CDCB®
COUNCIL ON DAIRY CATTLE BREEDING

Reintroducing Reproductive Performance Traits

Supplemental Information - July Resources

August 2026 Updates

Frequently Asked Questions

Why did CDCB review and update the female reproductive performance trait evaluations?

The legacy female reproductive performance traits have served the industry well for more than two decades, but dairy management practices have changed significantly. Increased use in synchronization programs, sexed semen, beef semen, and customized breeding strategies created situations where management decisions could influence evaluations more than was previously accounted for. The updates help separate genetics from modern management effects and improve the accuracy and stability of the evaluations.

What traits are being revised and what primary adjustments are being made?

Trait	Definition	Primary Revision to Trait
Daughter Pregnancy Rate (DPR)	Predicts the expected percent of non-pregnant cows that become pregnant during each 21-day period relative to the breed base	The model used to calculate DPR was revised to account for a herd-level and lactation group-specific voluntary waiting period (VWP).
Cow Conception Rate (CCR)	Predicts 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.
Heifer Conception Rate (HCR)	Predicts the expected difference in conception rate of daughters as maiden heifers relative to the breed base	The model used to calculate HCR was revised to account for service sire breed, mating type, and short cyling within individual inseminations.
Early First Calving (EFC)	Predicts the difference in age at first calving of an animal's daughters relative to the breed base	The calculation of EFC was moved to a single-trait model for computational efficiency.

What is First Service to Conception (FSC) and why was it added?

FSC is a new reproductive trait that measures the number of days between a cow's first insemination and successful conception. It focuses specifically on what happens after breeding begins. FSC fills an important gap in the existing traits by evaluating reproductive performance independently of voluntary waiting period (VWP).

How should farmers use the updated DPR trait and the new First Service to Conception (FSC) trait?

DPR is best for producers who use a VWP on the herd level and want cows to cycle, get bred, and become pregnant quickly, regardless of the number of services. FSC is useful for producers who select VWP on a cow basis and want cows to get pregnant as quickly as possible after the first breeding, without focusing on how many services it takes. It's important to remember that DPR is expressed as a percentage while FSC is expressed in days. For both DPR and FSC, a positive PTA is desirable.

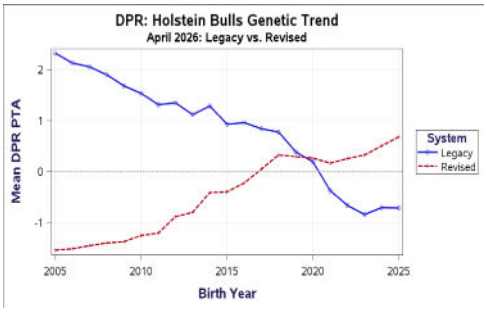
How can the differences in cow reproductive performance traits be understood?

Trait	Expressed In	PTA Range of Active A.I. Bulls[1]	Application of Trait
First Service to Conception (FSC)	Days	Holstein: -24.8 to +20.7 Jersey: -12.5 to +15.2 Brown Swiss: -7.8 to +9.2	Useful for producers who select voluntary waiting periods on a cow basis and want cows to get pregnant as quickly as possible after the first breeding without focusing on how many services it takes.
Daughter Pregnancy Rate (DPR)	Percent (%)	Holstein: -5.3 to +5.7 Jersey: -3.6 to +5.0 Brown Swiss: -1.6 to +3.0	Informational for producers who use a voluntary waiting period on a herd level and want cows to cycle, get bred, and become pregnant quickly, regardless of the number of services.
Cow Conception Rate (CCR)	Percent (%)	Holstein: -8.3 to +7.3 Jersey: -4.1 to +5.1 Brown Swiss: -3.6 to +2.9	Best for producers who want to improve conception rate success per service, since this trait reflects how many inseminations are needed for a successful conception.

1 - Values produced in the December 2025 test run. Some variation is expected in August 2026 as more phenotypic records are added and the list of Active A.I. bulls is updated.

