Breeding for improved survival
Technote 4

HIGHLIGHTS

- Selecting for Australian breeding indices improves survival and the drivers of business performance.
- Survival is included in Australia's three dairy breeding indices: Balanced Performance Index (BPI), Health Weighted Index (HWI) and Sustainability Index (SI).
- By using these indices, you will be breeding cows that last longer in the herd.
- A new multi-trait model has been used for the Survival ABV since December 2025.

Survival – also known as longevity or productive herd life – refers to an animal's ability to last in the herd for many lactations.

Survival is a significant contributor to dairy business performance. Improving survival creates the opportunity to breed and rear fewer replacements which means:

- Lower heifer rearing costs (or greater income as surplus calves are sold) as fewer replacements are needed.
- Reduced greenhouse gas emissions due to more productive older cows and fewer replacements.

Other benefits of improved survival include:

- The herd is more mature – more mature cows produce more milk than younger cows.
- A greater proportion of the culling decisions can be based on production, resulting in an increase in the average production of the herd.

Survival ABV

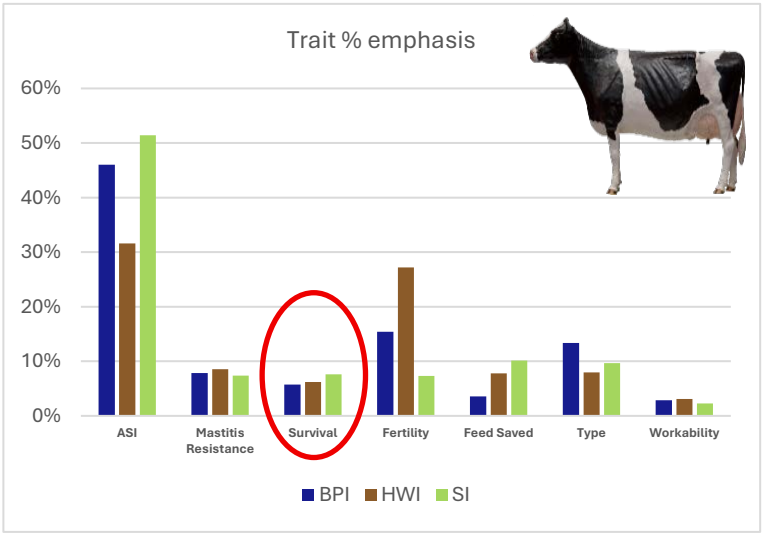
The Survival ABV reflects an animal's ability to produce daughters that last in the herd for many lactations. For bulls, it refers to its ability to produce daughters that last longer in the herd.

For cows it is an indicator of her potential herd life when compared to herd mates as well as an indicator of her ability to produce longer lived daughters.

The Survival ABV is expressed as a percentage with an average of 100. If a bull has a survival ABV of 105, his daughters are likely to last 2.5% longer in the herd than the daughters of a bull with a survival ABV of 100.

Breeding for improved survival

The best way to breed for improved survival is to use one of DataGene's three indices – Balanced Performance Index (BPI), Health Weighted Index (HWI) or Sustainability Index (SI). The graph above shows the weighting of survival in the Holstein indices.



You can also use the Good Bulls App and after selecting your index, filter for priority traits:

- Production (ASI)
- Health & Fertility (Mastitis Resistance, Fertility and Survival)
- Workability
- Type
- Feed Saved (except for Jerseys).

In all breeds, survival is given the highest weighting in the Sustainability Index. The graph shows trait weightings for Holsteins. Refer to the ABV Pocket Guide for trait weightings for Jerseys and Red Breeds.

While a cow's survival in the herd is influenced by production, fertility, cell count, type and workability, it is also influenced by other traits that we don't measure such as lameness, metabolic disorders, maternal calving ease and susceptibility to disease.

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Heritability

Heritability is a measure of how much a trait is influenced by genetics. Survival has relatively low heritability (0.035), similar to the heritability for fertility (0.03). This means genetics plays a smaller role in influencing a cow's survival than factors such as environmental conditions and management.

