

Impact of Improvements in Genetic Evaluations for Production Traits

Introduction

Genetic evaluations are an estimate of each animal's true genetic merit. The accuracy of the resulting genetic evaluations depends on the accuracy of the data used, the total amount of data available and the ability of the genetic evaluation system to account for management and environmental factors that affect the trait being considered. In May 2003, Holstein bull proofs and cow indexes for production traits will change to some degree due to the implementation of an enhancement in the genetic evaluation system, namely the Canadian Test Day Model. Simply stated, the enhancement provides for a better prediction of each cow's lactation curve based on the test day information that is available (see previous article dated February 2003 on the CDN web site). The focus of this article is to quantify the degree of change that can be expected for bulls and cows due to this enhanced methodology.

Past Experience

Some time after the introduction of the Canadian Test Day Model in February 1999, Canadian producers and industry personnel began to notice a trend that several newly proven bulls tended to decrease from run to run for a year or so after they received their first proof. In an effort to reduce the impact of this observed trend, the Genetic Evaluation Board sought technical and industry input and ultimately decided to increase the requirements for a bull to receive an official production proof in Canada. Therefore, starting in May 2001, Holstein bulls required at least 20 daughters passed 180 days in milk, rather than passed 90 days, before their production proof became official. This action delayed the date when young bulls would become newly proven and subsequently dampened the impact of the general downward trend in production proof.

At the same time, an extensive research effort was launched involving geneticists at the University of Guelph and Canadian Dairy Network to find the cause, and therefore a solution. By examining proof changes over time, it was found that newly proven bulls decreased an average of 140 kg milk, 8.8 kg fat and 7.6 kg protein over the first 1½ years after receiving their first official proof. This translates to an average slippage of about 165 LPI points over the same time period. The same study indicated that some proven bulls adding their first wave of second crop daughters were also over-estimated, but this trend was less consistent.

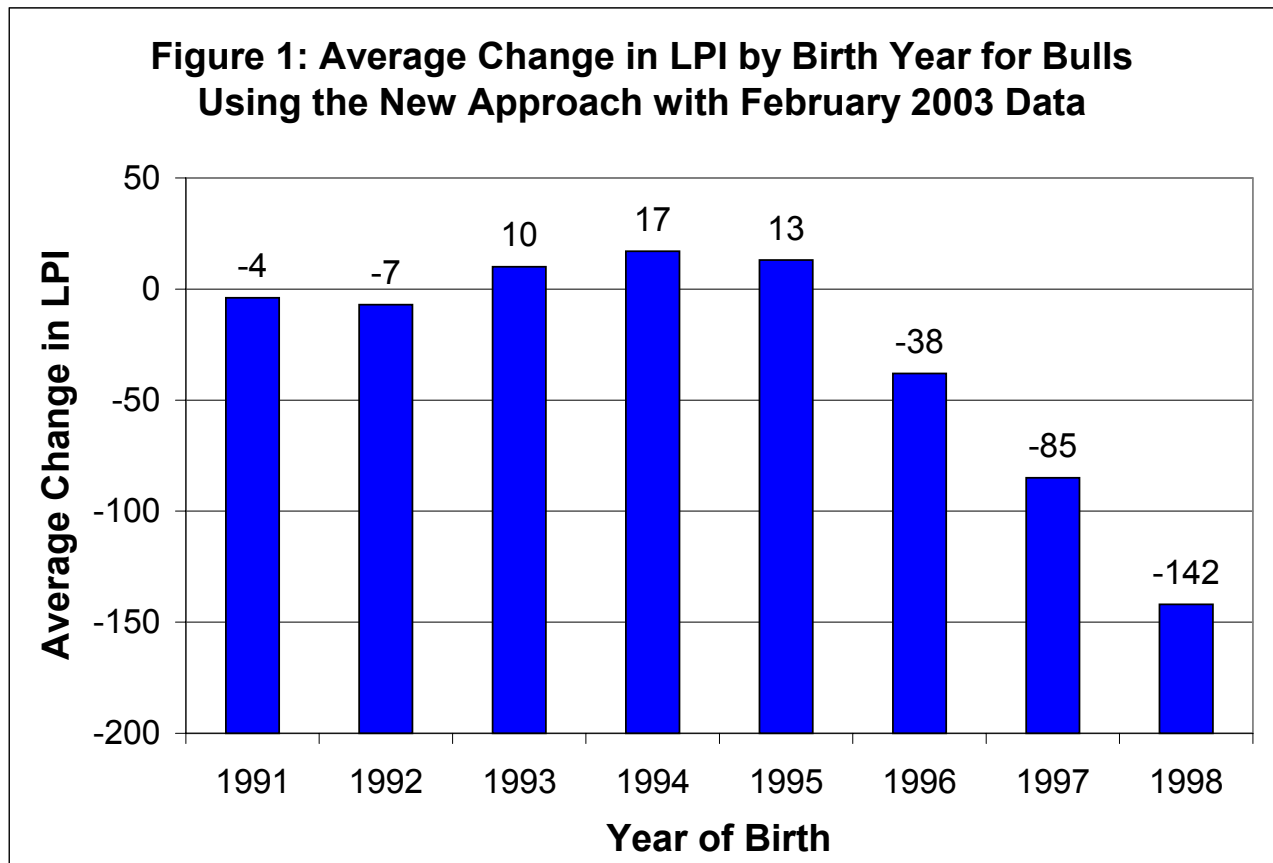
Improvement in Estimating Lactation Curves