Frequently Asked Questions

Why were the genetic trends for DPR and CCR previously downward but now upward?



In the legacy system, some 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 to 25 years. The change in trend does not mean biology has suddenly improved; it means we are now measuring genetic progress more accurately.

What was the cause of unexpected trends observed for young bulls by the industry in the legacy system?

The catalyst for this foundational review of reproductive traits was observations of subtle but consistent seasonal patterns in young sire PTAs along with gradual but consistent decline in PTAs from evaluation to evaluation as more information was accumulated. The expectation is to see more variety in PTA changes, both upward and downward. This observed trend is an inherent characteristic of the trait: heifers with higher reproductive performance are more likely to become cows with higher reproductive performance, and they enter the data stream earlier than cows with lower reproductive performance from the same contemporary group. Consequently, a young bull's earliest daughter records are biased toward daughters with higher reproductive performance because they calve first. As more daughters enter the data stream over time, the distribution of daughter performance becomes more representative of the full population.

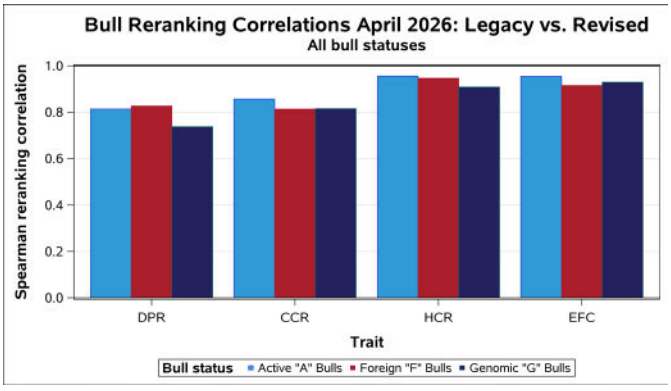
To address this, cow reproductive records are now included approximately 36 months after the animal's birth rather than as soon as they become available. This timing allows records from both earlier- and later-calving daughters to accumulate before evaluation, including records from cows that may have left the herd before 36 months of age.

These cow traits are highly correlated. Why are strong correlations useful?

Strong correlations give more information to other traits when data availability is limited. DPR has available data from 1960 to today. Meanwhile CCR, HCR, and FSC only have data from 2002 to today. When DPR is included in a multi-trait model, more information is available for CCR, HCR, and FSC. While the female reproductive traits are highly genetically correlated, each is informative in its own way.

What amount of reranking is expected with these updates?

The figure to the right shows how similar bull rankings are between the legacy and revised reproductive performance evaluations. A value of 1.00 indicates identical rankings, while lower values indicate greater reranking. In general, values of 0.95 to 1.00 indicate very little change, 0.90 to 0.95 indicate small changes, 0.80 to 0.90 indicate moderate reranking, and below 0.80 indicate more noticeable reranking.



Active and Foreign bulls showed very high ranking stabilty (0.91 to 0.96), indicating that the rankings of most established bulls changed very little under the revised evaluations. Greater reranking was observed for Genomic bulls, particularly for DPR and CCR. These young bulls are more affected by the updates to the reproductive performance evaluations, which reduce sources of bias and improve the stability of young bull evaluations.

This figure combines results across all dairy breeds. While the magnitude of reranking varies somewhat among breeds, the overall patterns are consistent. Breed-specific results can be found later in this report.

Frequently Asked Questions

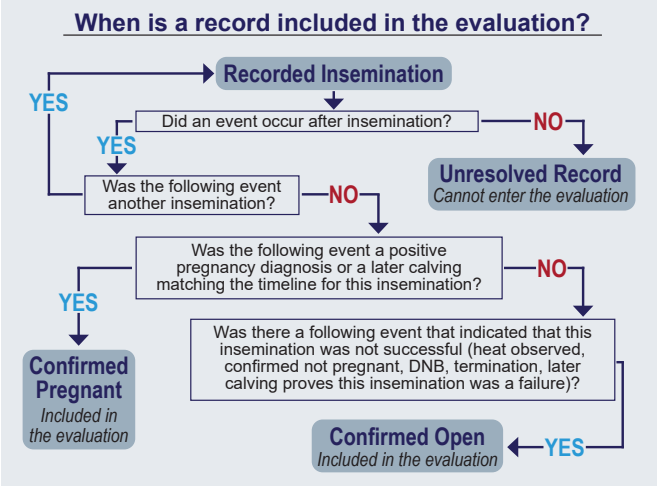
How is the conception date determined for FSC?

