



Mastitis Resistance Selection: Now a Reality!

Mastitis – it’s a real game changer in terms of profitability at the farm level! It can turn a good cow into a poor one very quickly! In 2013, over 20% of cows removed by involuntary culling from Canadian dairy herds left due to problems with mastitis and/or high somatic cell count. Over the past several decades since somatic cell testing became a routine service offered by milk recording agencies across the country, great progress has been realized. Although herd management is very important for maintaining low levels of somatic cell count, genetic selection should also be used to improve mastitis resistance. Effective August 2014, Canadian Dairy Network (CDN) will publish official genetic evaluations for Mastitis Resistance, which combines both clinical and sub-clinical mastitis into a single genetic selection index.

Health Data

Following a coordinated industry effort involving CDN, milk recording agencies, breed associations, A.I. organizations and various veterinarian groups, a national system for collecting health events was implemented in 2007. Since that time, approximately 40% of all herds enrolled on milk recording are voluntarily recording the incidence of eight key diseases and reporting this data to their milk recording agency (or their DSA veterinarian in Quebec). This accumulation of data has led to the calculation of genetic evaluations for clinical mastitis.

Clinical Mastitis and Somatic Cell Count

Somatic cell count (SCC) is a measure of sub-clinical mastitis that is easy to assess by laboratory analysis of each cow’s milk sample on test day. Due to the ease of recording this trait and its relative importance for herd and cow management, milk recording has offered somatic cell testing for decades as part of its portfolio of services. Now, with the additional collection of herd health events related to clinical mastitis, producers will have a tool to select directly for resistance to clinical mastitis as well as sub-clinical mastitis. Table 1 provides correlations among Holstein sire proofs for the various traits related to mastitis that CDN will be evaluating in the Holstein, Ayrshire and Jersey breeds.

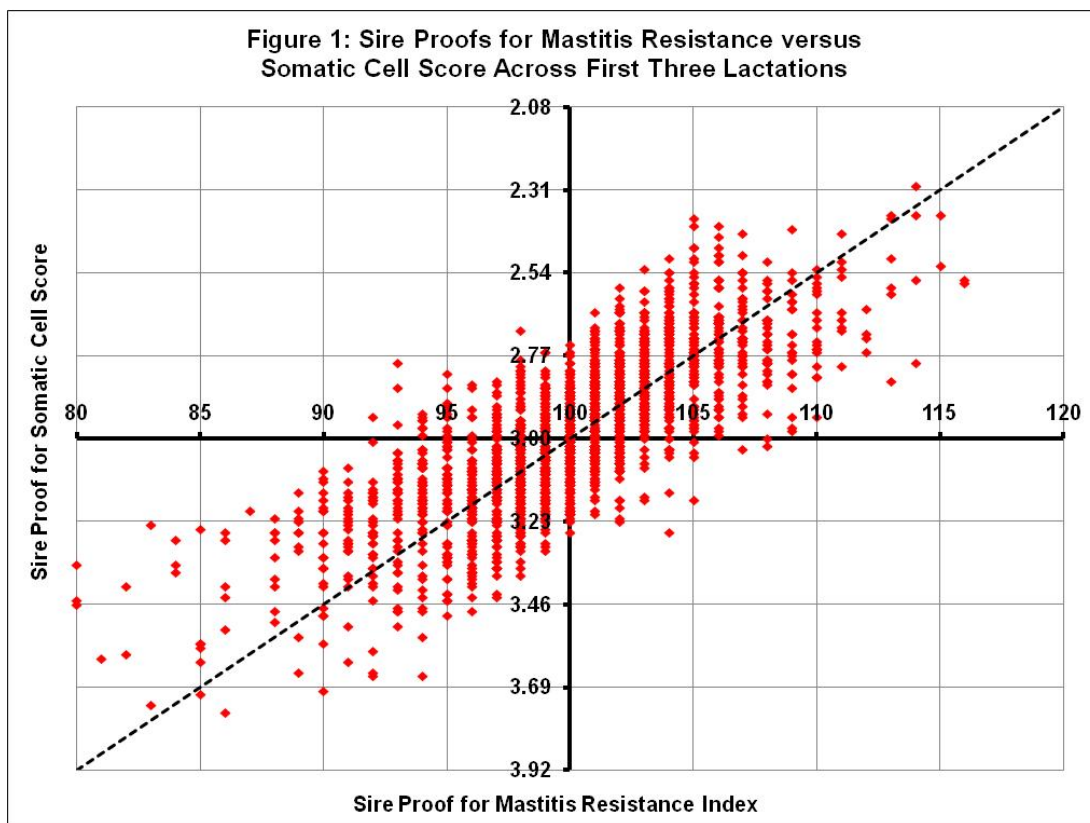
Trait	Mastitis Resistance	Clinical Mastitis - 1st Lactation	Clinical Mastitis - Later Lactations
Clinical Mastitis - 1st Lactation	85%		
Clinical Mastitis - Later Lactations	90%	73%	
Somatic Cell Score	-79%	-44%	-58%

Note: Negative correlations with SCS refer to the desired direction for improvement.

