is an important part of herd management. One parameter is the occurrence of hyperketonemia - defined as the concentration of beta-hydroxybutyric acid (BHBA) in blood above a certain threshold, .g. ≥1.2 mmol/l. Another indicator for risk of hyperketonemia from milk analysis is the fat-protein-ratio in milk. Blood BHBA with a threshold of ≥1.2 mmol/l and a fat-protein-ratio with values ≥1.5 indicating risk of hyperketonemia were combined to one reference.

This combined reference was used to build a linear discriminant analysis (LDA) prediction model on milk mid-infrared (MIR) spectral data and information about the cow. The model predicts the risk of hyperketonemia expressed in three alert levels: Green (Low risk), yellow (medium risk) and red (high risk).

Recent research has shown that BHBA in blood is not the only important indicator for metabolic stress in early lactation. The proposed separation values for non-esterified fatty acids in blood (NEFA) of <0.39 mmol/l and ≥0.7 mmol/l were used to create a reference with three classes of low, medium and high risk of poor metabolic adaptation. An LDA model with milk MIR-spectra and cow information and this reference was built.

Farmers in Bavaria are provided with information from both models for cows in the first 50 day of the lactation with the report for each herd test day. This system helps farmers to detect potential problems and allows to intervene earlier.

New reference data for the three breeds Simmental, Brown Swiss and Holstein has recently become available from the Q Check project (q-check.org) and further data collection in Bavaria. This provided the opportunity to enhance the original models and to better evaluate their performance. Analyses showed that different approaches for model development result in very similar performance of the prediction quality. Population-wide predictions over several years showed stable results particularly for the BHBA-model, whereas the NEFA model appears to reflect seasonal variation in blood NEFA

levels. Further analyses will show, how far additional data can further improve the prediction models.