FSC measures the number of days between a cow's first insemination and the insemination that results in a confirmed pregnancy. A pregnancy is considered confirmed if it is verified by a positive pregnancy diagnosis or a subsequent calving.

How does CDCB determine a confirmed pregnancy and when to use a cow's reproductive record?

An insemination is considered unsuccessful (confirmed open) if later records show the cow did not become pregnant. Evidence for this includes another insemination, a negative pregnancy diagnosis, heat or other reproductive events indicating the cow remained open, do not breed (DNB) or termination records, or a later calving that confirms another insemination resulted in pregnancy.

An insemination is considered successful (confirmed pregnant) if later records verify that the cow became pregnant. Evidence for this is either a positive pregnancy diagnosis or a subsequent calving.

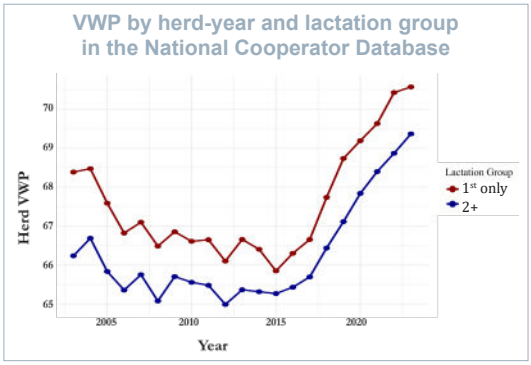


How and why is voluntary waiting period (VWP) changing in Daughter Pregnancy Rate (DPR)?

The revised model accounts for herd- and lactation-specific VWP rather than assuming all herds begin breeding at 50 days in milk. This better reflects real-world modern breeding practices and helps separate management decisions from genetic performance.

How are voluntary waiting periods accounted for now compared to the previous DPR calculations?

A VWP is the number of intentional days between calving and the first service. The initial version of DPR was first calculated in 2003. It assumed an industry standard VWP of 50 days, with a grace period up to 70 days. Management practices have since been refined, and unique VWP are often used on farms and between lactation groups. The 2026 revision to DPR includes VWP values by herd-year and by lactation group on a farm level. VWP will be set to the days in milk when the first 20th percentile of cows are bred for the first time.



What is a short cycle and why does it matter for CCR and HCR?

A short cycle occurs when a cow or heifer is bred again 10 to 17 days after a previous insemination. This often indicates a failed conception or other reproductive issues. Including this information in the model helps improve the accuracy of conception-related traits.

How are embryo transfer animals handled in reproductive evaluations?

Embryo transfer-related records are carefully managed to prevent reproductive technologies from biasing reproductive performance evaluations. Donor dams, recipients, ET-born animals, split embryos and clones are handled differently than conventionally born animals. These procedures are not new and have been a part of the reproductive performance evaluations for years.

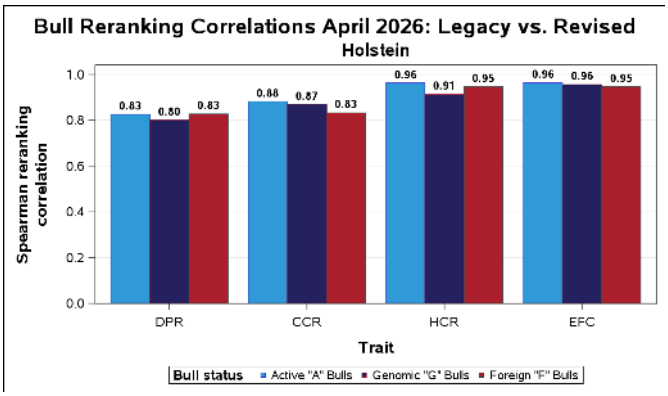
It's important that producers accurately record embryo transfer events in herd management software and calving records. This helps ensure data quality and allows CDCB to properly identify and manage ET-related records within evaluations. Accurate reporting improves the reliability of genetic evaluations for the entire industry.

