

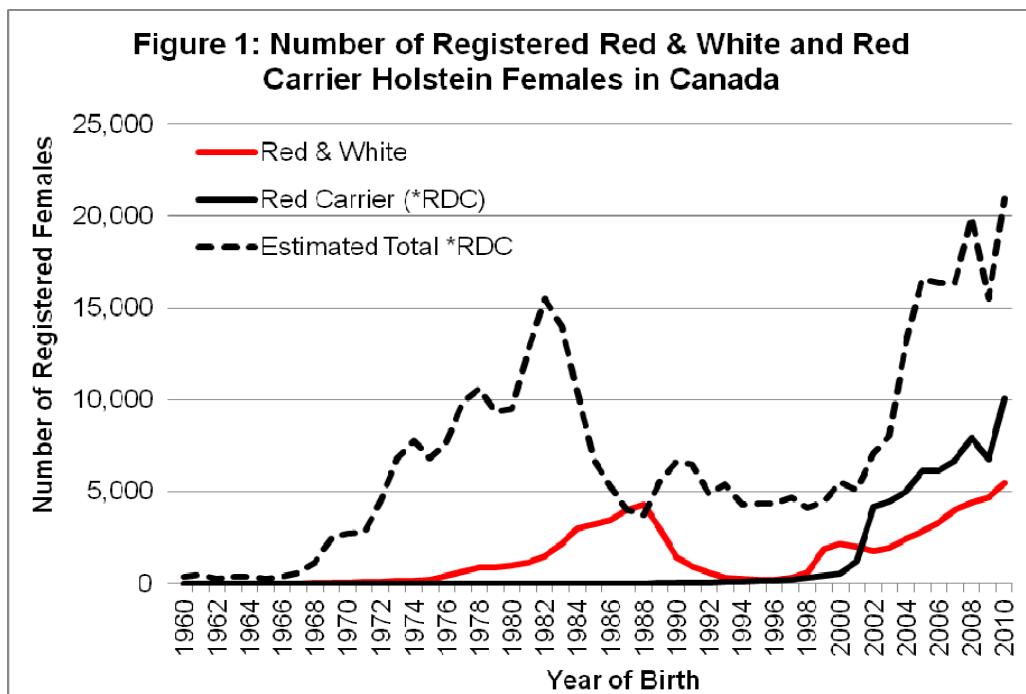
Increasing Popularity of Red & White Holsteins



For many decades now, Red & White Holsteins have been an accepted sub-population of the registered Holstein breed in Canada and elsewhere around the world. The oldest registered Holstein females born in Canada date back to the 1950's and 60's when red carrier Canadian bulls like A B C Reflection Sovereign, Rosafe Citation R, Roybrook Telstar, Bond Haven Nugget and others were being used. A recent analysis conducted by Canadian Dairy Network (CDN) examined the current status of Red & Whites within the Canadian Holstein population.

Number of Registrations

Figure 1 shows the trend in the number of Holstein females registered in Canada that are either Red & White or Red Carrier. For Red & Whites, 2010 reached record levels with over 5,000 Canadian-born females registered. The most recent increasing trend in the number of Red & White Holsteins started in the late 1990's. Previously, a peak in Red & Whites born in Canada was experienced in 1988 but this was followed by a rapid decline within a few years.



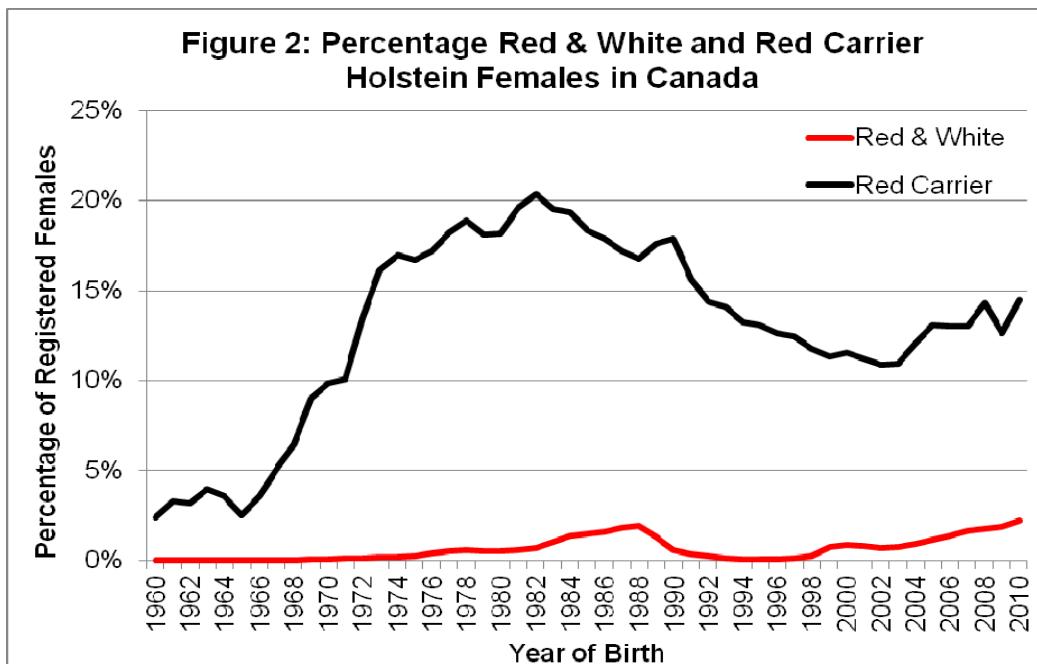
While Red & White Holsteins are easily identifiable by their visible red coat colour, carriers of the Red & White gene have traditionally been more difficult to identify with certainty and labelled accordingly. The arrival in recent years of a DNA test to accurately determine animals that are "Red Carrier" (*RDC) or "Free" of the red gene (*RDF) has significantly facilitated the process of proving Red Carrier animals for labelling. In addition, a procedure has been developed at CDN to estimate the probability that any given animal is a Red Carrier based on all known coat colour codes for its parents and ancestors. The solid black line running along the bottom in Figure 1 represents the count of known Red Carrier female Holsteins registered in Canada by year of birth. This count has seen a significant and rapid surge from under 500 per year before 2000 to surpassing the 10,000 mark for females born in 2010. Based on the CDN procedure for estimating "Carrier Probability" values for the red gene, an additional group of females within

