Crampy Project Update

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- Genetic Conditions

As Crampy cows become a growing concern for Canadian dairy farmers, Lactanet conducted a data collection blitz to assess the current prevalence rate in Canada and explore the potential for a genomic evaluation to reduce its incidence. In this article, we provide an update on the project and discuss future industry directions as we move towards developing tools to mitigate Crampy.

A Quick Refresher

Crampy, formally known as Bovine Spastic Syndrome, is a progressive neuromuscular disorder that affects cattle typically between the age of 2 and 7 years. This condition manifests as spastic contractions in the muscle of one or both hindlimbs, the back, and eventually the entire body. Clinical signs include shaking or pressing against the neck rail when rising, hyperextension of hindlimbs, and signs of lameness, although

animals can still walk bearing full weight. Diagnosing Crampy poses challenges due to the varying progression of symptoms, making it difficult to pinpoint the root cause, as discussed in our previous article.

Data Collection Blitz Overview

As you may recall, Lactanet launched a one-time national “Crampy Data Collection Blitz” encouraging farmers across the country to submit their data on lactating cows that exhibit symptoms associated with two neurological syndromes: Crampy and Paresis. Paresis shares many similarities with Crampy however it typically occurs in younger animals and often affects one hindlimb with a locked hock, resembling a “pegged leg” with no shaking.

The data collection period spanned from September 2021 to April 2022 during which Lactanet received 2,807 Crampy and 219 Paresis cases reported from 801 participating dairy herds across Canada. We extend our gratitude to all farmers who contributed data to this important industry project! Your participation and the data provided have been instrumental in the initial stages of developing tools to mitigate the prevalence of Crampy across Canada.

The collected data on affected animals in milk-recorded herds was matched with their herdbook registered herd mates to establish a whole herd inventory. This combined data was provided to the University of Guelph as part of the M.Sc. thesis project of Gabriella Condello. The objectives of the thesis were to estimate the prevalence of Crampy in Canadian dairy farms and to assess the genetic component to see if genetic tools could be a mitigation strategy, as highlighted below.

Age of Onset and Severity

As mentioned previously, Crampy is known to affect cattle aged two years or older and Paresis within the first two years of age, which identifies an

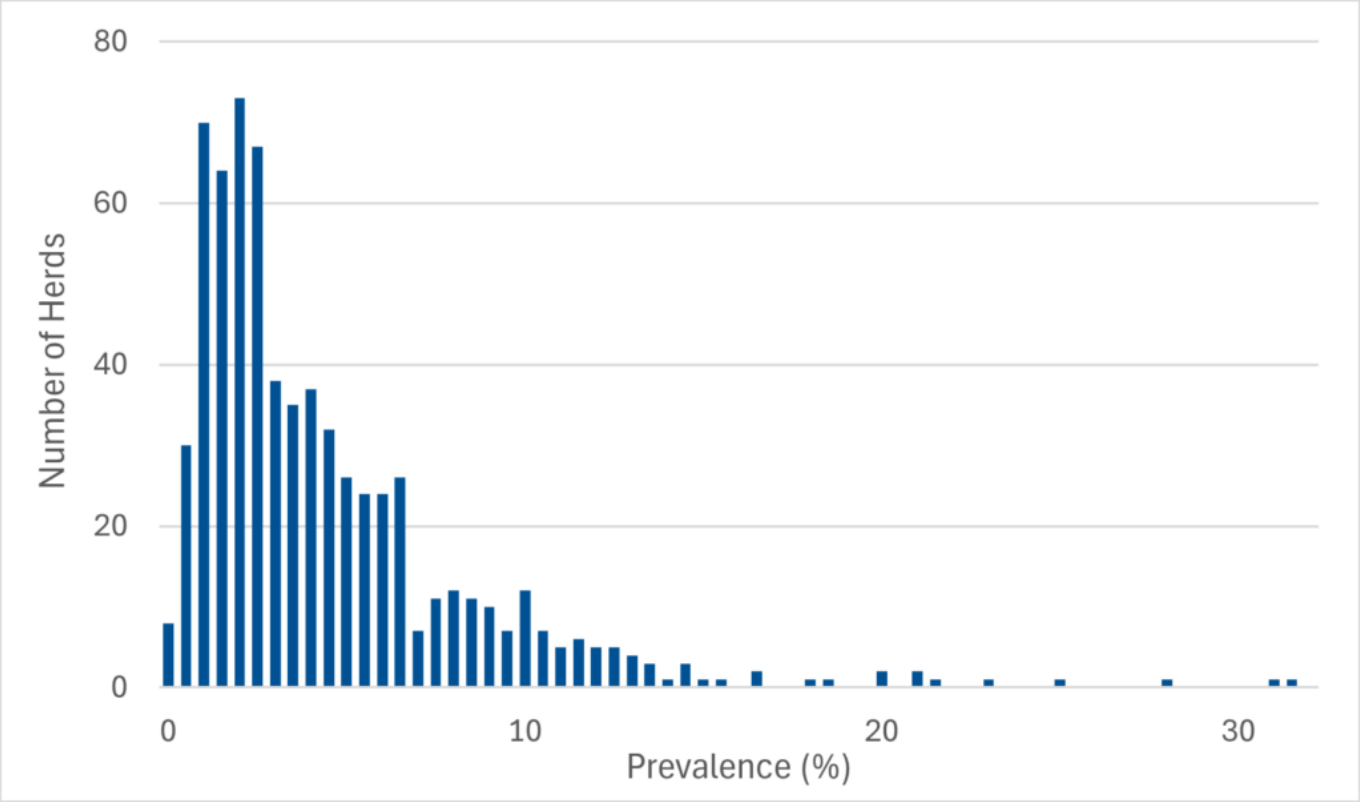
overlap in the potential age of onset. The age of onset for Crampy cases that producers identified varied up to 12 years, with the highest frequency between the younger ages. A high degree of severity was also identified during the younger ages with a total of 566 severe Crampy cases.

