

Does your Farm Data Give you the Full Picture?

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Why is this Important?

Dairy farmers view technology as a critical tool for their success. One benefit of dairy barn technologies is that besides milk, they also continuously produce scores of data about operations, processes, and yields. Knowing how to analyze and use this data is a powerful management tool. It is possible to undertake analyses that can help define and understand the return on investment of these technologies and the efficiencies they introduce. Data can also be used to understand your herd performance and to evaluate management changes (i.e. nutrition, reproduction, herd health, etc.).

Data in most dairy barns across Canada is collected through many barn and production systems and may ultimately sit in a computer system somewhere and likely takes considerable effort to access. The challenge of data organization is likely a common story on most dairy farms. Across a dairy operation, data is collected by various technologies with different manufacturers but with no pipeline for that data to flow into to provide a full picture of one's operation and its data assets in a single place.

The Dairy Learning Center (DLC) at Lakeland College houses numerous technologies and data collection systems, making it the perfect environment to answer the question of which technologies to invest in for a higher return on investment

What did we do?

In 2020, Lakeland College's 280-head DLC was awarded a grant from Alberta Innovates to compare the energy and water use between a traditional parlour milking system and a robotic milking system to understand which system was most efficient at using energy and water resources, with respect to milk production in a "real-world" setting (in situ). This collaboration was extended to Cybera, who initiated a Data Science Fellowship that brought four data scientists from across the province together for one month to work with the DLC. They were tasked with trying to determine which system, the parlour or the robot, used water and energy more optimally.

This work involved the DLC staff and faculty extracting relevant historical data from their various sources within the barn, bringing these datasets together in one place, linking the datasets together, and conducting analyses. The data scientists conducted an analysis using individual cow milk production, milking system data, DairyComp test day, water use, power use and weather to understand:

- (1) water use and corresponding milk yield for both the robotic milker and the parlour system
- (2) energy use and corresponding milk yield for both the robotic milker and the parlour system
- (3) separate models representing relationship between energy and water use and yield were created for both of the systems to determine which system was functioning more optimally.

What did we Find?

Given the data that the researchers had access to, they found that the robotic system used energy and water more optimally than the traditional parlour system. However, the picture of the two milking technologies, is not yet complete enough to rigorously answer Lakeland College's original research question. There were challenges related to accessing data that spanned back longer than a few months, including exporting data from systems so that it was available for analysis, and accessing data that included enough detail to understand variations between the two milking systems.

What does this mean?

As part of the work the Data Science Fellowship undertook, a dashboard prototype was created to help Lakeland College organize and access the datasets that the barn collects. By aiming to understand dairy barn data assets and what is needed to ask questions that are important to producers, Lakeland College demonstrates their commitment to beginning to fill some of the data-gaps that would help them complete the full picture.

An enormous amount of data is collected on each dairy farm, whether automatically by technology or manually by hand (Table 1). This data can have real value to producers, including evaluating farm efficiency, herd performance, and economic performance. Data collected on farm is also essential for benchmarking, determining farm performance compared to peers, and for evaluating the effect of management changes. In order to effectively use this data, producers should aim to understand what they are collecting, how to store and organize data and how to use this data to evaluate performance in different areas. Talk to your farm service providers to determine what data is useful for your operation how to effectively manage your data.

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Table 1. What kinds of data are available on farm?

Dataset	Inclusion	Purpose
DHI test day	Milk yield for all cows	Peer benchmarking
Parlour/VMS	Milking report for each cow	Evaluating the impact of milker, cow health, nutrition, weather, etc.
Herd Management Software	Health and reproduction data. This includes paper records too.	Identifying problem areas and evaluating management changes
Nutrition Reports	Group intake, diet composition	Impact of feed changes on health, fertility, production
Hoof Trimmer Reports	Prevalence of lameness and specific lesions	Identifying problem areas and evaluating management changes
Resource Usage	Power usage Water Usage	Evaluating farm efficiency
Environment	Meteorological parameters	Weather impacts on feed, health, fertility, production

Summary Points

- Data collected on farm can be translated to identify gaps in performance and to inform management decisions
- Help exists to collect, translate and summarize data
- Data collected on farm provides unbiased information to discuss with your farm service providers