Genetic selection for survival is still possible and effective because we use a huge dataset. It has a cumulative and long-term effect. Significant genetic variation exists within Holstein and Jersey breeds making it possible to identify animals with higher genetic merit for survival.

Reliability

Reliability is a measure of confidence in an ABV. The reliability of an animal's breeding values improves with age as more information becomes available, for example genomics and daughters' performance records and herd test results.

The reliability of the Survival ABV in a young Holstein genomic bull is about 60% which is similar to Fertility and Overall Type.

A new, multi-trait model for Survival ABV was implemented in December 2025 resulting in a better estimate of lifetime productivity than the previous model (see appendix for more details).

Breeds

DataGene evaluates all dairy breeds for survival: Holstein, Jersey, Aussie Reds, Cross Breeds, Brown Swiss, Ayrshire, Illawarra and Guernseys.

Read more

Khansefid M, Pryce JE, Shahinfar S, Axford M, Goddard ME, Haile-Mariam M. (2023) Improving accuracy and stability of genetic predictions for dairy cow survival. *Animal Production Science* 63, 1031–1042.

More information

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November 2025

Appendix: 2025 model for Survival ABV

This appendix explains the key changes new model for Survival ABV (introduced in November 2025) and the model used previously.

Early and late survival

A key innovation in the new Survival ABV is the use of a more detailed model that separates survival into two genetically related traits:

- Early Survival – survival from first to second lactation
- Late Survival – survival from second and later lactations.

This distinction recognises that there are different reasons why cows leave the herd early or later in life.

Model differences

The table summarises the key differences between the previous model and the new model implemented in November 2025.

Compared with the previous model, the new 2025 model:

- Has a more concise definition of contemporary groups.
- Uses an improved allocation of termination/survival scores (using milk test-day, termination and calving data).
- Excludes historic cows (born before 1988) as the reasons for culling have changed over time with changes to farming systems.

Survival ABV: model differences

	Nov 2025 model	Model pre-Dec 2025
Survival definition used	Lifetime survival across lactations (distinguishes between survival to the end of first lactation and survival in later lactations)	Overall survival across years (up to nine years after the first recorded calving)
Expression	Productive lifespan	Likelihood of a cow surviving from one lactation to the next
Average (base)	100	100
Number of traits	Multi-trait • Early survival • Late survival • Predictor traits	Single trait • % survived from this lactation to the next
Termination codes	Used	Not used
Predictor traits	Pin set Udder Depth Likeability	Overall type Pin set Udder Depth Likeability

Improved prediction of survival

The November 2025 model provides a better prediction for cow survival, so we expect a stronger relationship between predicted and actual survival. This is mostly due to separating first lactation survival, the new more concise definition of contemporary groups and the additional fixed effects.

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Predictor traits are directly used in the updated evaluation model. This is expected to be most useful for the genetic evaluation of the bulls with fewer and young daughters.

The models are based on different units of measure so Survival ABVs pre and post November 2025 are not directly comparable.

Animal rankings

The introduction of the new model had a once-off impact on animal rankings for Survival ABV. As survival is included in DataGene's three key selection indices, implementation of the new model also had a once-off impact on animal rankings for Balanced Performance Index (PBI), Health Weighted Index (HWI) and Sustainability Index (SI).

Note that DataGene implemented multiple changes in November 2025, one of which was the new model for Survival ABV. These changes had a combined impact on bull rankings in the December public release of Australian Breeding Values.

Rankings for Survival ABV

The following standard deviations provide some insight into the impact of the new model for Survival ABVs on bull rankings. In Holsteins, the standard deviation of the change is a little over 2.6 ABV points. This means that about two thirds of the bulls changed by less than plus or minus 5 ABV points, while the extreme changes were plus or minus 8 points (about 1% of the population).

In Jerseys, the standard deviation of the change was 3.4 ABV points indicating a little more change in the Jerseys compared to the old model.

