Mid-infrared based biomarkers in milk as a non-invasive tool for early prediction of lameness caused by metabolic disorders

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Lameness in dairy cows is a welfare issue that can vary greatly in severity, and is of concern for both producers and consumers. Metabolic disorders are a major problem in themselves, and, next to this, can cause lameness. Indeed, lameness is an often occurring consequence of various metabolic disorders, such as sub acute ruminal acidosis (SARA), ketosis or milk fever. The caused lameness event can occur weeks to months after the metabolic disorder making the detection of causality difficult. Moreover, detection of many metabolic disorders is very challenging and not straightforward. Mid-infrared (MIR) technology is already used for the prediction of major milk components, such as fat or protein, during routine milk recording and for milk payment. It was recently shown that this technology can also be used to predict novel components, linked to metabolic disorders of cows, such as ketone bodies, citrate and minerals. In the context of limiting the occurrence and severity of lameness, early prediction of lameness could help indicate the need to adapt the management and the environment of a cow at risk of lameness. Therefore, the aim of this study was to analyse the temporal link between metabolic disorders and lameness events, using locomotion scores of the cow and MIR based milk biomarkers for different metabolic disorders of her milk from previous test days. Research was based on data provided by RINDERZUCHT AUSTRIA, from their "Efficient Cow" project and were recorded between July 2014 and December 2014. First results obtained seemed to indicate that correct definition of the response variable is an important aspect as extremes in lameness severity, expressed on lameness scales, were more easily predictable. Results indicated also that using raw MIR spectra directly as predictor variables could be at least as efficient as using biomarkers that have to be predicted first from these spectra and then linked to lameness. Finally, these preliminary research results are currently challenged in complementary studies. If successful, MIR based information could form the basis for a novel managerial tool for lameness, based on expected occurrence of the disorder.

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