

Enhancing Dairy Producers' Profitability Using Genomics

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In 2014, four genetic projects have been funded within the Dairy Cluster 2 initiative. Two projects focus on genomics and aim to significantly improve the accuracy and the speed of current genomic evaluation methods. Within the first project, a new method to estimate reliabilities has been established and is currently used for weekly genomic evaluations by the Canadian Dairy Network (CDN). Also, a new genomic evaluation method based on chromosome segments has been developed and it will be soon tested on various traits. The second project involves the genotyping of 10,000 Holstein cows. This effort will increase the accuracy of genomic evaluations by using cow genotypes in the genomic reference population. Also, the use of sequence data paves the way for gene discovery. Currently, 6,000 cows have been genotyped among Canadian herds, and of those, 3,000 cows have been imputed to sequence. The other two projects focus on identifying novel traits, related to nutritional value of milk and animal health. The first project aims to use milk infrared data collected by milk recording agencies to identify indicators for improving cow robustness and the nutritional quality of milk for human consumption. A pipeline has been developed in collaboration with Canadian DHI to store these data and transfer them to CDN. Currently, the University of Guelph is analyzing approximately 2,000 milk samples for their fatty acid profile and other fine milk components to use as a reference for developing prediction equations. Those milk components are potential indicators of animal health and reproduction status, nutritional quality of milk, or both. Finally, the fourth project aims to provide dairy producers with better tools to increase hoof health. An interface was developed to transfer data collected by hoof trimmers to Canadian DHI and CDN in order to create a coherent and sustainable national database. This data can then be used to improve hoof health management reports and develop genetic and genomic evaluations for hoof health. Current results show that hoof lesion data collected by hoof trimmers can be used for this purpose, since there is an exploitable genetic variation for hoof lesions, and, therefore, there is a possibility for improvement through direct selection in the long term.

Implications: These research projects will provide tools to increase the accuracy of genomic evaluations and the opportunity to select for novel traits in order to enhance dairy producers' profitability.