Réseau laitier canadien
Canadian Dairy Network

Somatic Cell Score: Relating Bull Proofs to Daughter Performance

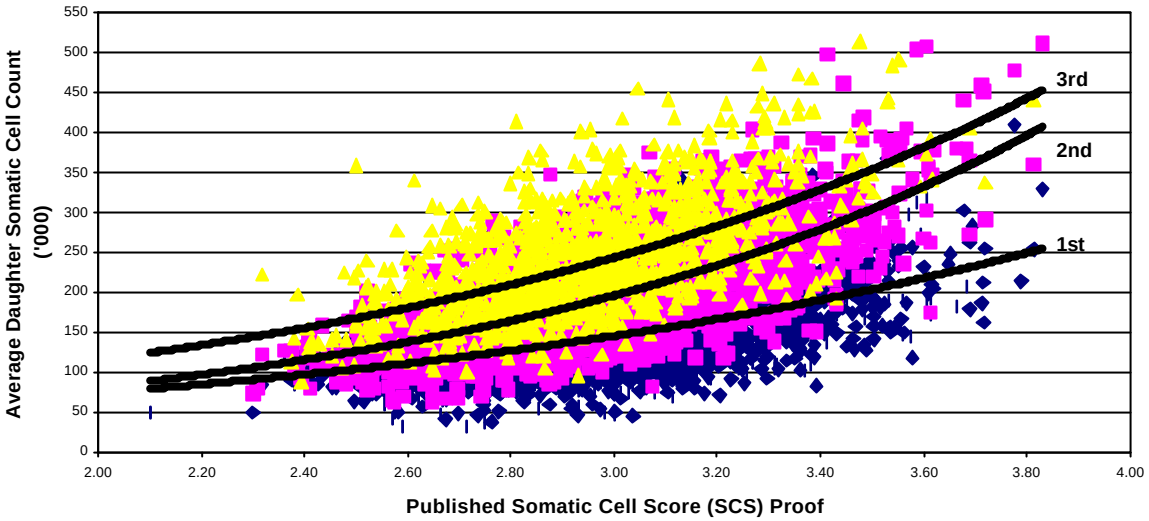
This article is the first in a series that will focus on the relationship between a bull's proof and the expected average performance of his daughters.

The analysis of milk samples for somatic cell count was initiated as an optional service provided by milk recording agencies. Today, essentially every dairy producer on a milk recording program in Canada values this information as part of the regular management services required to be profitable. This very same somatic cell count data collected for every milking cow in the herd on each test day is also used at CDN to produce genetic evaluations for Somatic Cell Score.

Canadian bull proofs for Somatic Cell Score have been officially published for five years now but relatively little attention has been given to this trait until recently. Producers are becoming more aware of the fact that high somatic cell counts reflect the presence of mastitis that results in significant losses of milk production and increased health costs. In addition, they are recognizing that this trait is influenced by both environment and genetics. Bull proofs for Somatic Cell Score are currently calculated using the Canadian Test Day Model and each bull receives a separate proof for first, second and third lactation. These three values are combined into a single published proof based on a relative emphasis of 25% on first lactation, 65% on second and 10% on third. Research has shown that somatic cell counts generally increase with each lactation, which explains why only 25% on the published Somatic Cell Score proof is based on first lactation compared to 75% on later lactations.

At Canadian Dairy Network, an analysis was done comparing each bull's published Somatic Cell Score proof to the average somatic cell count of their daughters on test day. Since the average somatic cell count is expected to be different across lactations, the relationship between proof and average daughter performance was performed separately for first, second and third lactation. Figure 1 shows the average daughter somatic cell count in each lactation relative to their sire's published Somatic Cell Score proof, which is a combination of his genetic potential for each of the three lactations. Although not all bulls have exactly the same relationship between proof and daughter average performance, the three solid lines in Figure 1 show the general relationship within each lactation. The trend of higher somatic cell counts associated with each successive lactation is clearly represented in this graph.

Figure 1: Relationship Between Published Somatic Cell Score Bull Proofs and Average Daughter Somatic Cell Count in 1st, 2nd and 3rd Lactation



Bull proofs for Somatic Cell Score are expressed using a value of 3.00 as breed average. In general, the most extreme bulls vary from the most desirable at around 2.50 to the most undesirable with a proof over 3.50. Table 1 provides the expected average somatic cell count for daughters in first, second or third lactation according to the published Somatic Cell Score proof of their sire, based on the solid line associated with each lactation in Figure 1.

For breed average bulls, their daughters are expected to have an average somatic cell count of 145,500 in first lactation which would increase to 196,100 in second and 243,600 in third lactation (Table 1). This difference of just under 50,000 somatic cells between the expected second and third lactation daughter performance appears quite consistent across the entire bull proof range of 2.50 to 3.50. As Somatic Cell Score proofs become more undesirable and surpass 3.60, the average performance of first lactation daughters compared to later lactation continually increases to almost double. More specifically, a bull with a published SCS proof of 3.50 is expected to have daughters with an average somatic cell count slightly above 200,000 in first lactation but this increases to about 300,000 in second lactation and 350,000 in third lactation. On the other hand, bulls with a proof below 2.75 have an expected daughter average somatic cell score under 200,000 in each of the first three lactations.

In terms of lost milk production, it is estimated that the difference between a bull rated at 3.50 for Somatic Cell Score, compared to another at the other extreme of 2.50, would have lower 305-day lactation milk yields due to mastitis inflection equivalent to 90 kg in first lactation and approximately 200 kg in each later lactation.

Table 1: Expected Average Daughter Somatic Cell Count by Lactation According to Published Bull Proof for Somatic Cell Score (SCS)

Published SCS Proof	Interpretation	Expected Average Daughter Somatic Cell Count		
		1st Lactation	2nd Lactation	3rd Lactation
2.30	Most Desirable	90,900	106,000	144,400
2.40		97,200	115,700	155,600
2.50		104,000	126,400	167,700
2.60	Desirable	111,200	138,000	180,700
2.70		118,900	150,600	194,700
2.80		127,200	164,500	209,800
2.90	Breed Average	136,100	179,600	226,100
3.00		**145,500**	**196,100**	**243,600**
3.10		155,700	214,100	262,500
3.20	Undesirable	166,500	233,800	282,800
3.30		178,100	255,200	304,800
3.40		190,500	278,700	328,400
3.50	Least Desirable	203,700	304,300	353,800
3.60		217,900	332,200	381,300
3.70		233,000	362,800	410,800

With the growing interest in Somatic Cell Score expressed by Canadian producers, the official Lifetime Profit Index (LPI) will be modified starting August 2001 to include this trait. In addition, at the same time, Somatic Cell Score genetic indexes for cows will be made available for A.I. organizations, breed associations and milk recording agencies to utilize while producers will receive them for every cow listed on their Genetic Herd Inventory report which is mailed semi-annually by CDN.