Does Filtering Really Help Achieve Your Breeding Goals?

It can be argued that sire selection is the single most important element of a successful breeding program. Of course, it goes without saying that you must first have established the breeding objectives for your herd. This is where the two national genetic selection indexes, LPI and Pro$, have a critical role to play. Canadian Dairy Network (CDN) and each breed association provides lists of top animals... proven sires, genomic young bulls, cows and heifers, ranked based on their LPI and Pro$. These indexes have been developed and implemented to guide Canadian producers in terms of setting their breeding goals and then realizing them.

Optimum Sire Selection Strategy

The ideal strategy for producers to achieve their breeding objectives is first to rank sires based on your preferred selection index. Once the highest sires for that index are identified, then the second step is to determine how to best incorporate them in your herd by avoiding matings that result in too much inbreeding and/or a higher risk of carrying an undesirable genetic recessive such as the gene associated with Cholesterol Deficiency.

In Canada, producers are encouraged to determine whether LPI or Pro$ best meets their overall needs. Recall that Pro$ was introduced in August 2015 as a profit-based index that ranks sires, and cows, according to the net profit that their daughters are expected to realize during the first six years of their life. Compared to Pro$, producers using LPI as their primary selection index can expect more genetic progress for conformation traits but slower gains for production yields and both indexes have a similar expected response for most functional traits.

Filtering on Trait Minimums

Some producers have adopted the strategy of applying minimum values on one or more traits for filtering through sires to identify those to use in the herd. Such a strategy can have a very significant impact on the resulting sire selection, which is often not considered.

Table 1 serves as an example of the impact of this type of filtering by trait on the resulting genetic profile of the selected sires, which is based on the top genomic young bulls actively marketed in Canada following the April 2017 release. Assuming that a total of ten sires are needed, scenario A simply provides the average evaluation for the Top 10 genomic bulls based purely on either Pro$ or LPI. As expected, these two groups have very high averages for all traits with Pro$ being stronger for production yields and slighter lower for conformation traits.

For the four other scenarios, from B to E, the averages in Table 1 are based on the ten highest sires for LPI among those that pass the various filtering criteria. With scenario B, a minimum Conformation evaluation of at least +12 was imposed. While this approach increases the average Conformation rating by 1.6 points it has a significant negative impact on the overall level of selected bulls for all other traits presented, except Fat yield. To counteract this impact on production, scenario C adds a second filter to include only those bulls that are at least +12 Conformation and +1500 Milk. This approach helps to some extent in terms of reducing the negative impact on milk yield but this strategy still translates to an important sacrifice for Daughter Fertility, Herd Life and Protein yield. In an effort to address this issue for Daughter Fertility, scenario D adds a third filter by removing any bull that is not at least breed average (i.e.: 100) for that trait. Lastly, scenario E is included in Table 1 to demonstrate that this third filter on Daughter Fertility would have to be increased to include only those bulls at 105 or higher in order to not lose any opportunity for genetic improvement compared to using either LPI or Pro$

as the sole selection criteria. Under this scenario, however, there is no real impact on the average level for Conformation but the resulting group of selected sires would translate into a significant sacrifice of 207 kg Milk, 5.7 kg Fat and 15.2 kg Protein compared to using the Top 10 sires by LPI.

Table 1: Impact on Sire Selection when Applying Minimum Values on Traits

Scenario	Criteria for Selection of Top 10 Genomic Young Bulls	LPI	Pro$	Milk	Fat	Protein	Conformation	Herd Life	Daughter Fertility
A	**Top 10 Pro$**	**3460**	**3001**	**2067**	**103**	**85**	**9.3**	**111.3**	**106.5**
	Top 10 LPI	**3513**	**2925**	**1962**	**91**	**84**	**11.5**	**111.1**	**107.6**
B	Minimum of +12 Conformation	3485	2819	1796	99	81	13.1	108.6	104.2
	Difference from Top 10 LPI	**-28**	**-106**	**-166**	**8.3**	**-3.2**	**1.6**	**-2.5**	**-3.4**
C	Minimums of +12 Conformation & +1500 Milk	3475	2831	1899	98	80	13.4	108.5	104.0
	Difference from Top 10 LPI	**-37**	**-94**	**-62**	**7.3**	**-4.6**	**1.9**	**-2.6**	**-3.6**
D	Minimums of +12 Conformation, +1500 Milk & 100 Daughter Fertility	3473	2830	1928	99	80	13.1	108.7	104.3
	Difference from Top 10 LPI	**-39**	**-95**	**-34**	**8.3**	**-4.5**	**1.6**	**-2.4**	**-3.3**
E	Minimums of +12 Conformation, +1500 Milk & 105 Daughter Fertility	3433	2735	1755	85	69	12.7	110.8	107.2
	Difference from Top 10 LPI	**-79**	**-190**	**-207**	**-5.7**	**-15.2**	**1.2**	**-0.3**	**-0.4**

Table 1 is also very revealing in terms of the impact of sire selection filtering on the genetic level for the overall indexes of LPI and Pro$. For LPI, scenarios B to E would be interpreted by most breeders as having a minor impact with a decrease of about 30 to 40 LPI points for scenarios B, C and D and 79 LPI points for scenario E. Given that Pro$ is a profit-based index expressed in true dollar terms, the impact of the filtering examples in Table 1 can be more accurately quantified. For scenarios B, C and D, which all have an impact of reducing the average Pro$ value of roughly 100, this would translate to an expected lost opportunity of an extra $100 lifetime profit for every daughter born in the herd during the year. For a herd with 50 heifer calves born annually, this equates to lost profit of $5,000 per year compared to using a sire selection strategy based solely on LPI. Under scenario E, which has a larger negative impact on production yields, the lost profit per year would be almost doubled. If Pro$ was the selection index of choice, for which the top 10 sires average about $3000 instead of $2925 for the top 10 LPI sires, the lost profits under each scenario would be about $75 more per daughter per year.

In summary, the temptation to apply minimum values for filtering through the long lists of sires being actively marketed in Canada is understandable but should be avoided. Such sire selection strategies actually hinder the speed at which you achieve your breeding objectives. LPI and Pro$ are two different selection indexes designed to meet the varying interests of Canadian producers. Select which index best suits your breeding goals and then stick with it to select the sires to use in your herd while managing the inbreeding level and likelihood of genetic recessives for each mating.

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