Bull rankings for BPI

The BPI balances the economic contribution of production health and fertility, type, workability and feed efficiency. The updated BPI (November 2025) allocates slightly higher emphasis to Survival in the overall index (about 1.5% more emphasis). This slight increase is not likely to have a huge impact on bull rankings. However, the variance in the Survival ABV due to the model change is likely to affect some bulls (see previous section: Rankings for Survival ABV).

Bull rankings for HWI

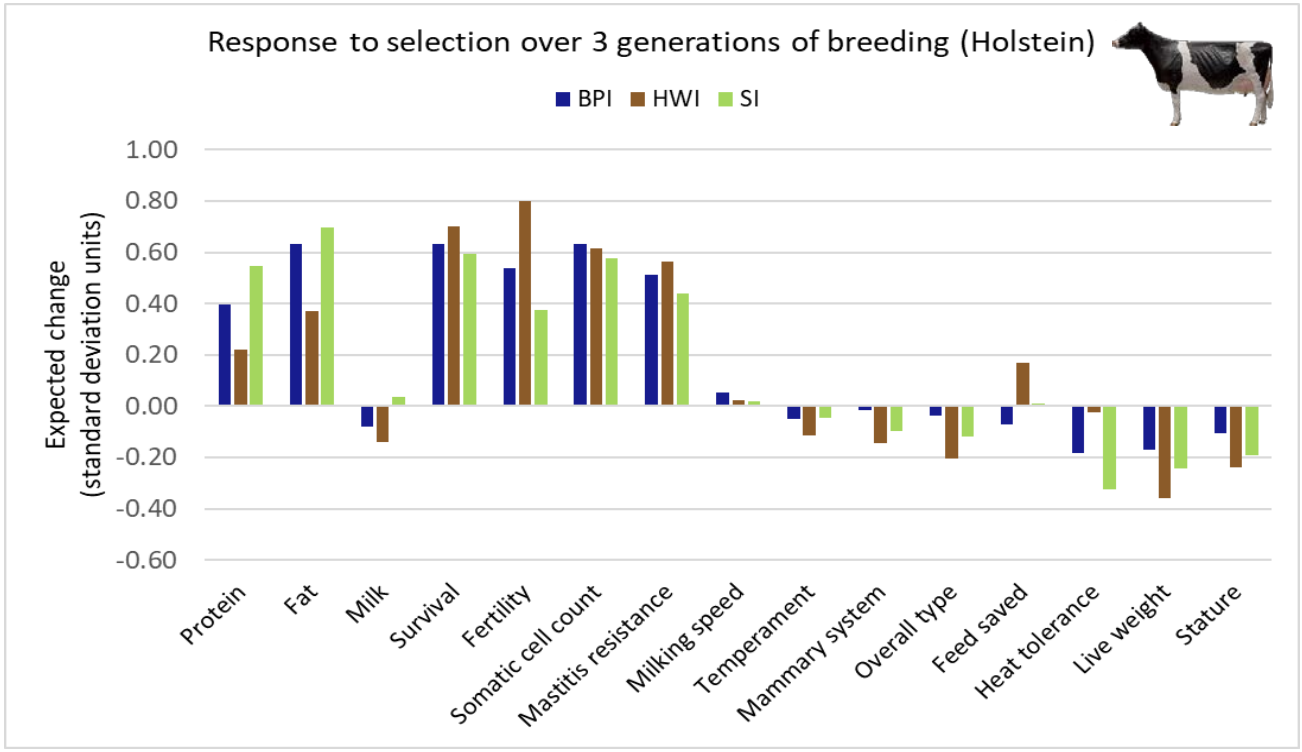
There is an increase of about 2% in the relative contribution of Survival to the new HWI. As was the case with the BPI, this is unlikely to produce a material impact on the HWI.

Bull rankings for SI

Of the three indices, the Sustainability Index has the highest weighting for Survival ABV, however, the relative emphasis of Survival in the SI is very similar to what it was in the previous SI.

Response to selection

Response to selection refers to the amount of genetic improvement or change in a trait that is achieved through selective breeding. It is the difference between the average genetic value of the offspring and the average genetic value of the previous generation, due to selection of superior animals as parents. Response to selection is influenced by selection intensity, heritability, genetic variation in the population and generation interval. The following charts show the predicted response to selection over three generations of breeding for Survival ABV.



