



## Current Perspective on Crampiness in Holsteins

Canadian Dairy Network (CDN) provides genetic evaluations for a multitude of traits that contribute to dairy farm profitability. In addition to the well-known production, type and functional traits, the type classification system also records a series of defective characteristics at the time each animal is appraised by a Holstein Canada classifier. One of these characteristics, namely “Crampy” within the Feet & Legs section, has received increased interest amongst breeders in recent years so it’s a great time to report on the ongoing research in this area.

### Defective Characteristics

The current type classification system in Canada provides classifiers the opportunity to record the occurrence of any one of 29 defective characteristics, which adjusts the animal’s classification scores accordingly. Ten of these defectives are associated with the Mammary System while there are seven for each of Feet & Legs and Dairy Strength plus five more in the Rump section of the classification scorecard. When an animal is appraised, the classifier may “tick” the animal as displaying the defective characteristic at two degrees of severity: minor or major.

As CDN processes the classification data to estimate genetic evaluations for Conformation and the other 28 published traits, it also analyzes the data associated with each of the defective characteristics, including “Crampy”. On a sire by sire basis, the frequency of each defective is calculated based on their classified daughters. Ratings are assigned for each bull, which can be accessed on the CDN web site by clicking on the Type Evaluation Details page linked to the sire’s Genetic Evaluation Summary. Bulls with a significant frequency of a given defective characteristic, such as “Crampy”, among their classified daughters are identified with an asterisk (\*) next to their negative (i.e.: undesirable) numerical rating.