Mastitis Resistance is an overall index that equally combines evaluations for three other traits, namely Clinical Mastitis in first lactation cows, Clinical Mastitis for cows in later lactations and Somatic Cell Score evaluated across the first three lactations. The heritability of Mastitis Resistance is estimated at 12%, indicating that genetic selection is possible. Official sire proofs for Mastitis Resistance have a desirable correlation of 79% with current proofs for Somatic Cell Score as well as correlations of 85% and 90% respectively, for clinical mastitis in first versus later lactations. Of particular interest as well is the fact that Somatic Cell Score, as a measure of

sub-clinical mastitis, has only a moderate desirable association with clinical mastitis in first and later lactations (44% and 58% respectively).

Figure 1 provides a visual representation of the association between sire proofs for Somatic Cell Score and the new Mastitis Resistance index, expressed as Relative Breeding Values with an average of 100 and 95% of bulls ranging between 115 (best) to 85 (worst). As suggested by the strong desirable correlation of 79%, the plot shows that many bulls already known to be good for low somatic cell counts in their daughters are also good for overall selection of Mastitis Resistance, including clinical mastitis. In fact, of those bulls that were at least one standard deviation better than average for Somatic Cell Score (i.e.: rating of 2.77 or lower), 98% of them are above breed average for Mastitis Resistance. Among those that were simply better than breed average for Somatic Cell Score (i.e.: below 3.00), 78% have a rating higher than the breed average of 100 for Mastitis Resistance. In other words, these bulls were better than average for Somatic Cell Score but below average for Mastitis Resistance. The availability of the new Mastitis Resistance evaluations allows for the improvement of both sub-clinical and clinical mastitis simultaneously.



Interpretation of Mastitis Resistance

To assist producers in understanding the expected response achievable in their herd when considering sire proofs for Mastitis Resistance, Table 2 provides a “translation” in terms of average daughter performance for both clinical mastitis and somatic cell count throughout the first three lactations.

When used in a typical herd with average herd management, an average bull with a rating of 100 for Mastitis Resistance is expected to produce daughters that will have somatic cell counts averaging 178,000, 226,000 and 292,000 in each of the first three lactations, respectively. In addition, 92% of the daughters in first lactation are not expected to have clinical mastitis and this percentage decreases slightly to 88% for later lactations. Bulls that are better than breed average receive a Mastitis Resistance evaluation higher than 100 and are expected to produce daughters that are less susceptible to having both sub-clinical and clinical mastitis, as shown in Table 2.

Table 2: Expected Average Daughter Performance Associated with a Sire's Mastitis Resistance Index

Mastitis Resistance (MR) Index	Clinical Mastitis		Somatic Cell Count ('000)		
	% Healthy in First Lactation	% Healthy in Later Lactations	First Lactation Average	Second Lactation Average	Third Lactation Average
115	96%	95%	144	144	195
114	96%	94%	145	148	198
113	95%	94%	145	152	202
112	95%	93%	146	157	206
111	95%	93%	148	162	211
110	95%	93%	149	167	216
109	94%	92%	151	172	221
108	94%	92%	153	177	227
107	94%	91%	155	183	234
106	94%	91%	157	188	241
105	93%	90%	160	194	248
104	93%	90%	163	200	256
103	93%	89%	166	206	264
102	93%	89%	170	213	273
101	92%	88%	174	219	282
100	92%	88%	178	226	292
99	92%	88%	182	233	302
98	92%	87%	187	240	313
97	91%	87%	192	247	324
96	91%	86%	197	255	336
95	91%	86%	202	262	348
94	91%	85%	208	270	360
93	90%	85%	214	278	373
92	90%	84%	220	286	387
91	90%	84%	226	294	400
90	89%	84%	233	303	415
89	89%	83%	240	312	430
88	89%	83%	247	320	445
87	89%	82%	255	329	461
86	88%	82%	263	339	477
85	88%	81%	271	348	494

Summary

The August 2014 arrival of official genetic evaluations for Mastitis Resistance for the Holstein, Ayrshire and Jersey breeds provides dairy producers with an advanced tool for genetic selection against mastitis, simultaneously for both sub-clinical and clinical. Due to the larger number of progeny proven sires with an official Mastitis Resistance, the Holstein breed will also benefit from the calculation by CDN of genomic evaluations for this important trait. The publication of Mastitis Resistance will not replace the availability of genetic evaluations for Somatic Cell Score but dairy producers should move towards using this new index when making selection decisions to reduce the overall incidence of mastitis in their herd.

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