

## Cow Conception Rate (CCR)

Introduced in 2009, Cow Conception Rate PTA predicts the expected difference in conception rate of daughters as cows, relative to the breed base. CCR was updated for the August 2026 evaluation and beyond to include a days-in-milk covariable in the model. Genomic and genetic evaluations for CCR are provided for Ayrshire, Brown Swiss, Guernsey, Holstein, Jersey, and Milking Shorthorn (traditional only) males and females.

### Benefits of Trait

- Improves genetic selection for successful conception in lactating cows
- Supports reduced breeding costs and fewer inseminations per pregnancy
- Enhances reproductive efficiency in modern herd management systems
- Complements DPR by focusing on conception success rather than time to pregnancy

### Heritability

CCR has a heritability of 2.9%. This level is typical for reproductive performance traits, indicating that genetic progress is gradual but cumulative over time.

### Description of Trait

CCR utilizes inseminations (0 for failure; 1 for success) within a lactation (maximum of seven services). These inseminations are adjusted for mating type, service sire breed, and short cycle then used to calculate a conception rate by dividing by the total number of inseminations required.

### Inclusion in Selection Indexes

CCR has been included in the lifetime merit indexes since 2014. As of the April 2025 update to the indexes, CCR has the following relative emphasis in each:

- Net Merit \$: 1.8%
- Cheese Merit \$: 1.7%
- Fluid Merit \$: 1.8%
- Grazing Merit \$: 5.2%

These values represent CCR's economic importance to reproductive efficiency and herd profitability. The August 2026 modifications to CCR do not affect these emphases because the weights on traits in the lifetime merit indexes are based on economic values that are not being updated. Animal variations in NM\$, CM\$, FM\$, and GM\$ that are expected with the updates to CCR will be due to changes in PTA values because of the revisions, not the relative emphasis of the trait in the index.

### Correlations with Other Traits

Within the reproductive performance trait portfolio, CCR is strongly correlated with Daughter Pregnancy Rate (+0.94) and First Service to Conception (+0.98) and moderately correlated with Heifer Conception Rate (+0.52). These correlations allow information from related reproductive performance traits to improve evaluation accuracy, particularly when data is limited.

## How to Interpret the Trait

CCR is best for a producer who wants to improve conception rate success per service since this trait reflects how many inseminations are needed.

PTAs are interpreted based on the breed average and expressed as percentages. A positive CCR PTA is desirable.



### Reliability Ranges

Reliability varies by animal and is influenced by the amount of available information. Young animals typically have lower reliability, while proven sires with extensive daughter records have higher reliability.

|                   | "A" Status Bulls |
|-------------------|------------------|
| Ayrshire          | 32% to 98.1%     |
| Brown Swiss       | 60% to 99%       |
| Guernsey          | 37.3% to 93%     |
| Holstein          | 31.5% to 99%     |
| Jersey            | 58.1% to 99%     |
| Milking Shorthorn | 51.9% to 89.2%   |

### Data Source

The data to calculate this trait is stored in the National Cooperator Database. CCR utilizes reproductive records, including insemination events, pregnancy diagnoses, and subsequent calving confirmations reported through U.S. dairy records programs.

Producers can help continue to improve reproductive performance traits by recording key information in on-farm software.

- Ensure animal ID is unique and recorded correctly
- Confirm each animal has sire, dam, and date of birth
- Properly record service sire with the NAAB code or bull ID for each reproductive event
- Record ET births

### Resources and Research



Published research supporting this trait and the 2026 reproductive revisions is available by scanning this QR code.

Listen to The CDCB CowCast for a conversation with lead researcher Dr. Taylor McWhorter about the 2026 revisions to reproductive traits. Available on YouTube and podcast platforms on May 12.

