

Resistance to Metritis (METR)

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 metritis (METR) are provided for Holstein males and females. Evaluations are expressed in percentage points of resistance above or below the breed average.

Trait definition

The METR predicted transmitting ability (PTA) represents the expected resistance of an animal's offspring to metritis in a herd with average management conditions. Larger, positive values are more favorable.

Unit of measurement: Percentage points

The average resistance rate is equal to 93.8% in U.S. Holsteins. The resistance rate is equivalent to the incidence rate subtracted from 100.

Daughters of a Holstein bull with a METR PTA of +2.0% are expected to have an average resistance rate to metritis of 96% (assuming the breed average resistance is approximately 94%). Daughters of a Holstein bull with a METR PTA of -2.0% are expected to have an average resistance to metritis of 92%. Daughters from the bull with PTA of -2.0% are expected to have twice the number of cases of metritis as daughters from the bull with PTA of +2.0%.

Benefits of trait:

- A case of metritis can increase the risk of fertility problems including ovulatory dysfunction¹ and increased calving to conception interval.²
- Direct cost of metritis is \$112 per case. This does not include any associated costs such as decreases in production and fertility^{3,4} already accounted for in Net Merit.
- The significant genetic component of this trait indicates that producers can select animals less likely to experience metritis.

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 METR 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 more than 2 million METR records from over 1.1 million cows. These health records are used in conjunction with lactation data available in the CDCB cooperator database.

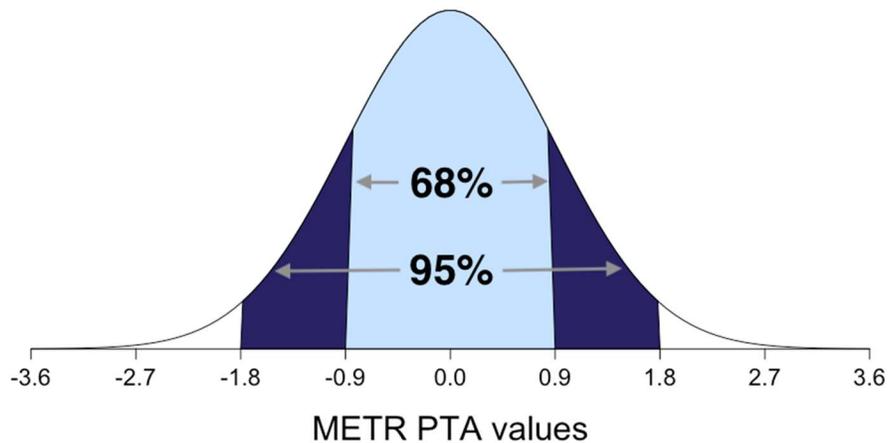


Photo source: Pixabay

Range of population:

The standard deviation (variation) for METR PTA is 0.9%. Because one and two standard deviations normally include 68% and 95% of observations, respectively, we assume about 68% of bulls will have a METR PTA between -0.9 and +0.9 percentage points while 95% of the bulls will range from -1.8 to +1.8 percentage points.

METR PTAs range from 2.3 percentage points below to 2.2 percentage points above average in evaluated Holstein bulls born since 1990 with reliabilities $\geq 90\%$ (December 2017).



Pre-release testing indicates the active AI Holstein sires in December 2017 (614 bulls) range from -1.6 percentage points to +1.3 percentage points, with the average at approximately +0.6 percentage points.

Reliability range: Young genomic bulls are expected to have reliabilities averaging 42% for resistance to metritis, and progeny tested bulls are expected to have genomic reliabilities averaging 48%. As additional data are accumulated, reliabilities will increase.

Heritability: Estimated heritability is 1.4% for resistance to metritis (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 metritis.

PTA Correlations: The largest significant ($P < 0.05$) correlation with PTA for resistance to metritis was with daughter pregnancy rate PTA at 0.46. Additional significant correlations were 0.41 with cow conception rate PTA, 0.32 with productive life PTA, 0.26 with livability PTA, and 0.23 with heifer conception rate PTA.

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 reproductive disorders and/or measures of fertility.

RESEARCH REFERENCES

¹Emanuelson, U., P. A. Oltenacu, and Y. T. Gröhn. 1993. Nonlinear mixed model analyses of five production disorders of dairy cattle. *J. Dairy Sci.* 76:2765–2772.

²Fourichon, C., H. Seegers, and X. Malher. 2000. Effect of disease on reproduction in the dairy cow: A meta-analysis. *Theriogenology*. 53:1729–1759. doi:10.1016/S0093-691X(00)00311-3.

³Donnelly, 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).

⁴Liang, 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.