

The Efficient Dairy Genome Project

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The Efficient Dairy Genome Project (EDGP) is a large research project that is focused on two novel traits in dairy cattle, feed efficiency (FE) and methane emissions (ME). The EDGP will provide genomics-based tools to support selective breeding for these two traits. To this end, the project has developed a secure database housed at CDN which will be used to deliver a routine genomic evaluation service for FE and ME to producers and the AI industry. Canadian data is being collected from two university farms and a commercial farm, SunAlta Farms in Ponoka, AB. Over 200 GrowSafe bins have recently been installed at SunAlta Farms to collect individual feed intake measurements. This information is being combined with similar data from partner countries including Australia, Denmark, Switzerland, the United Kingdom and the United States. The project has also generated whole-genome sequences for 32 Holstein bulls which was combined with existing sequence data on another 451 individuals from previous projects. This information has been used to find DNA differences (single nucleotide polymorphisms and structural variants) that may be contributing to variation in these traits. Such variants will help us understand the underlying biology of these traits and will serve as genetic markers to select superior animals. The project has also estimated economic weights for FE and ME and work is in progress to develop an Efficiency Index for genetic selection. In addition to these efforts, the economic, environmental and social impacts of selecting for these two traits are being measured.

Implications: *Increasing* feed efficiency and *decreasing* methane emissions in dairy cattle while maintaining current milk production will help to address the increasing demand for high quality milk while reducing feed costs for producers and reducing the overall environmental impact of the dairy industry.