## Range of Population

Most animals fall within a relatively narrow range around zero, with positive values indicating a higher-than-average genetic ability for successful conception per insemination and negative values indicating a lower-than-average ability relative to the breed base. These PTA values are calculated during a pre-release analysis. Some variation is expected in August 2026.

|                   | Active A.I. Bulls<br>("A" Status Bulls) |          |      | Genomic Bulls<br>("G" Status Bulls) |          |      | Bulls born since 2000<br>(≥ 90% reliability) |          |      |
|-------------------|---|----------|------|-------------------------------------|----------|------|--|----------|------|
|                   | PTA Range                               | Mean PTA | SD   | PTA Range                           | Mean PTA | SD   | PTA Range                                    | Mean PTA | SD   |
| Ayrshire          | -2.2 to +7.3                            | +1.84    | 2.82 | -2.7 to +2.9                        | +0.37    | 1.10 | -3.0 to +8.6                                 | +1.85    | 2.54 |
| Brown Swiss       | -3.6 to +2.9                            | +0.55    | 1.52 | -3.2 to +6.6                        | +0.99    | 2.02 | -5.2 to +5.9                                 | -0.29    | 2.12 |
| Guernsey          | -2.3 to +4.4                            | +1.04    | 2.00 | -3.9 to +5.6                        | +0.94    | 2.42 | -6.2 to +5.9                                 | -0.82    | 2.49 |
| Holstein          | -8.3 to +7.3                            | +0.61    | 2.16 | -5.0 to +7.4                        | +1.65    | 1.58 | -9.9 to +10.5                                | -1.61    | 2.46 |
| Jersey            | -4.1 to +5.1                            | +0.15    | 2.03 | -7.3 to +5.0                        | +0.74    | 1.82 | -11.7 to +7.5                                | -1.16    | 2.18 |
| Milking Shorthorn | -3.8 to +1.8                            | -0.62    | 2.40 | ---                                 | ---      | ---  | -3.6 to +4.5                                 | -0.07    | 1.88 |

Approximately 68% and 95% of observations fall within one and two standard deviations (SD) of the mean, respectively. The following example demonstrates how these proportions apply to active Holstein and Jersey bulls.

|          | PTA Standard Deviations ("A" Status Bulls) |       |       |       |
|----------|--|-------|-------|-------|
|          | -2   | -1    | +1    | +2    |
| Holstein | -3.71                                      | -1.55 | +2.77 | +4.93 |
| Jersey   | -3.91                                      | -1.88 | +2.18 | +4.22 |

## Frequently Asked Questions

### How does the revised version of CCR compare to the legacy version?

Cow Conception Rate PTA continues to predict the expected difference in conception rate of daughters as cows relative to the breed base. The model used to calculate CCR was revised to include a days-in-milk covariable and account for service sire breed, mating type, and short cycling with pre-adjustments to individual inseminations.

### How do the PTA values of the revised CCR compare to the legacy values?

The changes in PTA ranges, mean PTA, and standard deviations between versions of CCR are due to the updated model and variance components. These differences reflect rescaling of the traits, rather than a true increase or decrease in underlying genetic variation.

|                 | Revised CCR PTA<br>("G" Status Bulls) |          |      | Legacy CCR PTA<br>("G" Status Bulls) |          |      |
|-----------------|---------------------------------------|----------|------|--------------------------------------|----------|------|
|                 | PTA Range                             | Mean PTA | SD   | PTA Range                            | Mean PTA | SD   |
| <b>Holstein</b> | -5.00 to +7.40                        | +1.65    | 1.58 | -6.50 to +6.40                       | +0.25    | 1.49 |
| <b>Jersey</b>   | -7.30 to +5.00                        | +0.74    | 1.82 | -5.40 to +5.10                       | +0.14    | 1.61 |

### Why was the genetic trend for CCR previously downward trending but now trending upward in the new model?

In the previous system, some long-term changes in herd management were not fully accounted for. As a result, some of the effects of management choices could be incorrectly attributed to genetics, which made trends for traits like DPR and CCR appear flat or even declining. The updated model does a better job of separating genetic improvement from management effects and accounting for how on-farm practices have changed over the past 20–25 years. The change in trend does not mean biology has suddenly improved; it means we are now measuring genetic progress more accurately.

### How should farmers use the updated CCR trait?

CCR is best for a producer who wants to improve conception rate success per service, since this trait reflects how many inseminations are needed. DPR and FSC offer tools that include days open and days from first service to conception, respectively.

### What is the average number of inseminations per conception for U.S. cows?

According to data stored in the National Cooperator Database and used in genetic evaluations, the average Holstein cow that calved in 2024 in the United States is bred 2.09 times per conception. U.S. Jersey cows that calved in the same year were bred 2.07 times per conception on average.