



# Dairy farms in the big data era: A world of opportunities and challenges

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The ever-increasing use of technological tools on dairy farms is generating massive amounts of data. Processing all that information, through software, algorithms and soon artificial intelligence, opens the door to developing powerful and practical applications and innovative tools for dairy farmers. To reap the benefits of this digital revolution, producers have a vested interest in ensuring the data collected on their farms are exploited to their full value and used appropriately. Some reflection upon this is in order.

## Data, data and more data

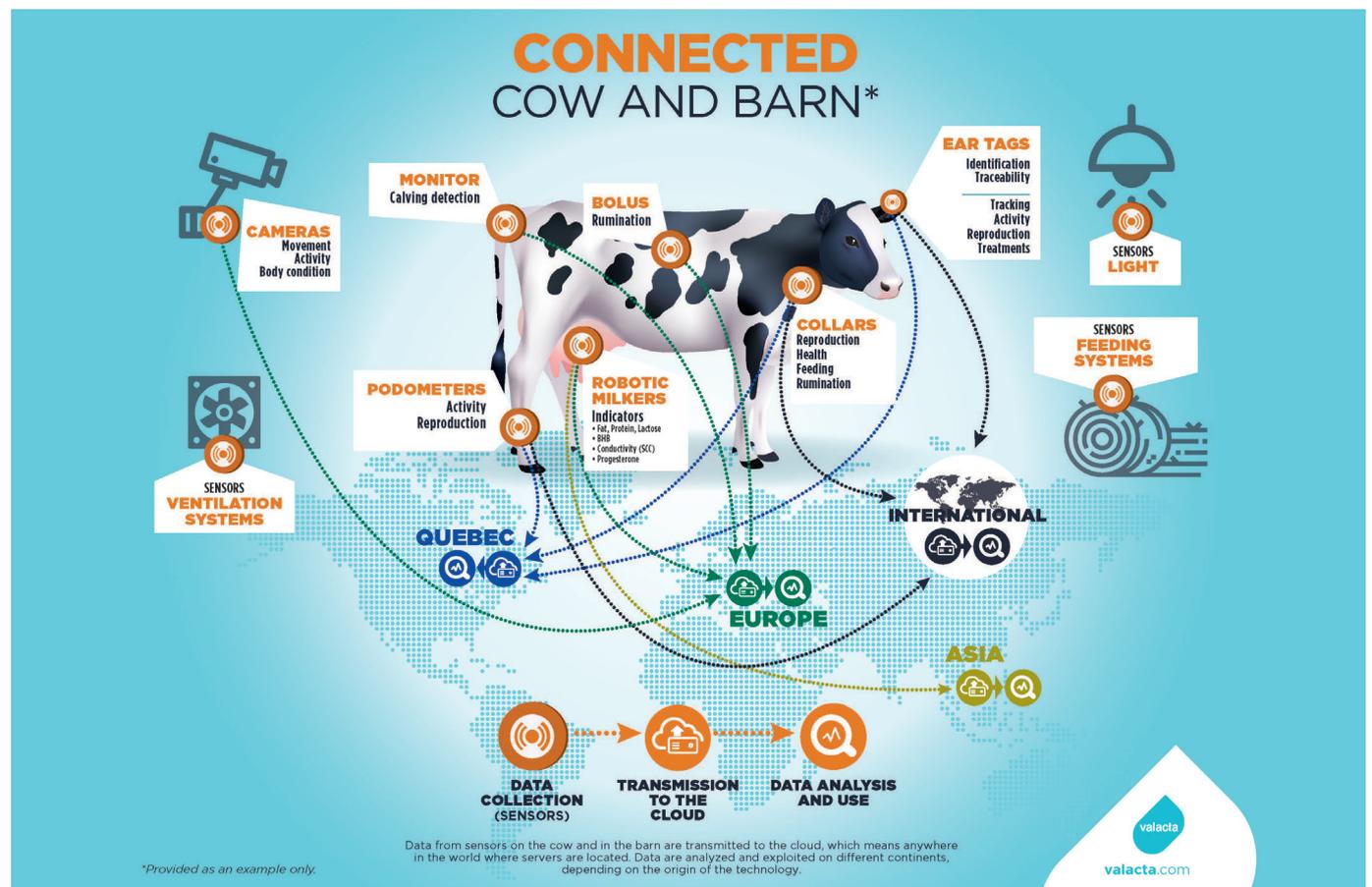
The dairy sector has long been using data to improve herd performance. Pedigree and milk recording data, for example, have been collected for more than 100 years now for the purpose of genetic improvement. Over the past decades, data gathering has multiplied to include information on management, feeding, health and milk payments, among other things. Through sensors, cameras and automated milking systems, a cow now generates data with every chew, every movement and at each milking of each of her quarters. That information serves a number of purposes – from detecting heat and pregnancy, to detecting diseases, like mastitis and metabolic disorders, to ascertaining stress levels in individual cows, which can affect milk production. In addition, equipment in the barn, from ventilation to feeding systems, is likely to be linked to sensors that also contribute to the data set.