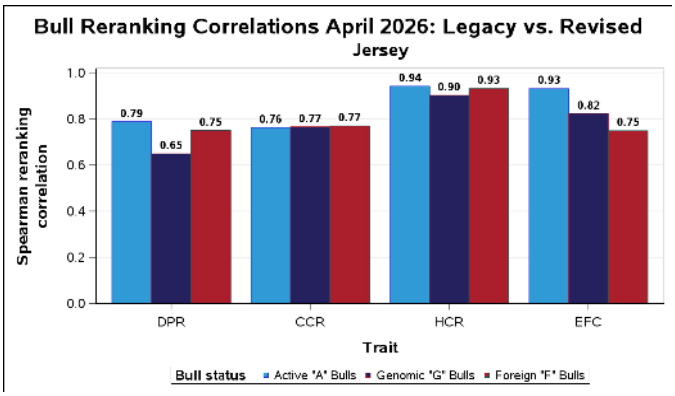
Reranking Correlations

Reranking of Active, Foreign, and Genomic Bulls

The updates to the reproductive performance evaluations are comprehensive, so noticeable reranking is expected within the reproductive performance traits, particularly DPR and CCR. Because these traits also contribute to Productive Life and the Lifetime Merit Indexes, some impact is expected, but on average, it is not substantial. For bulls with Active, Foreign, and Genomic statuses, Spearman ranking correlations for Productive Life and the Lifetime Merit Indexes all exceed 0.99, indicating virtually no reranking.

Among the reproductive performance traits, DPR exhibited the greatest reranking, with ranking correlations ranging from 0.74 to 0.83 across bull groups. CCR also showed moderate reranking (0.81 to 0.86). In contrast, the heifer reproductive performance traits remained substantially more stable. HCR correlations ranged from 0.91 to 0.96 while EFC ranged from 0.91 to 0.95, indicating relatively little reranking compared with the cow reproductive performance traits.





Across all reproductive performance traits, Active A.I. bulls consistently exhibited the greatest ranking stability, followed closely by Foreign bulls, while Genomic bulls experienced the greatest reranking, particularly for DPR and CCR. This pattern is expected because Active and Foreign bulls generally have higher reliabilities based on daughter performance and extensive phenotypic information. In contrast, Genomic bulls rely primarily on genomic information with no daughter records, making them more responsive to improvements in the evaluation methodology.

Similar trends were observed across all dairy breeds. Although the magnitude of reranking varied somewhat among breeds, the greatest changes consistently occurred for DPR and CCR, while HCR and EFC remained comparatively stable. Greater variability was observed in the smaller breeds because of their smaller bull populations, but no unexpected patterns were identified.

Reranking of Cows with Genotypes and Phenotypes

Among cows with both genotypes and reproductive performance records, ranking stability remained high across the three birth-year groups (under 5 years, 5 to 10 years, and over 10 to 15 years). As with bulls, the greatest reranking occurred within the reproductive performance traits that underwent the most substantial model revisions.

DPR exhibited the greatest reranking, with correlations ranging from 0.84 to 0.89 across birth groups, followed by CCR (0.86 to 0.92). In contrast, the heifer traits remained more stable, with HCR and EFC correlations generally ranging from 0.88 to 0.93. These results indicate that the largest changes were confined to the cow reproductive performance traits directly affected by the revised evaluation models.

Birth year also influenced the degree of reranking for the cow reproductive performance traits. The youngest cows (under 5 years) exhibited greater ranking stability for DPR and CCR than cows born five to 10 years earlier. This agrees with the genetic trend analyses, which showed that the legacy and revised evaluations diverged most strongly for older birth cohorts but became increasingly similar for more recent animals.

