

# Abstract Submission Form

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**Preferred presentation**

Oral

**Preferred session**

Session 1: WG Animal Data Exchange – Decision Support Tools of the Future – Promoting Sustainability Farm Management

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**Title of your paper**

Evaluating Farm Management Practices: A semi-supervised clustering approach to assess the impact of technologies

## Insert ABSTRACT text

This study explores a methodological approach aimed to evaluate the impacts of farm management practices on bovine welfare, with a particular emphasis on the utilization of high-dimensional data for benchmarking purposes. We present a semi-supervised method to overcome the challenges associated with comparative studies and the analysis of large, aggregated datasets on farm management and equipment. This approach combines knowledge-based feature selection with machine learning (ML) techniques to identify farm clusters based on different farm management practices and assesses disease risk both within these clusters and between cluster groups.

We show how this approach can be used to investigate the impact of technologies on bovine health, particularly with regard to milk fever, udder diseases and fertility disorders. Findings indicate that clustered farms categorized into groups based on the use of sensors and automated milking systems

(labeled as Smart-Clusters) show a trend towards decreased diseases risk with the lowest prevalence of udder and fertility disorders, odds ratios (ORs) of 1 for both, and a slight increase in the risk of milk fever (OR: 1.05). In addition, the healthiest farm management cluster (cluster 8) demonstrates that organic management, irrespective of technology use, positively impacts bovine health, as evidenced by ORs of 1 for milk fever and udder diseases, and a slight increase in the risk for fertility disorders (OR:1.07).

Our semi-supervised clustering approach not only helps to understand the complex interplay between management practices and cattle health, but also serves as a potential resource for farm planning and optimization, representing step forward in an individualized data-driven benchmarking framework.

**Enter keywords**

farm management, bovine health, semi-supervised clustering, key-features, AMS, Sensor Systems