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Subject	Abstract presented manuscript as ORAL presentation	Challenges of integration and validation of farm and sensor data for dairy herd management

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Session: Using sensor technologies for health and welfare monitoring and recording as part of dairy herd improvement

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ABSTRACT

Precision livestock management has become an integral part of agriculture and dairy farms are increasingly using precision technologies such as sensor systems for herd health monitoring. Various companies exist, offering different sensors, e.g. accelerometers in collars or boli measuring cow activity and rumination, for different purposes such as fertility or feeding management or health monitoring. The D4Dairy project aimed, amongst others, to investigate the potential of sensor data and other farm and cow-specific data for disease prediction and genetic improvement of metabolic, udder and claw health. Results should lay a foundation for herd management tools and genetic health indices, which are expected to work across farms and sensor systems. Prior to any application, validation of sensor measurements is necessary. Some companies validated their sensor technologies in scientific studies by comparing sensor measurements (e.g. rumination time, duration of lying bouts) to a gold standard such as direct or video behavioural observations. Another aspect comprises validation of changes or patterns in sensor variables for a desired outcome such as heat or health alarms. However, to our knowledge no studies investigated how the measurements or alarms of different sensor systems correspond to one another. In particular, this will be a prerequisite for the development of herd management tools across farms, breeds and sensor systems. Furthermore, for the implementation of monitoring of any kind, reliability of measurements is another crucial aspect. Erroneous measurements due to hardware or software malfunctioning have to be identified correctly and outliers have to be distinguished from true deviations. The latter is even more difficult for sensor measurements without possibilities for plausibility check. Activity indices or other dimensionless sensor outputs lack established reference values and may differ even between animals equipped with the same sensor type whereas plausibility of rumen temperature or milk yield can also be assessed based on empirical knowledge. These issues had and partly still have to be overcome in the D4Dairy project and all projects with similar aims. In our contribution we want to present our approaches to sensor data validation, the problems we encountered and how we dealt with them including general recommendations for future studies in this area. :



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