each birth year were also identified as having a probability of at least 50% of being a carrier. Since they were not DNA tested, or perhaps they were never mated to a Red & White or Red Carrier sire to test if they may be a carrier, these animals are not known and labelled as Red Carrier. Considering that half of these females are likely red carriers and the other half are likely not, the dashed black line in Figure 1 shows the estimated total number of Red Carriers after summing the known animals and half of those with a Carrier Probability of at least 50%. This dashed line appears to be a logical and accurate estimate of the trend in Red Carrier Holstein females born in Canada since 1960. Although, the estimated count of Red Carriers born in Canada in 1982 surpassed 15,500, the count of Red Carriers born in 2010 is nearly 21,000 (Figure 1) with every indication this rapid rate of increase will continue into the future. No doubt that popular Red Carrier proven sires including Pursuit September Storm*RDC, Granduc Tribute*RDC, Ladino Park Talent-Imp-ET*RDC, Gen-I-Beq Salto*RDC and Dudoc Mr Burns*RDC all contributed to this growth in red carrier Holsteins in Canada, as well as the general use of Red & Whites sires.

Population Percentage

In addition to trends in population counts, the CDN analysis also examined the proportion of registered Holsteins born in Canada that carry the red gene. This statistic is particularly of interest given that total herdbook registrations were less than 30,000 heifers born per year prior to the 1960's and this has increased to approximately 250,000 per year for the past decade or so. Figure 2 shows the percentage of all registered Holsteins born in Canada that are known to be Red & White or are estimated to be Red Carrier, by year of birth since 1960.

In percentage terms, the proportion of Canadian Holsteins that are Red & White reached an all-time high of 2.2% for heifers born in 2010, just surpassing the previous high of 1.9% achieved in 1988. While the rate of increase in this proportion of the Canadian Holstein population is relative slow but steady, it is estimated to reach the 4% level within the next ten years. In terms of Red Carriers, it is estimated that 14.5% of all Black & Whites Holsteins born in Canada in 2010 carried the red gene. Based on the current trend, it is estimated that the 1982 high in this statistic of 20% will be reached again within the coming decade. Based on the sum of the Red & White and Red Carrier heifers, a total of 16.7% of Canadian Holsteins born in 2010 carry the red gene.



Variant Red Gene

The 1980 birth of a Red & White Holstein heifer in Canada named Surinam Sheik Rosabel-Red was the beginning of a long story towards the discovery of a new gene that yielded red coat colour in Holsteins. Subsequently, this gene has been named the “Variant Red” gene and carriers receive a code of *VRC. Although an initial research project conducted in Canada was not able to pinpoint the specific gene responsible for this source of red coat colour, efforts continue in this area. Specific to the CDN analysis reported in this article, animals visibly Red & White due to the Variant Red gene have been included in the Red & Whites statistics reported while the Red Carrier statistics have excluded animals that may be a carrier of the Variant Red gene unless they also have at least a 50% probability of possessing the traditional red gene.

Summary

The interest in Red & White and Red Carrier Holsteins continues to grow in Canada with record counts achieved among registered heifers born in 2010. In percentage terms, the proportion of Canadian Holsteins that are Red & White also reached an all-time peak in 2010 at 2.2%. Within the coming ten years, it is predicted that the percentage of Holsteins that are visibly Red & White will surpass the 4% mark and the proportion that are Red Carriers will reach a new all-time higher surpassing the former 20% level of 1982.

Authors: Brian Van Doormaal, CDN and Holstein Canada
Bethany Muir, Holstein Canada

Date: December 2011