To eliminate the systematic trend in proof changes over time that was found, an improved method for estimating each cow's lactation curve will be officially introduced in the Canadian Test Day Model starting May 2003. Applying this new approach to data that was

used for previous official genetic evaluation runs since November 2001 has allowed CDN to examine its impact on the stability of bull proofs over time. The bottom line is that the enhanced methodology removed 80 percent of the decreasing trend in LPI for newly proven bulls resulting in an average change of only 30 points during the first 1½ years after becoming officially proven.

Impact on Current Evaluations

In order to quantify the degree of proof changes associated with the move to the enhanced methodology, a complete parallel run was conducted at CDN using the same data as for the official February 2003 bull proofs and cow indexes. Since the impact of the new approach varies across bulls, depending on how long they have been proven, Figure 1 shows that proven bulls born in the most recent birth year (ie: 1998) experience a one-time change averaging 142 LPI points. The impact for bulls that have already been proven for a year or two is substantially less at 85 and 38 LPI points respectively, since they have already experienced the gradual decreasing trend in their official proof since the time they were first proven. Older bulls experience relatively little change on average. Basically, the new approach puts all bulls on an equal basis right from the start and essentially all systematic trends that have been observed will be eliminated in the future.



Also of interest is the impact of this enhancement on top ranking bulls and cows. Table 1 shows the average change in genetic evaluation for the Top 25 and 100 LPI lists for bulls and cows when the new method was applied to the February 2003 data. While the average evaluation for yield traits and LPI decreases for top bulls, an average increase for

these traits is observed for the top cows. The main reason for this result is the fact that no systematic trend had been observed in cow indexes over time and the impact of the new approach for a specific cow depends of several factors including the genetic evaluation of her sire, dam and herd mates. Even with the average decrease in proofs for high LPI sires, it is important to note that essentially 90 percent of the top LPI sires and 85 percent of the top LPI cows remain the same under both approaches.

Table 1: Average Change in Genetic Evaluations for Top LPI Bulls and Cows				
Trait	Bulls		Cows	
	Top 25	Top 100	Top 25	Top 100
Lifetime Profit Index (LPI)	-79	-75	+60	+23
Milk Yield (kg)	-73	-76	+137	+76
Fat Yield (kg)	-5.7	-5.3	+2.9	+1.7
Protein Yield (kg)	-2.8	-2.6	+2.6	+0.9
Fat Deviation	-0.02	-0.01	0.00	+0.01
Protein Deviation	-0.01	-0.01	-0.03	-0.03
Somatic Cell Score	+0.03	+0.03	-0.02	+0.01
Lactation Persistency	-1.0	-0.7	-0.5	-0.7
Percentage Remaining in the Top LPI list with the New Approach	92%	87%	84%	85%

Summary

Continued research supported by the industry organizations has identified an enhanced approach to estimating lactation curves within the Canadian Test Day Model, which will be officially implemented in the Holstein breed starting May 2003. The intent is to implement the same enhancement for the coloured breeds by February 2004. Holstein bulls that recently received their first official proof and others that have added their first wave of second crop daughters will be most affected by this one-time change. In addition to the usual changes due to the inclusion of new daughters and more records on existing daughters that expected from run to run, the May 2003 release will also reflect the impact of introducing this new approach for Holsteins. In the future, however, proofs for newly proven bulls will be more accurate than before with no systematic changes over time, signifying an important achievement in Canada of accurate and stable genetic evaluations.