VALACTA – Dairy Production Centre of Expertise

The passion to do more by valuing milking robot data

Mario Séguin
Agr., Dairy Production Expert – Milk Recording and Data Management, R&D, Valacta.

Given the growing number of dairy farms equipped with automated milking systems (AMS), Valacta is working to better understand and value the data generated by the software and sensors found in these systems.

Valacta's primary goal is to support these producers in making the best possible use of AMS technology. Valacta also focuses on developing automated processes that will ultimately collect farm data through cloud computing. Acquiring and processing this data will make it possible to establish national benchmarks to support producers in robotic milking herd management.

Some brands of milking robots provide indicators on milk component values as well as somatic cell counts (SCC). To put such information to good use, it is essential to better understand and validate the data against results from certified laboratories. To that end, Valacta has conducted a study aimed at characterizing the milk component data generated by robotic milkers (see textbox).

Sensor calibration is key to obtain accurate component readings.

After collecting milk samples from all milkings during a 24-hour period, daily values of fat, protein and SCCs that were generated by the robots were retrieved from the AMS software. Samples were also tested in the laboratory, which made it possible to compare the lab results with the values obtained from the milking robots.

Do fat and protein values from robotic milkers differ from the laboratory analyses?

Average daily herd results show little difference between the robot data and the laboratory results. Researchers conducted different analyses to quantify the variance for each cow. One of these analyses was meant to establish correlations between robot values and laboratory values. With a correlation of +0.37 for fat and +0.38 for protein, the results confirmed that the robot values are an "indication," as specified by the manufacturer.

Does calibration affect the accuracy of the measurements?

The analysis of the correlations for each of the 10 herds showed variable results. One possible explanation for the variation is the calibration of the milking robots. Calibration is a key factor in the precision of measuring instruments. The most commonly used calibration method for robot sensors is based on bulk tank levels. Producers themselves must input the levels for each milk shipment into their software. One hypothesis is that calibration frequency may affect the accuracy of the component readings by the robotic milker.

What about SCC?

The technology used to generate SCC values differs among systems. One system aims to identify cows suffering from clinical mastitis, as would an on-farm CMT (California Mastitis Test). The other system uses an optical somatic cell counter, a technology similar to what is found in certified laboratories. For SCCs under 500,000, the optical counter provides values that are comparable to laboratory results. This is not the case with the CMT technology, however, as it tends to underestimate herd SCC. These results show that it is important to have a clear understanding of the differences between the on-farm automatic milking systems, particularly if the data is to be used for genetic evaluations.

Can we do more with the data from automatic milking systems?

This study confirms that milk component levels currently provided by robotic systems can be used to help producers better manage their herds. The results also suggest that it is important to have a good understanding of the technology behind each different system to monitor their calibration and accuracy. Further research will be important to better understand sensor calibration procedures and to assess the effects of calibration. The Canadian dairy industry will then need to use this knowledge to establish data validation mechanisms based on their intended use, making a distinction between data for herd management purposes and data for genetic evaluations.

Valuation of milk component data generated by robotic milking systems

Project Overview:
- 14 dairy farms
- 2 milking robots per farm (in most cases)
- Milk samples were taken from all milkings during a 24-hour period in 10 herds with milking robots equipped with sensors for milk, protein and lactose levels. A total of 2,970 samples were collected from 797 cows. Five of the farms used a CMT milk analyzer to measure SCC.
- For the four farms using an optical somatic cell counter, milk samples from the first milking were taken over a 12-hour period from a total of 216 cows.
- The samples were analyzed in the Valacta laboratory for milk component levels and SCC.
- Financial support was provided through the "Growing Forward 2" Sector Development Program, a joint initiative of the MAPAQ and Agriculture and Agri-Food Canada.