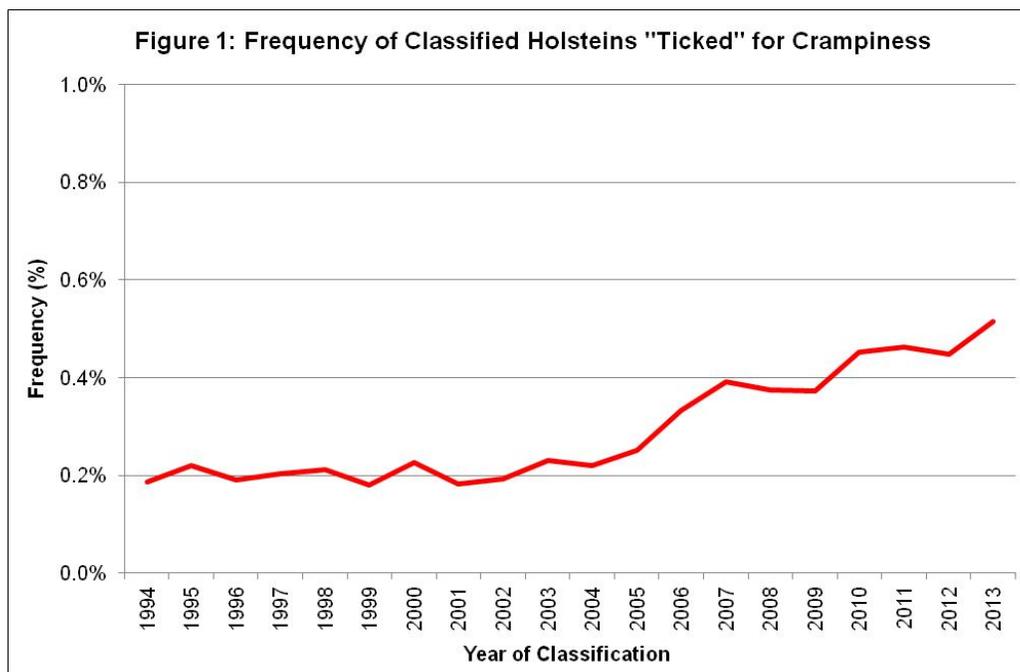
### Genetic Nature of Crampiness

A scientific analysis of defective characteristics reported by researchers at the University of Guelph in 2000 demonstrated a reasonable degree of genetic inheritance for some of the recorded defectives, which included “Crampy”. More recently, CDN conducted a pedigree analysis of progeny proven Holstein sires that had a higher than normal frequency of “Crampy” in their classified daughters. Table 1 lists the group of sires that have at least ten proven sons in Canada of which at least 30% of those sons have a negative rating for “Crampy” and 10% or more have a rating that is -2 or lower. Of the ten sires listed, some demonstrated the crampiness syndrome themselves and some had a higher than average frequency of “Crampy” noted in their classified daughters, but these observations are not true for all of them. Some sires in Table 1 could have a higher proportion of their proven sons rated poorly for “Crampy” depending on the maternal side of their sons’ pedigrees. While it is not clear cut that these sires all transmit the genes associated with crampiness, Table 1 provides strong evidence that there is a genetic component underlying this disease in dairy cattle.

Name of Sire	Total No. Proven Sons	Sons with a Negative Rating for "Crampy"		Sons with a "Crampy" Rating of -2 or Lower	
		No.	Percent	No.	Percent
BRAEDALE PAGEWIRE	10	8	80%	6	60%
REGANCREST DOLMAN-ET	25	15	60%	6	24%
DUDOC MR BURNS	58	25	43%	12	21%
BRAEDALE GOODLUCK	55	31	56%	11	20%
REGANCREST-LH MODEST-ET	48	20	42%	8	17%
OPSAL FINLEY-ET	35	18	51%	5	14%
LEXVOLD LUKE HERSHEL-ET	39	15	38%	5	13%
BRAEDALE GOLDWYN	148	45	30%	17	11%
BRAEDALE FREELANCE	107	48	45%	11	10%
SUMMERSHADE IGNITER	59	20	34%	6	10%

### Frequency of Crampiness

Figure 1 shows the frequency that “Crampy” was ticked during classifications carried out over the past twenty years. From 1994 to 2004, roughly 0.2% of classified Holsteins were found to be crampy and this incidence has slowly increased to approximately half of one percent (i.e.: 1 in 200) in 2013. While this increase is not cause for alarm, it has created more interest in “Crampiness”, also known as Spastic Syndrome, among breeders and research scientists. While there seems to be a general perception that a single elite sire, namely Braedale Goldwyn, has been the underlying source of this trend, the fact remains that less than 1 percent of all his classified daughters have been identified as “Crampy”. There have been other bulls in the breed with incidence rates that approached 10% although most were ultimately not returned to active A.I. status as a proven sire.



In 2011, the DairyGen Council of CDN provided funding on behalf of industry partner organizations to a team of researchers at the universities of Guelph and Ottawa to

conduct a 3-year project focusing on the Spastic Syndrome in dairy cattle. The main objectives of the project are to better understand the mode of genetic inheritance of this disease, which is normally considered neuromuscular in nature, and ideally to identify the associated genes. A key benefit to this research is the existing genotypes at CDN for thousands of progeny proven sires and cows, some with crampiness and others without any signs even beyond 8 or 10 years of age. Contrary to initial thoughts, this disease in dairy cattle is complex with possibly a variety of forms of expression and multiple controlling genes. The current project is scheduled to continue through 2014.

## **Summary**

The type classification service provided by Holstein Canada for all dairy cattle breeds includes the recording of 29 defective characteristics, one of which is “Crampy”. Previous research and a recent analysis at CDN provide strong evidence of genetic inheritance associated with this neurological disease, which is often referred to as Spastic Syndrome among veterinarians. In association with each genetic evaluation release, CDN also calculates, and displays on its web site, individual bull ratings to reflect the observed incidence of each defective characteristic among their classified daughters. Negative ratings are associated with a higher than average frequency and an asterisk (\*) is displayed for ratings that are significant within the breed. On behalf of all industry partners, the DairyGen Council of CDN funded a 3-year research project to be completed by the end of 2014 that aims to clarify the mode of inheritance of crampiness in dairy cattle and possibly identify any causal genes.

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Date: November 2013