



Growing Forward 2

A federal-provincial-territorial initiative

NB Dairy Genomics Project

Producer Summary

March 2018



Producer Summary - New Brunswick Dairy Genomics Project

A. Genomic profiling as a prediction tool for future milk production

A comparative statistical analysis was conducted on 1962 Project-profiled heifers to ascertain the accuracy of genetic profiling as a predictor tool of first lactation yield. The analysis divided the genotyped heifers into quintiles based on Genomic Parent Average for LPI, Milk, Fat, Protein and Conformation. **The analysis demonstrated that quintile groups for a given trait do very well in terms of identifying groups with increasing performance in first lactation as well as conformation, in particular the top-producing 20% and bottom-producing 20%.** Though, the actual accuracy of predictability based on LPI quintiles depends on the emphasis of the trait in LPI. Breeds and herds with smaller quintile groups had more variable results. **It is very apparent that performing genomic profiling on heifers now makes sense. However, it is clear that the evaluation of any single heifer is not a highly accurate prediction of their future performance as a cow. With genomics, you can identify a group of heifers, i.e. bottom 20%, that in general, will not perform well when they enter the milking herd. But it must be remembered that all higher-ranking heifers in the top-producing quintile may not necessarily perform well, since environment has a major impact on production. Additionally, project analysis revealed the average reliability gain for LPI when using genomics increased by 35, 9 and 25 percentage points for the Holstein, Ayrshire and Jersey animals respectively.** Thus for Holsteins, the prediction accuracy with genomics is doubled for most key traits. The reliability gains are lower for the Ayrshire and Jersey breeds simply because the genotyped reference population for these breeds is so much smaller than the Holstein reference pool.

The Project clearly demonstrated that genomic profiling of heifers offers four major advantages to dairy producers:

1. To identify young calves that do not have the level of genetics that warrant keeping them as potential heifer replacements,
2. To make improved genetic selection and mating decisions to increase the genetic potential of future heifer replacements for the herd,
3. To identify females that are carriers of undesirable genetic traits in order to manage their potential impact in the herd,
4. Ensures correct parentage when parents are also genotyped, which is true for all A.I. sires.

To facilitate the ease of using genomics in a producer's herd the Canadian Dairy Network, Holstein Canada and Zoetis Canada are partnering to develop an on-line free software tool that will allow producers to:

- Evaluate results of your past breeding decisions,
- “Tweak” LPI or Pro\$ for customized goals,
- Assess genetics of your current herd inventory,
- Evaluate “Return on Investment” of strategies for using genomic testing, sexed semen, top sires, etc.
- Identify carrier females to manage the impact of genetic recessives/haplotypes in your herd.

It is anticipated this software tool will be available in the fall of 2018.

B. Heifer weaning weight as a prediction tool for future milk production

Research evidence suggested heifer calves that make the biggest weight gains between birth and day 56 will also be the highest milk producers. The objective of this component was to determine if this observation is true and if so can 56-day weight gain be used as a predictor tool for future milk production?

The comparative statistical analysis of the relationship between Average Daily Gain (ADG) and Milk Yield in 297 study calves at the level of the individual herd determined that the ADG was just barely significant at the 5% level, having a P-Value equaling 0.0475. Additionally, a 1kg/day in ADG translated into a 1,410 kg increase in 305-d Milk

Yield in the first lactation. **In conclusion, the research hypothesis “Heifer calves that make the biggest weight gains between birth and day 56 will be also be the highest producers” is not true and ADG was determined not to be a good predictor for first lactation milk yield.** In fact statistical analysis revealed that the best predictor for first lactation milk yield was the heifer’s Genomic Parent Average (GPA) for Milk. Even without genomic testing, Parent Average (PA) for Milk was a good predictor of future milk performance.

C. Passive immune transfer as a prediction tool for future milk production

Passive Immune Transfer is the measure of the level of colostral antibodies (IgG) in the blood of a neonatal calf derived from the animal consuming colostrum from either their dam, another fresh cow or from a commercial colostral source. Subsequent to consumption of adequate high quality colostrum neonatal calves should have serum IgG levels of 10g/L or 1000mg/dL or greater. Newborn calves that have consumed colostrum but have serum IgG levels less than 10g/L or 1000mg/dL are classified as having received insufficient levels of IgG antibody protection and are diagnosed as animals with Failure of Transfer of Passive Immunity (FTPI). These animals are subject to increased risk of disease. Research evidence suggested calves that absorb larger quantities of colostral (IgG) antibodies, i.e. have higher blood levels of IgG, will also be better milk producers. The objective of this component was to determine if this observation is true and if so can Passive Immune Transfer be used as a predictor tool for future milk production?

The comparative statistical analysis of the relationship between neonatal serum IgG levels and Milk Yield in the study calves at the individual herd level determined that the neonatal serum IgG level was not significant at all, having a P-Value equaling 0.9295. Furthermore, the statistical relationship between neonatal FTPI and Milk Yield in the study calves was also not significant having a P-Value of 0.5238. **In conclusion, the research hypothesis “Heifer calves that absorb larger quantities of colostral antibodies (IgG) will be better milk producers” is not true and neither blood IgG levels or the resulting FTPI status are good predictors for first lactation milk yield.** The reason for no strong correlation between neonatal IgG levels and first lactation milk yield is the fact that other herd management factors have a very large impact on average production levels.

(D) Current (2014) cost of raising replacement dairy heifers

Thirteen of the 29 participating producers completed the *Costs of Raising Replacement Heifers Questionnaire*. On those 13 farms, analysis of costs ranged from a low of \$728 to a high of \$4,163 with the average Cost of Production being of \$2912. **However, if the one extreme low value of \$728 is removed from the group the average 2014 Cost of Production was \$3094 per heifer from birth to calving.**

The Final Report for the Project with much more detail can be found in English/French on Milk 2020’s Website at <https://www.milk2020.ca>.