The American Jersey Cattle Association (AJCA) has released additional information about the new undesirable genetic factor, Jersey Neuropathy Splayed Forelimbs (JNS). As well, tools are now available to help Jersey breeders eliminate the genetic defect or better manage its potential economic impact.

We have learned that JNS is attributable to a specific haplotype on Bos taurus autosome 6 (BTA6) and includes approximately 100 SNPs. Dairy geneticists believe a mutation in a gene named UCHL1 (Ubiquitin C-Terminal Hydrolase L1) is responsible for symptoms. The condition was confirmed in the fall of 2020 and added to the AJCA Policy Regarding Undesirable Genetic Factors upon approval of the Board of Directors in November 2020.

In this month's Jersey Jargon, we will explain how Jersey breeders can limit carrier-to-carrier matings, manage potential calf losses and become better informed about the genetic defect.

Determining an Animal's JNS Status

JNS is detected by evaluating an animal's genetic evaluation. Official status as JNS Carrier (JNSC)—versus JNS Free (JNSF) —is determined through one of three means:

(1) By direct observation of the UCLH1 missense variant on BTA6 in the genotype,

(2) By direct observation of the haplotype, including the UCLH1 missense variant on the BTA6 autosome,

(3) By imputation through evaluation of genomic results of the animal and family members if the variant is contained in the JNS haplotype of other genotyped animals and reassessed as additional information is obtained from genomic analyses.

Impact of JNS

Through evaluation of 1.5 million genotyped dairy cattle (500,000 Jerseys), it is estimated that 6% of the Jersey population are JNS Carriers. Thus 94% are JNS Free. Thus far, the haplotype has not been detected in other breeds and geneticists believe it was not introduced to the Jersey breed from another population.

The AJCA expects this frequency to increase, though, in the coming year as progeny of several heavily used carrier sires are born.

To display symptoms, an affect calf needs to inherit the defective JNS haplotype from both sire and dam. Matings of JNS carriers (carrier sire and carrier dam, for example), will yield offspring that are 25% normal non-carriers, 50% heterozygous carriers, and 25% affected animals.

Tools to Manage JNS

The best way to manage JNS is with knowledge of an animal's genetic makeup and pedigree. With it, Jersey breeders can avoid carrier-to-carrier matings or better manage matings to carrier sires and dams. Beginning in January 2021, both JNSC and JNSF status will be reported for new genotyped bulls and females. As well, this status will be identified on official performance pedigrees and progeny reports.

Jersey breeders can also find JNS status on Registered Jersey bulls in the December 2020 Green Book. JNS status is identified in the list of all summarized bulls and marketed bulls. As well, JNS status can be found in the free, online sire selection tool, BullsEye. With this tool, Jersey breeders can also create a list of bulls that are JNS Free.

Another means of managing JNS is through JerseyMate, which eliminates matings of designated JNS Carrier bulls to designated JNS Carrier females. High-risk matings are not likely because JerseyMate accounts for the economic impact of potential matings, using $150 as a loss for a calf with JNS.

Background

The journey to uncover the root of JNS is a testimony to the value of genotyping and work of a team of Jersey breeders who initially reported a condition out of the ordinary, veterinarians and pathologists, geneticists at the USDA Animal Genomics Improvement Laboratory, the Cooperative Dairy DNA Repository, the Council on Dairy Cattle Breeding and the AJCA.

The case study included 11 reported and documented calves affected with JNS. Parentage of all calves was confirmed through genotyping. Outside one dam sired by a herd bull, all sires and dams were genotyped. The animals were sired by six different sires and five different maternal grandsires. All trace 3-7 generations back to a single foundation cow born in 1985. Both her sire and maternal grandsire are JNS Free. At this point, it cannot be determined if this is an original mutation.

Further Information

A complete description of the condition can be found on pages 12-13 of the Green Book. The online Green Book can be viewed at https://greenbook.usjersey.com. The document is also available at https://www.usjersey.com/Portals/0/AJCA/2_Docs/Policy/Policies_Undesirable_Genetic_Factors_rev1120.pdf and on page 25 of the December 2020 issue of the *Jersey Journal.*

A webinar with more in-depth information on JNS can be viewed at https://www.youtube.com/watch?v=G8teqsIUFc8&feature=youtu.be. Included in the webinar is video footage that clearly shows mobility of calves affected with JNS.

If you have additional questions about JNS, contact Cari Wolfe, Director of Research and Genetic Program Development, by email at cwolfe@usjersey.com or phone at 614/322-4453.