Assessing the Potential for Genetic Selection

Given the challenging diagnosis of Paresis and limited reported cases, only the Crampy cases were explored further. Animals that were three years of age or older with reported signs of a neuromuscular disorder, were assumed as Crampy cases. Using this age category minimized the possible overlap between the two disorders. The data was further filtered resulting in 1,952 Holstein cows with reported signs of Crampy with 54,826 herdbook registered herd mates from 678 herds. In total, over 12,000 of the cows included in the analysis were genotyped.

The average within-herd prevalence rate for Crampy was estimated to be 4.7%, as shown by the distribution of herds in Figure 1. The higher prevalence of Crampy in some herds suggests it could be influenced by genetic or environmental factors such as herd management practices. Further analyses calculated genetic components that help identify the possibility for a genetic evaluation to reduce this prevalence. The estimated heritability of Crampy was found to be 6.8%, which clearly suggests potential for genetic selection.

Figure 1: Distribution of Within-Herd Prevalence Rate of Crampy in Canadian Holsteins



The relationship between sire estimated breeding values (EBVs) and the percent of daughters reported as Crampy was also compared. Daughters born to the poorly rated sires were 3.2 times more likely to develop Crampy compared to those born to the top-rated sires. By prioritizing the top-rated sires and reducing the selection of those with a higher expected frequency of Crampy daughters, the prevalence rate of Crampy can be reduced over time. This indicates that selecting against poorly rated sires is beneficial for genetic selection as it targets genetic improvement. Furthermore, an analysis of regions within the cattle genome identified several significant regions and genes meaning that Crampy is controlled by many genes, which confirms previous studies. For all traits of importance that are controlled by multiple genes, genetic and/or genomic evaluation and selection is the obvious approach for a favourable genetic response.

What's Next?

The results of this study confirm and quantify the degree of genetic control contributing to Crampy in dairy cattle. It also highlights the

opportunity for genomic selection, however additional data is needed prior to the development of a national genetic evaluation system for Crampy.

An ongoing national data collection strategy is required to identify Crampy cows in Canadian herds as symptoms are observed with age. Given the earliest age at onset for Crampy is at least two years, a data collection strategy should be focused on lactating cows in herds enrolled on milk recording. In addition, to maximize the accuracy of a genomic evaluation system, a proportion of cows affected and unaffected by Crampy within each herd should be genotyped. To follow up on this data collection and research initiative, the Canadian dairy industry needs to develop and implement a cost effective ongoing data collection strategy that identifies Crampy cows as symptoms are expressed over time.

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