



Improving Existing Traits and Adding Exciting New Ones

Some believe genomics is the be-all and end-all of the opportunity for genetic improvement. In reality, genomics is a by-product of solid traditional genetic evaluation systems and would not work without them as input. For this reason, Canadian Dairy Network (CDN) is continually improving both genomic AND traditional genetic evaluations to provide you with the most accurate overall genetic information possible for each animal. Read about some recent changes that have been made, as well as about some exciting things to come on the horizon.

Separating Somatic Cell and Production Traits

In 1999, Canada was one of the very first countries in the world to use each cow's test day information for genetic evaluations instead of lactation-based data. Since that time the production traits, namely milk, fat and protein yields, were evaluated simultaneously with somatic cell score using statistical software called the "Canadian Test Day Model" (CTDM). While this system has served the industry very well for the past 15 years or so, research at CDN in recent years identified an opportunity to improve the stability of published Somatic Cell Score proofs. Given the growing importance of this trait in the eyes of producers and its contribution towards both LPI and Pro\$ indexes, CDN geneticists found that both production and Somatic Cell Score proofs would be improved, in terms of variability over time, if they were analyzed using two separate test day models rather than calculated simultaneously within a single multiple trait system.

Effective April 2016, the new approach of calculating production evaluations separately from Somatic Cell Score will be used for all breeds. This enhancement also required the calculation of new genetic parameters such as heritabilities and genetic correlations across traits. In addition to affecting Milk, Fat, Protein and Somatic Cell Score, the update can also lead to changes for Lactation Persistency and a minor impact on Herd Life, since Somatic Cell Score is a predictor of indirect Herd Life. For Holsteins, this improvement is expected to have no impact on LPI for 85% of proven sires and 76% of genotyped cows, and the most extreme changes will be a one-time adjustment of up to ± 40 and ± 130 LPI points for proven sires and cows respectively.

Daughter Fertility and Female Fertility Traits

Improvements to CDN's traditional evaluations for female fertility are also expected before the end of this year, which mainly entails the use of pregnancy check data to better determine conception dates. The pregnancy check data collected from producers by DHI now provides CDN with the opportunity to improve the existing genetic evaluation system for traits related to female fertility, of which three reflect heifer fertility and four represent fertility in lactating cows.

The main traits to be affected by this improvement are the interval from first service/insemination to conception in both heifers and cows as well as days open. To date, subsequent calving records have been used to determine when conception occurred, simply by using the insemination record approximately 280 days prior to the calving date. Utilizing data that confirms pregnancy status will reduce the time required to validate that conception actually did occur and it will also allow for the inclusion of conception dates for females that do not have a subsequent calving date at CDN. In terms of sire proofs for First Service to Conception, more data on daughters will be available, and about six months earlier, which therefore increases the accuracy of this trait, as well as Daughter Fertility as the overall index that combines key female fertility traits.

Novel Traits to Come in Canada

On-going research is set to release a wealth of new information in the coming years. Key areas of current research include health traits as well as feed efficiency and methane emissions.

- **Ketosis & Displaced Abomasum:**

Genetic evaluations for Clinical Mastitis and a Mastitis Resistance index were officially introduced in August 2014 as the first outcome of the National Health Project in 2006. The next fruit of this national system for producers to report on-farm health events are genetic evaluations for Ketosis, including BHB as an indicator of sub-clinical ketosis, and Displaced Abomasum, which will all be combined into a Metabolic Disease Resistance index. The target date for official implementation of this new genetic evaluation system is December 2016.

- **Metritis & Retained Placenta:**

Stemming from the same source of on-farm data collection of health events mentioned above, genetic evaluations are under development for resistance to fertility disorders, including Metritis and Retained Placenta. Expect to see new proof information available in 2017.

- **Hoof Health/Lameness:** Hoof health data acquired from Hoof Supervisor software, used by a growing number of Canadian hoof trimmers, has undergone research and proven to be an area of opportunity for genetic selection. The recording of various infectious and non-infectious lesions as well as other hoof health characteristics, observed at the time of hoof trimming, serves as an excellent source for building a national system for herd management and genetic evaluation with the aim of reducing costs of treatment and lameness. The ongoing research project has established a data collection system to allow routine data transfer from Hoof Supervisor to DHI and on to CDN. An important outcome of this project will be the implementation of genetic and genomic evaluations for hoof health traits with targeted implementation by 2018.

- **Feed Efficiency and Methane Emissions:** CDN has taken the leadership role in conducting a major research initiative, involving international partners, that targets the use of genetics and genomics for improving feed efficiency and reducing methane emissions in dairy cattle. The project received \$3.8M in funding from Genome Canada and will involve the collection of individual cow feed intake data and genotypes from two research herds and two producer-owned partner herds in Canada. The ultimate goal is the implementation of new genetic and genomic evaluation systems for these traits in the coming years.

As is the case in all industries, the only thing constant is change - the same goes for Canadian genetic evaluations. Improvements to methodology, incorporating new data to strengthen existing evaluations, and the development of novel traits all contribute to maintaining Canada's status as a world leader in dairy cattle improvement.

Authors: Lynsay Beavers, Industry Liaison Coordinator, CDN
Brian Van Doormaal, General Manager, CDN

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