Canadian Pride of the Canadian Kind!

The recent success of Canadian athletes at the 2012 London Summer Olympic Games creates a surge of pride and shared success for our great country, Canada. The medal ceremony for each and every event involves the presentation of national anthems and flags but there is an unspoken understanding of the work, passion, dedication and commitment of the athlete to reach that podium. Dairy cattle breeding is similar, with its various competitions and forms of the "podium". Many Canadian breeders consistently promote the "Canadian Kind" and are proud of the dairy cow and her genetics in demand around the world. This has resulted from generations of hard work, love for the dairy cow and dedication towards the achievement of established goals.

Flagship of Canadian Genetics

Part of this Canadian pride and world recognition relates to the value of the Lifetime Profit Index (LPI) for ranking progeny proven sires, genomic young sires, cows and heifers. This overall selection index tool has served Canadian breeders very well since its inception more than 20 years ago. The LPI formula has evolved over the years with input from the respective breed associations so that it reflects the objectives of their breed improvement goals and strategy. This index is part of the "Canadian Kind" and should be promoted and used as such both domestically and internationally.

Comparison of LPI and TPI

With Canada being so close to the US marketplace, reference is often made to TPI values for merchandising Canadian genetics. It is therefore important to understand the difference between LPI and TPI. The Canadian LPI formula includes three main components, namely Production, Durability and Health & Fertility. In the United States the TPI formula includes Production, Conformation and Health & Fertility, with the only difference being where each country's measure of longevity fits into the formula. For sake of this comparison, Productive Life has been included in the Durability component since that is where Herd Life is considered within the LPI formula. In essence, Durability represents selection for long lasting cows for which Herd Life (or Productive Life in the US) as well as type traits are contributing factors.

Table 1 provides a direct comparison of the traits included in the LPI and TPI formula as well as the overall relative emphasis of each trait and the three components. Although some of the specific traits included in each national selection index are different, it can been seen that the LPI formula has relatively more weight on the Production component (51% vs 43%) and therefore less relative emphasis on Durability (34% vs 38%) and Health & Fertility (15% vs 19%) components.

Within each index component, there are some important differences worth noting. For Production, the Canadian LPI formula includes some direct emphasis for increasing the fat and protein percentages of milk while TPI aims to improve the component yields without specifically selecting against the volume of fluid milk. With the Durability component, the TPI formula includes overall conformation (PTA Type) in addition to overall mammary and overall feet & legs whereas the Canadian LPI formula does not directly include Conformation given its very high correlation with Mammary System. As part of the Canadian breeding philosophy, the LPI includes emphasis on Dairy Strength whereas in the United States, the TPI has a negative weight on Dairy Form. Both countries include their respective measure for longevity in their national index with LPI placing 6.8% directly on Herd Life and the TPI having 9% directly on

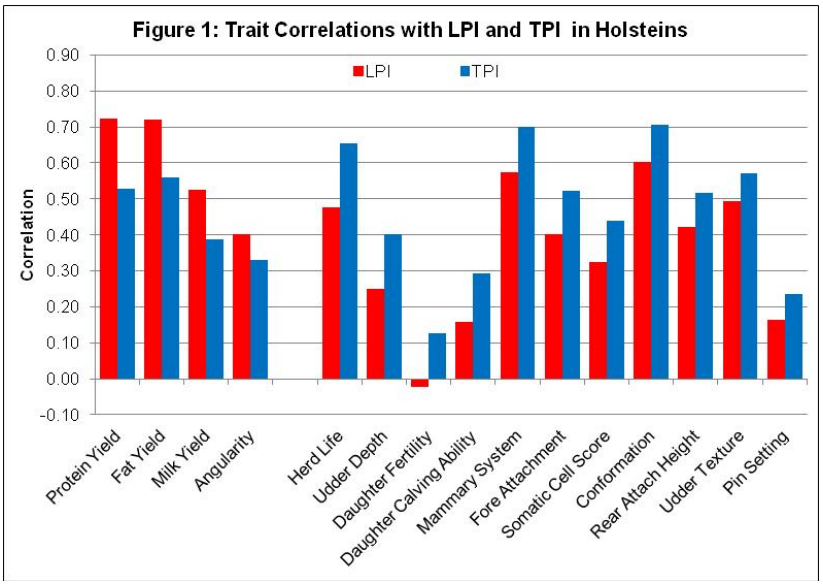
Productive Life. For the Health & Fertility component, the main emphasis in both the LPI and TPI is for improving female fertility and somatic cell score. LPI also includes Udder Depth and Milking Speed as indicator traits to improve udder health. For the TPI formula, two traits measuring calving ability in the cow population are included, which are equivalent to Daughter Calving Ability in Canada.

Table 1: Traits and Relative Weights in the LPI and TPI Formula for Holsteins Grouped According to the Three Components of LPI

LPI Component	LPI			TPI		
	Weight	Trait	Emphasis	Weight	Trait	Emphasis
Production	51%	Protein	29.1%	43%	Protein	27%
		Fat	19.4%		Fat	16%
		Protein %	1.5%			
		Fat %	1.0%			
Durability	34%			38%	PTA Type	10%
		Mammary System	13.6%		Udder Composite	12%
		Feet & Legs	10.2%		Feet & Leg Composite	6%
		Dairy Strength	3.4%		Dairy Form	-1%
		Herd Life	6.8%		Productive Life	9%
Health & Fertility	15%	Daughter Fertility	10.0%	19%	Daughter Pregnancy Rate	11%
		Somatic Cell	3.0%		Somatic Cell	5%
		Udder Depth	1.5%			
		Milking Speed	0.5%			
					Daughter Calving Ease	2%
					Daughter Stillbirth Rate	1%

Another approach for comparing LPI and TPI is by examining how they correlate to each individual trait evaluated, whether or not they are directly included in the formula. This approach provides an accurate reflection of the expected selection pressure on various traits, either through direct inclusion in the index or by a correlated response with trait or traits that are included. To conduct this analysis, Canadian Dairy Network (CDN) used the traits and relative weights of the TPI formula and applied them to proofs for progeny proven bulls with an official LPI in Canada. Overall, the correlation between LPI and TPI was 95% and the three components had correlations of at least 97%, indicating the two formulae are highly similar.

Figure 1 presents those traits evaluated in Canada that have a correlation with TPI that is more than 5 percentage points (i.e.: .05) higher or lower than with LPI. As expected, the traits that will respond to more genetic gain by selecting for LPI compared to TPI are protein, fat and milk yields as well as Angularity. From the opposite perspective, the TPI has more selection pressure, compared to LPI, on various mammary traits and overall conformation as well as longevity, female fertility and pin setting. Again, these results are predictable given the difference in relative weights placed on various traits in the two national indexes, especially given the TPI has both PTA Type and Udder Composite included, which are highly correlated.



Summary

As Canadians, we have a lot to be proud of. This includes our long-standing philosophy for breeding the “Canadian Kind” of dairy cow. For decades, the LPI has been the main tool used to achieve genetic selection goals, both nationally from a breed association perspective as well as within many herds across the country. As Canadians, be proud of your national selection index, the LPI, and make it the primary tool for the promotion and merchandising of Canadian genetics. The TPI formula in the United States can also be a valuable tool since some traits have slightly differing emphasis, but the Canadian Dairy Industry Publishing Code of Ethics for advertising and merchandising Canadian genetics states this information must be presented only in addition to the official genetic information published by CDN.

Author: Brian Van Doormaal, CDN

Date: August 2012