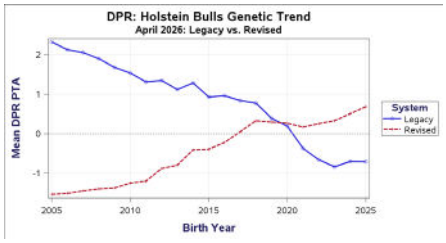
Although the revised reproductive performance evaluations produced noticeable reranking for DPR and CCR, overall cow rankings remained highly consistent. Because reproductive performance traits contribute only a portion to Productive Life and the Lifetime Merit Indexes, the impact on these traits is minimal. Productive Life and Lifetime Merit Index ranking correlations all exceed 0.98 across the three birth groups, indicating very little reranking.

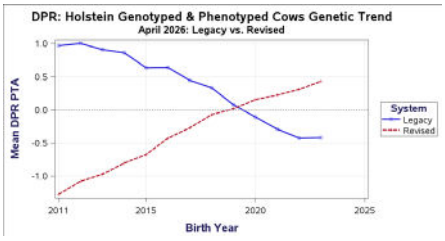
Genetic Trends

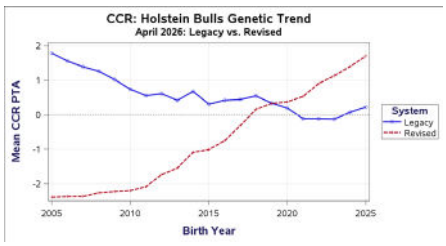
The revised evaluation produces different genetic trends than the legacy evaluation because it more accurately reflects genetic differences in reproductive performance. The same overall patterns were observed in cows and bulls. Note that the cow genetic trends seen below end earlier than the bull trends because only cows with completed reproductive performance phenotypes are included. The youngest birth cohorts have not yet accumulated DPR and CCR records for the evaluations. Genetic trends for these cows closely matched those observed in bulls for DPR and CCR, providing confidence that the revised evaluation performs consistently across animal populations.

