

Gestation Length (GL)

INTRODUCTION DATE

August 8, 2017, and then in all weekly and monthly evaluations

DESCRIPTION OF TRAIT

Genetic evaluations of males and genomic predictions of both sexes are now provided for gestation length (GL) as a new trait expressed in days.

Trait Definition:

For service sires, the PTAs represent the influence the service sire is expected to have on the number of days his **mates** carry their calves during their pregnancies.

The evaluation model defines GL as a trait of the service sire because maternal effects on GL are small compared to direct genetic effects of sire, dam and Mendelian sampling of the calf.

Unit of Measurement: Number of days

Females bred to a Holstein bull with a GL PTA of +4 days are expected to carry their calves about 281 days, or four days longer than the breed average (277 days). A Holstein bull with a GL PTA of -5 days would have mates expected to be pregnant for only 272 days. The difference between these examples is extreme at nine days.

Benefits of trait:

- In grazing or seasonal calving herds, differences in gestation length may help concentrate calvings into a specified period.
- In all operations, gestation length may help herds schedule dry dates, pinpoint expected calving dates and manage the maternity pen.
- Increase understanding correlated effects of GL on other traits such as calving ease, stillbirth, and age at first calving.

Breeds: Ayrshire, Brown Swiss, Guernsey, Holstein (B&W, R&W), Jersey, Milking Shorthorn and crossbred animals that have usable genotypes. The all-breed model includes crossbred matings and breed effect of dam.

Note there is breed variance in GL, as shown in this table.

Breed	Mean GL for cows ²	Mean GL for heifers ²	Mean GL for the base year (2010) ³
Ayrshire	281.7	281.6	281
Brown Swiss	287.2	287.5	286
Guernsey	284.8	285.7	284
Holstein	279.0	277.8	277
Jersey	280.0	278.4	278
Milking Shorthorn	281.1	279.3	279



Photo source: American Jersey Cattle Association

Calculation: To predict the GL of a calf, add the predicted transmitting ability (PTA) of the sire plus the PTA of the dam (or half the PTA of the calf's maternal grandsire if the dam is not genotyped) plus the GL mean for the breed or breed combination.

Method of measuring and collecting data: Collected through Dairy Herd Information (DHI) affiliates. The edited GL data included a total of 12.4 million conception and calving dates of 6.8 million cows.

Range of population:

The standard deviation (variation) for GL PTA is 1.4 days. Because 1 and 2 standard deviations normally include 68% and 95% of observations, respectively, we assume about 68% of bulls will have a GL PTA between -1.4 and +1.4 days while 95% of the bulls will range from 2.8 to +2.8 days.

GL PTAs range from 5.6 days shorter to 6.4 days longer than average, in the population of Holstein bulls born since 1995 and $\leq 90\%$ Reliability. The range for Brown Swiss and Jerseys was slightly smaller, as fewer bulls have predictions.

Pre-release testing indicates the active AI Holstein sires (520 bulls as of April 2017) range from -5 days to +4 days, with the average at about 0.0 days.

Reliability Range: The young genotyped bulls are expected to have Reliabilities for GL averaging 28% for Guernsey, 33% for Brown Swiss, 35% for Ayrshire, 54% for Jersey and 65% for Holstein.

Heritability: Estimated for heifers at 48%

Use in net merit indices: No immediate plans to incorporate GL into net merit indices. Research by Norman et al.¹ showed cows with intermediate GLs also have the most favorable same or subsequent-lactation performance for several other economically-important traits (i.e. calving ease, stillbirth, current and subsequent lactation milk and milk component yields, and longevity).

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. Producers might consider bypassing those service bulls having long predictions for gestation length as one means to manage calvings.

Correlations: 38% with PTA for daughter calving ease, 24%-29% with PTAs for yield and productive life

Future developments:

It is possible that a second GL trait could be provided in the future, showing how many days the **daughters** of each sire are expected to carry their calves. The first trait – influence of the service sire on gestation length of his mates – was priority because it has a larger genetic influence, nearly twice the influence of expression through the bulls' daughters.

RESEARCH REFERENCES

¹Norman, H.D., J.R. Wright, and R.H. Miller. 2011. [Potential consequences of selection to change gestation length on performance of Holstein cows](#). J. Dairy Sci. 94 (2):1005-1010.

²Norman, H.D., J.R. Wright, M.T. Kuhn, S.M. Hubbard, J.B. Cole, and P.M. VanRaden. 2009. [Genetic and environmental factors that affect gestation length in dairy cattle](#). J. Dairy Sci. 92 (5):2259-2269.

³Wright, J.R., and P.M. VanRaden. 2017. [Genetic evaluation of gestation length as a trait of the service sire](#). J. Dairy Sci. 100, Suppl.2:42.v [Poster presentation](#), 2017 American Dairy Science Association Meeting