

## Heifer Livability (HLIV)

### INTRODUCTION DATE

December 1, 2020, and then in all subsequent weekly, monthly and triannual evaluations.

### BENEFITS OF TRAIT

- The most common reasons for heifer disposal include digestive and respiratory diseases.<sup>1</sup> Selecting for improved heifer livability will improve animal health and welfare by decreasing the incidences of these diseases.
- The average cost of heifer loss is \$500.<sup>2</sup> Reducing the incidence of death and cost of replacement heifers will increase profitability.
- Heifer Livability reveals a heifer's overall resistance to causes leading to mortality. With increasing data on reasons for disposal in heifers, more extensive research can be conducted.



### DESCRIPTION OF TRAIT

Genetic and genomic evaluations for Heifer Livability (HLIV) are provided for Holstein and Jersey males and females. Evaluations are expressed in percentage points of Heifer Livability above or below the breed average.

#### Trait definition:

The HLIV predicted transmitting ability (PTA) represents the expected livability percentage of an animal's female offspring from 2 days after birth up to 18 months of age in a herd with average management conditions. Larger, positive values are more favorable.

**Unit of measurement:** Percentage points

The average Heifer Livability is equal to 96% in U.S. Holsteins and Jerseys.

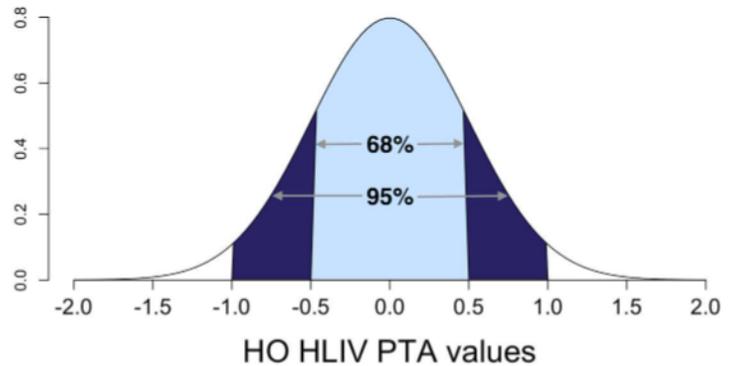
For example, a Holstein bull with a HLIV PTA of +1.0% would be expected to average 97% of his heifers surviving (assuming the breed average heifer livability is 96%). Daughters of a Holstein bull with a HLIV PTA of -1.0% are expected to have an average heifer livability of 95%.

**Breeds:** Initially, the evaluations will be available only for Holstein and Jersey animals. As more heifer termination data become available, evaluations can be provided for additional breeds.

**Data source:** CDCB HLIV evaluations were developed using data from the National Cooperators' Database maintained by the CDCB. Disposal codes were studied from 3.4 million heifer records from all breeds born between 2009 and 2016. Only herds reporting death losses between 1 and 25% were included. The number of reported deaths was 135,000 (4.0%), counting deaths that occurred between two days of age and when the heifer left the herd, or until the maximum imposed of 18 months. More than 90% of usable records were from Dairy Records Management Systems (Raleigh, NC). Records are not included until three years after the birthdate. Stillbirths and deaths occurring in the first two days of life are considered in the stillbirth evaluations.

### Range of population:

The standard deviation (variation) for HLIV PTA is 0.5% in Holsteins and 0.2% in Jerseys. Because one and two standard deviations normally include 68% and 95% of observations, respectively, we assume about 68% of Holstein bulls will have a HLIV PTA between -0.5 and +0.5 percentage points while 95% of the bulls will range from -1.0 to +1.0 percentage points. Similarly, we assume about 68% of Jersey bulls will have a HLIV PTA between -0.2 to +0.2 percentage points will 95% of the bulls will range from -0.4 to +0.4 percentage points.



HLIV PTAs range from 1.2 percentage points below to 2.4 percentage points above average in evaluated Holstein bulls born since 2000 with HLIV reliabilities  $\geq 70\%$ .

Among Jersey bulls born since 2000 with HLIV reliabilities  $\geq 70\%$ , HLIV PTAs range from 0.6 percentage points below to 0.90 percentage points above average (December 2020).

**Reliability range:** Young genomic bulls are expected to have reliabilities averaging 46% for heifer livability in Holsteins and 30% in Jerseys. Progeny tested bulls are expected to have genomic reliabilities averaging 55% in Holsteins and 46% in Jerseys. As additional data are accumulated, reliabilities will increase.

**Heritability:** Estimated heritability is 0.4% for heifer livability (observed scale).

**Use in Net Merit indices:** Heifer Livability will first be introduced as a stand-alone trait in December 2020. It will be incorporated in the Net Merit indices at the next revision, planned for April 2021.

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

**PTA Correlations:** Significant favorable correlations with PTA for Heifer Livability were found with yield traits, ranging from 0.34 to 0.36. Heifer Livability PTA was also favorably correlated at 0.44 with Productive Life. Additional significant correlations were 0.37 with calving trait dollars, and 0.36 with Early First Calving PTA.

Heifer Livability has a favorable trend in recent years, likely a result of selection for correlated traits.

### FUTURE DEVELOPMENT

The CDCB's Pursuing Data Quality committee has developed a revised format which makes future termination coding more comprehensive, especially for heifers. This new data can be used for more extensive heifer livability research. Additional use of the termination codes can increase the accuracy of available genetic and management information for producers.

### RESEARCH REFERENCES

<sup>1</sup>USDA. 2018. *Dairy 2014, Health and Management Practices on U.S. Dairy Operations, 2014*. USDA-Animal and Plant Health Inspection Service–Veterinary Services–Center for Epidemiology and Animal Health–National Animal Health Monitoring System (USDA-APHIS-VS-CEAH-NAHMS), Fort Collins, CO. #696.0218.

<sup>2</sup>Neupane, M, VanTassell, CP, and VanRaden, PM. 2020. Genomic evaluation of heifer livability. *J. Dairy Sci.* 103 (Suppl. 1):60 (abstr. 155).