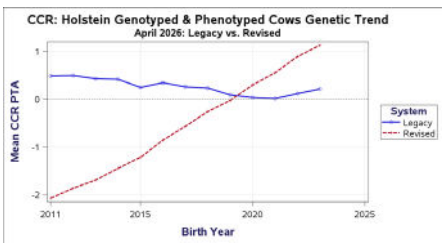
BULLS COWS

HOLSTEIN

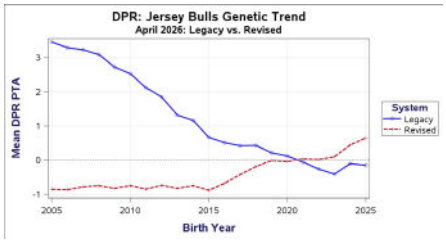


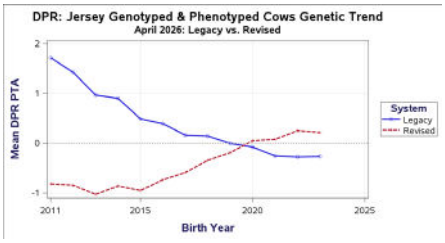


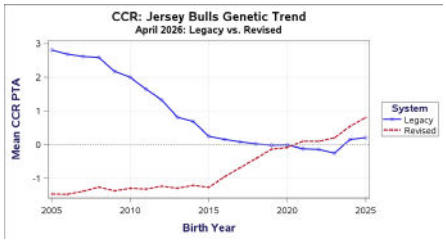


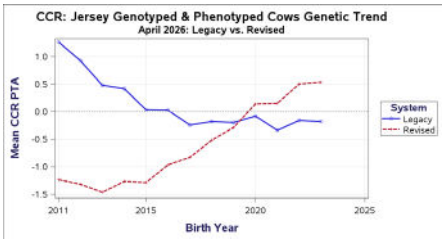


JERSEY

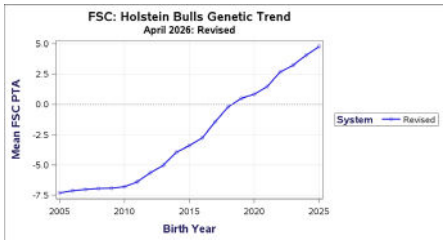


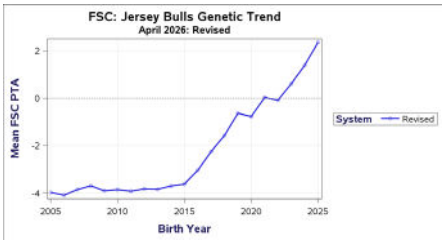






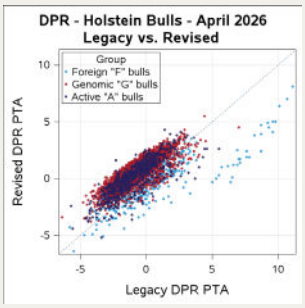
Genetic trends for FSC indicate consistent genetic improvement across most breeds, particularly Holstein, Jersey, and Guernsey, with increasingly favorable PTAs in more recent birth cohorts. Ayrshire and Brown Swiss also show positive trends, while Milking Shorthorn exhibits greater variability because of its smaller population size. Overall, the revised evaluation maintains the expected biological patterns while providing more consistent and reliable evaluations of genetic merit for reproductive performance over time.

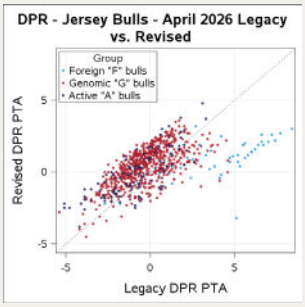


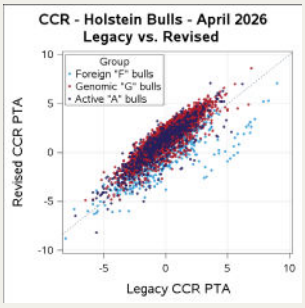


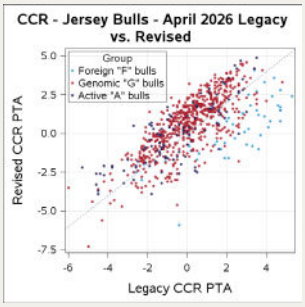
Scatterplots - A, F, G Bulls

CCR and DPR showed strong agreement between the legacy and revised evaluations across all bull status groups and breeds. Most bulls remained close to the diagonal line, indicating that relative rankings changed little for the majority of bulls. While some reranking occurred, especially for DPR and CCR, the changes were distributed across the population. Greater scatter was observed in the smaller breeds because of their smaller populations.









