

Resistance to Hypocalcemia (MFEV)

INTRODUCTION DATE

April 3, 2018, and then in all subsequent weekly, monthly and tri-annual evaluations.

DESCRIPTION OF TRAIT

Genetic and genomic evaluations for resistance to hypocalcemia or milk fever (MFEV) are provided for Holstein males and females. Evaluations are expressed in percentage points of resistance above or below the breed average.

Trait definition

The MFEV predicted transmitting ability (PTA) represents the expected resistance of an animal's offspring to hypocalcemia, also known as milk fever. Larger, positive values are more favorable.



Photo source: GENEX Cooperative, Inc.

Unit of measurement: Percentage points

The average resistance rate is equal to 98.7% in U.S. Holsteins. The resistance rate is equivalent to the incidence rate subtracted from 100.

Daughters of a Holstein bull with a MFEV PTA of +0.5% are expected to have an average resistance rate to hypocalcemia of 99.5% (assuming the breed average resistance is approximately 99%). Daughters of a Holstein bull with a MFEV PTA of -1.0% are expected to have an average resistance of 98%. Daughters from the bull with PTA of -1.0% are expected to have four times the number of cases of hypocalcemia as daughters from the bull with PTA of +0.5%.

Benefits of trait:

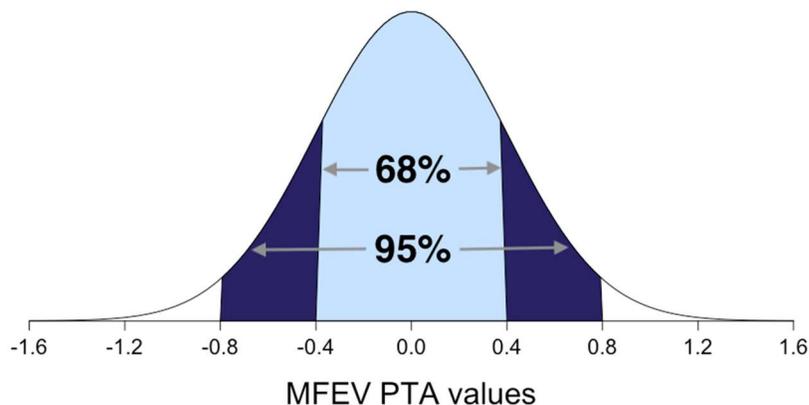
- Although hypocalcemia can be easily treated with intravenous calcium, it is also a risk factor for peripartum diseases such as mastitis, retained placenta, displaced abomasum, and ketosis, as well as increased culling.¹
- Including a direct measure for MFEV will allow producers the opportunity to select animals genetically more resistant to developing hypocalcemia.
- Direct cost of hypocalcemia is \$34 per case. This does not include any associated costs such as decreases in production and fertility^{2,3} already accounted for in Net Merit.

Breeds: Initially, the evaluations will be available only for Holstein animals. As more health data become available, evaluations can be provided for additional breeds.

Data source: CDCB MFEV evaluations were developed using producer-recorded data collected through Dairy Herd Information (DHI) affiliates from herds across the U.S. Strict editing was applied to ensure only the most reliable data was included for the development of genetic evaluations. The edited data included a total of 1.2 million MFEV records from over 720,000 cows. These health records are used in conjunction with lactation data available in the CDCB cooperator database.

Range of population:

The standard deviation (variation) for MFEV PTA is 0.4%. Because one and two standard deviations normally include 68% and 95% of observations, respectively, we assume about 68% of bulls will have a MFEV PTA between -0.4 and +0.4 percentage points while 95% of the bulls will range from -0.8 to +0.8 percentage points.



MFEV PTAs range from 1.3 percentage points below to 0.6 percentage points

above average in evaluated Holstein bulls born since 1990 with reliabilities $\geq 75\%$ (December 2017).

Pre-release analysis indicates the active AI Holstein sires in December 2017 (614 bulls) range from -0.5 percentage points to +0.4 percentage points, with the average at approximately 0 percentage points.

Reliability range: Young genomic bulls are expected to have reliabilities averaging 40% for resistance to hypocalcemia, and progeny tested bulls are expected to have genomic reliabilities averaging 44%. As additional data are accumulated, reliabilities will increase.

Heritability: Estimated heritability is 0.6% for resistance to hypocalcemia (observed scale).

Use in net merit indices: This trait will not be incorporated into net merit indices at launch; development of a health-enhanced net merit is expected in the future (date to be determined).

It is suggested that producers continue to rely primarily on a composite economic index with the specific choice dependent on the farm's milk payment situation and management system. In the meantime, producers might consider avoiding those service bulls having low predictions for resistance to hypocalcemia.

PTA Correlations: The only significant ($P < 0.05$) correlation with PTA for resistance to hypocalcemia was with SCS PTA at -0.29, indicating animals that resist milk fever are more likely to have lower somatic cell scores. Resistance to hypocalcemia was not significantly correlated with other trait PTA such as protein yield, productive life, livability, or reproductive traits such as daughter pregnancy rate, cow conception rate, and heifer conception rate.

Future developments:

In the future, further model improvements and development will be researched and tested. This may include the development of a multi-trait model that incorporates multiple metabolic disorders.

RESEARCH REFERENCES

¹Reinhardt, T.A., J.D. Lippolis, B.J. McCluskey, J.P. Goff, and R.L. Horst. 2011. Prevalence of subclinical hypocalcemia in dairy herds. *Veterinary Journal* 188:122–124. doi:10.1016/j.tvjl.2010.03.025.

²Donnelly, M. R., A. R. Hazel, B. J. Heins, & L. B. Hansen, 2018. Health treatment cost of Holsteins in 8 high-performance herds. *J. Dairy Sci.* (in preparation).

³Liang, D., L.M. Arnold, C.J. Stowe, R.J. Harmon, & J.M. Bewley, 2017. Estimating US dairy clinical disease costs with a stochastic simulation model. *J. Dairy Sci.* 100(2): 1472–1486.