

New Lifetime Profit Index

For the past 14 years, the Lifetime Profit Index (LPI) has been the primary genetic selection tool used to rank dairy bulls and cows in Canada. When the original LPI was introduced in 1991, the goal was to establish a dynamic national index that would evolve as needed over time. The current LPI formula has been in place since August 2001 when Herd Life and traits associated with udder health, most importantly Somatic Cell Score, were added.

Based on industry consultation and the analysis of current genetic trends, Canadian Dairy Network (CDN) will be implementing changes to the LPI formulas for each breed in February 2005.

Why change now?

Two main driving forces have stimulated the new changes to the LPI formula. The first of these is the domestic milk pricing system, which, in most provinces, has recently increased the value of fat relative to protein. Secondly, given the new genetic evaluation system for Daughter Fertility that was introduced in November 2004 (see WDD Fall 2004, p 10) and the antagonistic relationship between fertility and production, it was logical to incorporate this new trait in the national selection goal.

What is changing?

The table above compares the emphasis of each trait in the new LPI formula with those in the previous (2001) formula. The new LPI formula reflects four main changes:

- Shift some emphasis away from protein and towards fat;
- Include direct selection to increase both fat and protein percentage;
- Add Daughter Fertility alongside the udder health traits within a new combined Health & Fertility component;
- Introduce a scaling factor to improve the consistency of resulting LPI values when the genetic base is updated annually.

The first two changes are primarily motivated by the changes in domestic milk component prices. In terms of relative emphasis between protein and fat,

Emphasis on Traits in 2001 vs 2005 Holstein LPIs		
	2001 %	2005 %
Production	57	54
Protein Yield	42.8	30.8
Protein %	-	1.6
Fat Yield	14.2	20.5
Fat %	-	1.1
Durability	38	36
Herd Life	7.6	7.2
Mammary System	15.2	14.4
Feet and Legs	11.4	10.8
Capacity	3.8	3.6
Health and Fertility	5	10
Somatic Cell Score	3.0	3.0
Udder Depth	1.5	1.5
Milking Speed	0.5	0.5
Daughter Fertility	-	5.0

the current weights of 75% protein versus 25% fat will be changed to a 60:40 ratio in the new formula. In addition, the new LPI formula will add some direct weight on both fat and protein percentages.

Genetic selection for increased production yields has a negative impact on cow fertility. To counter-balance this undesirable relationship, the LPI formula will include direct emphasis on Daughter Fertility.

The introduction of a scaling factor to the production component will prevent changes in LPI which result from annual updates to the genetic base. This addition to the formula has little impact on ranking of bulls and cows but may have a one-time impact on the range of LPI values within each breed.

Impact on top LPI sires

The new LPI formula in each breed was applied to the official November 2004 bull proofs in order to examine the impact on re-ranking. Since the LPI changes relate only to shifts in emphasis amongst the production traits plus the addition of Daughter Fertility, the top group of bulls for LPI remain quite similar. In Holsteins, among the current Top 10, 25, 50 and 100 LPI bulls, approximately 80 percent remain the same at each level.

source: Brian Van Doormaal, Canadian Dairy Network