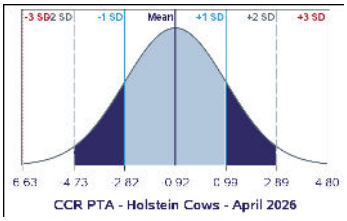
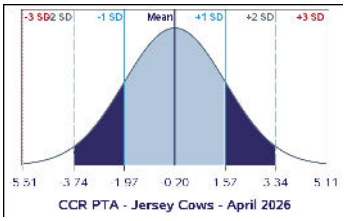
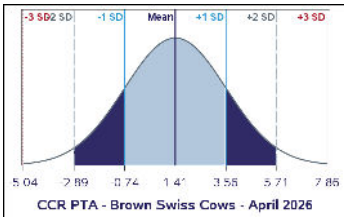
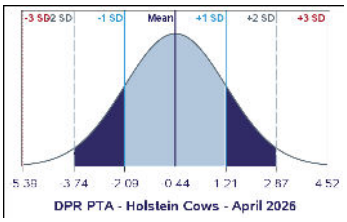
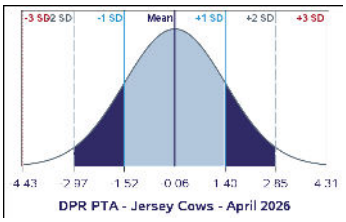
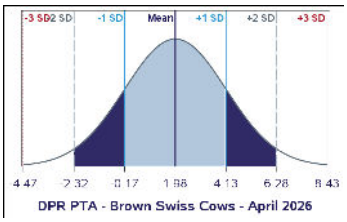
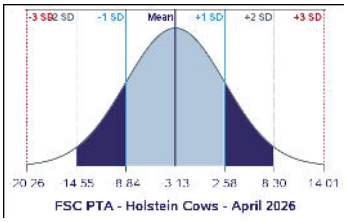
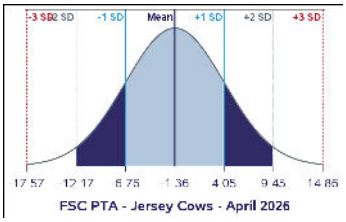
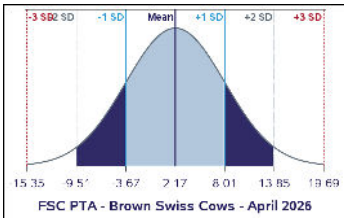
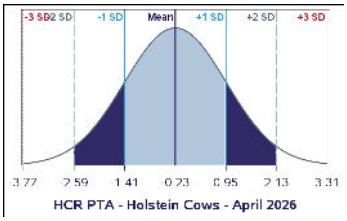
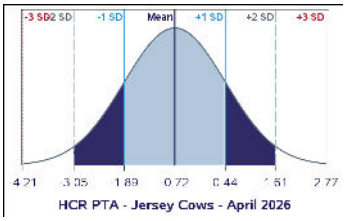
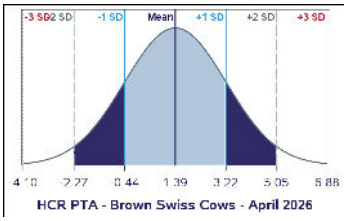
PTA Distributions

The revisions to these four traits will have impacts on the PTA ranges seen in active bulls and the mean PTA of that population. These values are based on December 2025 test run information. Variation is expected in August 2026 due to additional phenotypes entering the evaluation and the list of Active A.I. bulls being updated.

		PTAs of Active Bulls (HO)		PTAs of Active Bulls (JE)		PTAs of Active Bulls (BS)	
Trait	**Unit**	**Range**	**Mean**	**Range**	**Mean**	**Range**	**Mean**
DPR	**%**	-5.30 to +5.70	+0.06	-3.60 to +5.00	+0.13	-1.60 to +3.00	+0.47
FSC	**days**	-24.80 to +20.70	+2.13	-12.50 to +15.20	+0.20	-7.80 to +9.20	+0.19
CCR	**%**	-8.30 to +7.30	+0.61	-4.10 to +5.10	+0.15	-3.60 to +2.90	+0.55
HCR	**%**	-5.30 to +4.60	+0.48	-3.40 to +4.20	-0.03	-5.60 to +3.70	-0.02
EFC	**days**	-16.90 to +8.40	+0.74	-13.30 to +10.10	+0.67	-9.40 to +8.90	+0.70

PTA Ranges for Holstein, Jersey, and Brown Swiss Females

Below are distribution graphs for Holstein, Jersey, and Brown Swiss female PTAs. Approximately 68% and 95% of observations fall within one and two standard deviations (SD) of the mean, respectively. Final values and distributions will vary slightly in August 2026 when additional phenotypic information is added to the evaluation.

	Holstein	Jersey	Brown Swiss
Cow Conception Rate (CCR) PTA Expression: %			
Daughter Pregnancy Rate (DPR) PTA Expression: %			
First Service to Conception (FSC) PTA Expression: Days			
Heifer Conception Rate (HCR) PTA Expression: %			
Early First Calving (EFC) PTA Expression: Days