All the data generated by high-tech hardware and software are geared towards facilitating herd and farm management. How are producers and their advisers to navigate this sea of information?

## Capitalizing on the data

Despite their enormous potential, data only have value if they are exploited fully and if they deliver a benefit, such as:

- reducing and/or facilitating workload and herd management;



**Figure 1:** Today, a modern dairy operation generates information through sensors, cameras and automated milking systems. A cow now generates data with every chew, every movement and at each milking of each of her quarters. Harnessing that information is key.

- improving feed efficiency or reducing ration cost without affecting productivity;
- improving certain herd performance criteria like calving intervals or milk components;
- lowering the incidence and impact of stress and disease on animals.

There is also the largely untapped potential of increasing the value of the data by aggregating data sets to improve herd performance indicators. Imagine, for example, a data bank combining historical data for barn temperature, changes in production and milk components (shipments and milk recording), rumination and activity. Producers might be able to use that information to predict and quantify milk revenue losses during the hot summer months, and then take measures to limit heat stress.

Add genomic data to that, and it might even be possible to identify bloodlines with greater resistance to heat stress! Aggregating and analyzing these different data sets as a whole markedly increases their potential.

## Data challenges

For data to be fully exploited, they must be accessible and combinable. This is

already the case for milk recording and milk payment data, in addition to some health and, even more recently, AMS data, which can all be processed and exploited as a whole. For example, AMS farms can transmit data from those systems to Valacta's database. That information, coupled with milk recording data, is used to generate a management report, which allows producers to assess the performances of both their system and herd. This report also allows them to compare their indicators with averages for AMS farms and then take action to increase the efficiency of their robotic milkers. However, this represents only a fraction of the potential for valuing the data generated by milking robots, since access to this data is not seamless from one system to the next.

When systems are incompatible and cut off from one another, as it is so often the case, adding value to data becomes much more complex.

What happens to all the data generated by the connected cow and barn (Figure 1)? Isolated in separate clouds, are all the data exploited at their fullest value for the benefit of producers, who have already paid for them?

In this age of big data and advanced technology, producers can legitimately ask themselves: Who exactly has access to my data? Do I have full control over my data and am I making the most of that information? Would my technology provider be able to facilitate the transfer of my data to organizations run by dairy producers? Who foots the bill to develop the infrastructures required to transfer data between producer organizations and technology providers?

Data ownership and use are important issues, an integral part of what is called data governance. Data must be managed soundly, in an informed manner, for the benefit of dairy producers and all dairy sector stakeholders.

## Further reflection is required

If multiple data sets from different sources represent unprecedented potential for dairy production, they also raise a number of critical issues, like access, sharing and governance. In order to benefit their industry to the fullest, dairy producers will need to ask the right questions and demand a greater return on their investment through value-added data.