DATA FUELS GENETIC IMPROVEMENT

HOW SHARED DATA ADVANCES DAIRY RESEARCH

Pause for a moment and think about how society benefits from shared data. It certainly comes in handy if someone needs to find the best orthopedic surgeon when a knee replacement is on the horizon. How about the detection of genes likely to cause cancer? Without data sharing, research is more expensive and important discoveries and progress are limited. The National Cooperator Database, stewarded by the Council on Dairy Cattle Breeding, delivers on the promise of forward progress for the dairy industry as a whole. This is possible thanks to producers who contribute their data, which enables genetic and genomic evaluations and other groundbreaking research to happen.

What DHI Milk Data Makes Possible

— Dr. Malia Caputo, Council on Dairy Cattle Breeding

How does the standard DHI milk sample provide valuable research data?

DHI milk analysis not only provides information for genetic evaluations and valuable real-time information for the producer to make decisions on-farm, but it also contributes to research for the development of new traits and tools. DHI labs have new capabilities to generate additional milk component information, including fatty acids and beta casein, which are related to various economically important outcomes such as cow health and cheese making ability. Research has linked milk fatty acids with cow nutrition, allowing producers to use milk fatty acid data as an early indicator of potential poor rumen health and milk fat depression. Ultimately, the outputs of milk samples provide, and will continue to provide, additional information to the producer to better inform management, culling, and breeding decisions on farm.

What new data types are you starting to collect and what impact do they have for producers and the industry?

Traditional DHI milk analysis contributes important information regarding milk composition, including milk fat, protein, and somatic cell score. The instruments used to generate this information utilize infrared spectrometry, which generates milk spectral data. Milk spectral data can provide additional component measurements such as lactose, milk urea nitrogen (MUN), beta casein, and fatty acids from the same DHI milk sample. These components not only provide more detail to the producer on each cow's potential profitability but can also provide insight related to cow health, nutrition, and management. Fatty acid analysis can be used to estimate methane production, providing a valuable metric for sustainability efforts.

What role does milk spectra data play in the research you are doing?

Since milk spectra data is generated as part of routine DHI procedures, it can provide additional insights without significant additional sample collection cost or labor in most cases. Facilitating the collection and reporting of this information from DHI labs is allowing the Council on Dairy Cattle Breeding to build a database to explore a number of research questions. This research includes the development of new component traits, better understanding of how milk fatty acids are related to overall lactation performance, and prediction of indirect measures like methane production. Guided by the wants and needs of the industry, the milk spectra database will hold answers to real-life challenges, providing producers and their consultants with additional management tools to make more informed and timely decisions regarding the management of their animals.

> ***"Milk spectra data is an untapped wealth of information that can provide additional insights without significant additional sample collection cost or labor in most cases."***
>
> *— Dr. Malia Caputo, CDCB*

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Farms Benefit From Research Data Generated by the National Cooperator Database

— Dr. John Cole, Council on Dairy Cattle Breeding

How does the research data generated by the National Cooperator Database benefit dairy producers and consultants?

Dairy producers are making genetic progress more than twice as fast as they did before genomic selection. The gains made through breeding are permanent and cumulative, and for some traits, more than half the year-over-year gain in performance is due to improved genetics. Today's animals are more productive, more fertile, longer-lived, healthier, and more profitable than in the past.

Where would genomic evaluations be without the database?

There are no CDCB genomic evaluations without the National Cooperator Database. The cow performance information that flows through the integrated industry system into the database is essential for the calculation of genetic and genomic evaluations.

What do you consider the top three traits producers can select for or away from thanks to the database research?

I recommend producers focus on the lifetime merit index that best matches the way they're paid for their milk because that's the most efficient way to make long-term genetic gains. Given that, my top three traits are:

1. **Productive Life** – Long-lived, profitable cows are the backbone of successful herds. Given the significant fluctuations in replacement heifer inventories and prices, cow longevity is more important than ever.
2. **Heifer & Cow Conception Rate** – Without good fertility, we can't create the next generation of dairy animals, and we can't keep the milk, fat, and protein flowing.
3. **Feed Saved** – Efficient cows are profitable cows, and Feed Saved evaluations help us identify the top performers. When cows consume less feed at the same level of production, they also have a lower greenhouse gas intensity and contribute to the sustainability of our industry.

How do you see research evolving in the future?

There are several key areas where CDCB research – both internally and in concert with university and industry partners – has the potential to provide substantial additional value to the industry.

- **New traits** – We continue to work with our collaborators to identify phenotypes that are routinely recorded on dairy farms, have a genetic component, and are of economic importance to dairy producers.
- **Management tools** – While we're very good at predicting animal genetic merit and providing dairy producers with tools for making the best possible mating decisions, we can also provide better tools for predicting animal performance.
- **Sensor data** – There are now dozens of technologies available to dairy producers that collect many measurements (sometimes hundreds or thousands) for each animal each day. Discovering how to apply this information to genetic selection is an exciting prospect.
- **The other AI** – Machine learning systems and large language models aren't always as good as the options we're already using, but they can be useful.
- **'omics** – After the tremendous success of genomics, there has been an explosion in other 'omics technologies. We hope to be able to use this information to make highly personalized predictions in the future.

View Here

Learn more about the National Cooperator Database

POWERED BY CDCB™

How can you know when the genetic evaluations you're using to make a selection decision come from this integrated and quality-controlled system? Look for the Powered by CDCB mark. This logo indicates that genetic information is derived from the objective, farmer-owned data stored in the National Cooperator Database and calculated by an independent organization.