Réseau laitier canadien
Canadian Dairy Network

Lifetime Profit Index (LPI) Formula
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LPI = [Production x Emphasis] + [Durability x Emphasis] + [Health x Emphasis]

Where the relative emphasis on each of the three main components in each breed is as follows:

Breed	Production Emphasis (%)	Durability Emphasis (%)	Health Emphasis (%)
Ayrshire	65	30	5
Brown Swiss	60	35	5
Canadienne	60	35	5
Guernsey	60	35	5
Holstein	57	38	5
Jersey	60	35	5
Milking Shorthorn	60	35	5

Production Component (PROD):

$$PROD = [Weight_{Protein} \times (Protein - Avg)/ S.D.] + [Weight_{Fat} \times (Fat - Avg)/ S.D.]$$

The production component formula is the same for all breeds except Jersey, where milk yield is also included with a negative weight and the appropriate average (Avg) and standard deviation (S.D.). The exact values used for each breed are as follows:

Breed	Relative Weights			EBV Averages			EBV Standard Deviations		
	Milk	Fat	Protein	Milk	Fat	Protein	Milk	Fat	Protein
Ayrshire	0	2.5	7.5	-122	-4	-3	527	20	16
Brown Swiss	0	2.5	7.5	-43	-3	-2	591	25	20
Canadienne	0	2.5	7.5	11	0	0	466	13	8
Guernsey	0	2.5	7.5	-7	1	-2	619	25	21
Holstein	0	2.5	7.5	101	9	5	830	31	25
Jersey (1)	-3	3.0	9.0	142	6	4	802	34	25
Milking Shorthorn	0	2.5	7.5	-178	-4	-4	574	22	15

Note (1): The relative weights of –2 Milk : 2 Fat : 6 Protein, which sum to 10 in absolute values, are each multiplied by a factor of 1.5 to maintain a similar range in LPI values compared to the previous formula with no negative weights.

Durability Component (DUR):

DUR = {[2 x (HL – 3.00)/.14] + [4 x MS/5] + [3 x F&L/5] + [1 x CAP/5]} x Correlation Factor

Where HL = Herd Life, MS = Mammary System, F&L = Feet and Legs, CAP = Capacity and the correlation factor for the Durability component, specific to each breed, is provided in the table below.

Health Component (HEALTH):

HEALTH = {[-6 x (SCS – 3.00)/.23] + [3 x UD/5] + [1 x (MSP – 69)/4.8]} x Correlation Factor

Where SCS = Somatic Cell Score, UD = Udder Depth, MSP = Milking Speed and the correlation factor for the Health component, specific to each breed, is provided in the following table.

Breed	Durability Correlation Factor	Health Correlation Factor
Ayrshire	1.1846	1.3520
Brown Swiss	1.3042	1.3815
Canadienne	1.4180	1.0427
Guernsey	1.3879	1.3204
Holstein	1.2925	1.2824
Jersey	1.1716	1.5991
Milking Shorthorn	1.5456	1.5044

The correlation factors for the Durability and Health components of the LPI formula within each breed account for the degree of relationship which exists between the traits in each of the Production, Durability and Health components and ensures that the desired relative emphasis placed on each of these main components is respected for each breed.

The Lifetime Profit Index formula for each breed is applied to bulls and cows in Canada that have official genetic evaluations for production and type traits. In any case when an official genetic evaluation for a specific trait is not available, namely for Herd Life or Milking Speed, the LPI is based on any preliminary genetic evaluation that may be available or, otherwise, a value equal to breed average is used.

For foreign sires in the Holstein and Jersey breeds, which have MACE evaluations for production and type traits available, the LPI formula for the respective breed is used to compute MACE LPI (MLPI) values. In these cases, a predicted Herd Life evaluation is calculated based on MACE proofs for type traits and Somatic Cell Score, and a breed average value is used for Milking Speed.