

# Information overload calls for 'virtual brain'

VICTOR CABRERA

**D**airy farmers are inundated with data. On-farm milking, feeding, activity monitoring and reproductive systems gather data while artificial-insemination companies, milk processors and breed associations continually update producers with new information.

In addition, weather forecasts, commodity prices and ever-changing regulations keep producers juggling facts and figures. All this data holds little value if it's not transformed into usable information.



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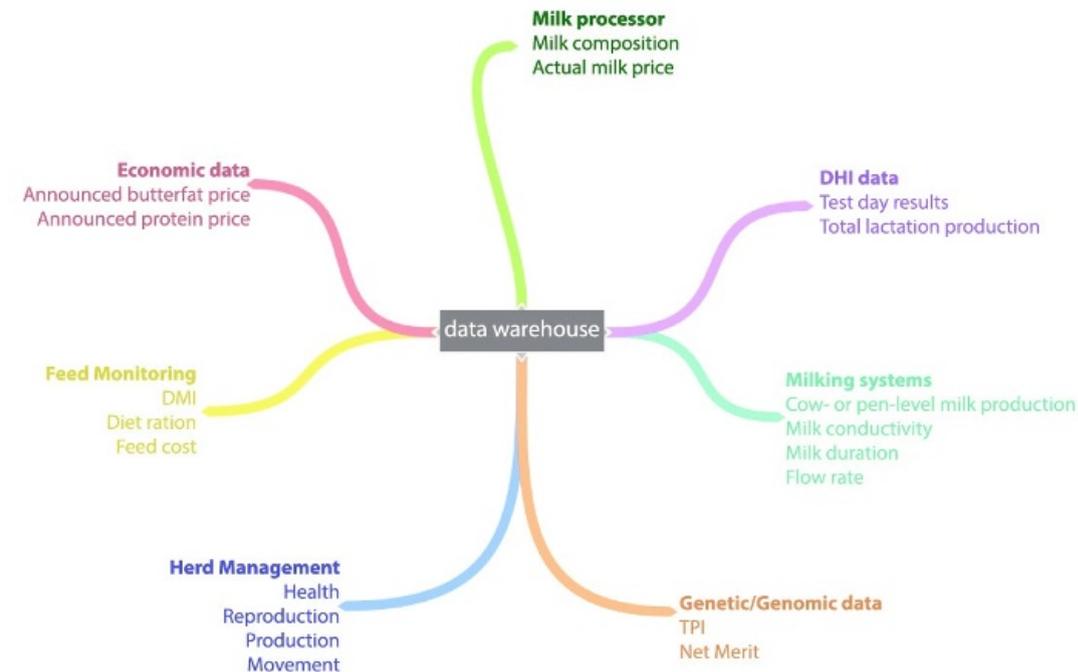
A team of researchers at the University of Wisconsin-Madison is progressing with a project that will not only sort dis-

jointed streams of information but also apply artificial intelligence to mimic the same kind of "reasoning" a successful dairy-herd manager would use.

Researchers from the computer and dairy-science departments are working on a web-based project that has been compiling data streams from three well-managed dairy herds in southern Wisconsin.

We called this project the "Virtual Dairy Farm Brain" because we're trying to mimic the thinking of a good dairy-farm manager. We're going to start by seeing what the manager decides to do with the data and then see what our system would suggest as potentially the best decision.

Once the on- and off-farm data is collected from the dairy farms it's integrated into a data warehouse and stored in real-time on a secure server at the UW-Madison Wisconsin Institute for Discovery. Data from more than 4,000 cows



has been streaming in for several months.

A packed room at the 2018 PDPW Business Conference underscored the impact information overload is having on dairy producers. Virtual Dairy Farm Brain researchers presented their vision to attendees and surveyed them to better understand their needs regarding data analytics. About 91 percent of the participants rated data integration as "important" or "very important."

The Virtual Brain presents data in real-time visual dashboards, enabling decision-makers to detect changes and immediately institute corrections or improvements. In addition the data warehouse will simplify otherwise time-consuming calculations by bringing the data together and "thinking" like a dairy manager to enact wise decisions.

A majority of surveyed participants - 83 percent - reported they use feed efficiency and milk income as

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key performance indicators, rather than feed cost, for the basis of management decisions.

Feed efficiency, defined as milk produced divided by the amount of dry matter consumed, is calculated by integrating data collected by three separate systems – daily-milking information recorded by milking-system software, dry-matter intake collected by feed-monitoring software, and daily-pen allocation from herd-management software. Similarly, income over feed cost is calculated by integrating milk-composition data from three separate sources – the milk processor's database, an external economic database and feed-monitoring software.

As researchers monitor the program they've discovered interesting information regarding management strategies that

are commonly accepted as standard. Eighty-eight percent of the surveyed participants indicated their primary strategy for grouping milking cows is determined by parity or stage of lactation.

However data has shown when cows were grouped by nutritional requirements or parlor efficiency instead, improvements were seen in herd health, productivity and diet formulation while feed costs and nutrient emissions decreased.

Currently users of Virtual Dairy Farm Brain can plot a cow's daily-milk production on-demand and compare it with the daily herd-level milk production during a selected time period. Users can then integrate that data with a cow's recorded health and reproduction events or other management factors to

analyze the impact of those events on milk production. Fifty-eight percent of surveyed attendees reported their culling decisions are based mostly on reproduction while 39 percent pointed to production as a primary culling factor.

If sorting through data is one monumental task, applying artificial intelligence to arrive at a logical action is certainly another. Collaborating with the UW's Center for High Throughput Computing allows the project to continue moving toward its ultimate objective of sparing dairy producers countless hours of calculation and data interpretation.

Devising algorithms that analyze what's happening on farms is one of the many roles the computer scientists play in the Virtual Brain project. By

discovering which inputs result in which outcomes the entire team can build a program that more accurately predicts the potential results of a broad range of everyday management decisions.

As the project moves through the stages of ensuring the web-based prototype is more widely available, researchers also look forward to creating a mobile-friendly application. In the meantime interested dairy farmers still have an opportunity to be involved in the project. Farms that use multiple data sources are eligible to participate in data-streaming at no cost to the farm.

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