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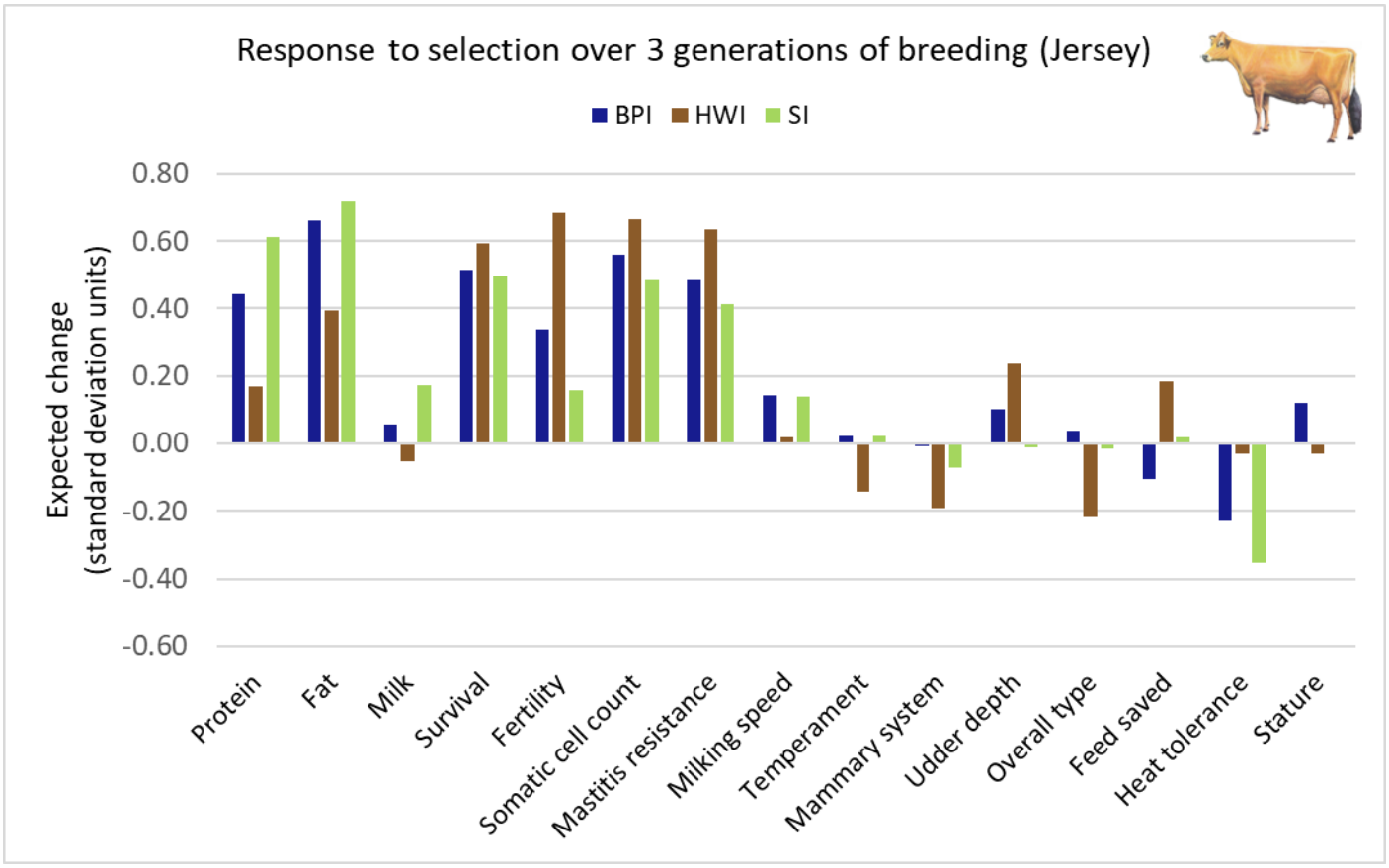

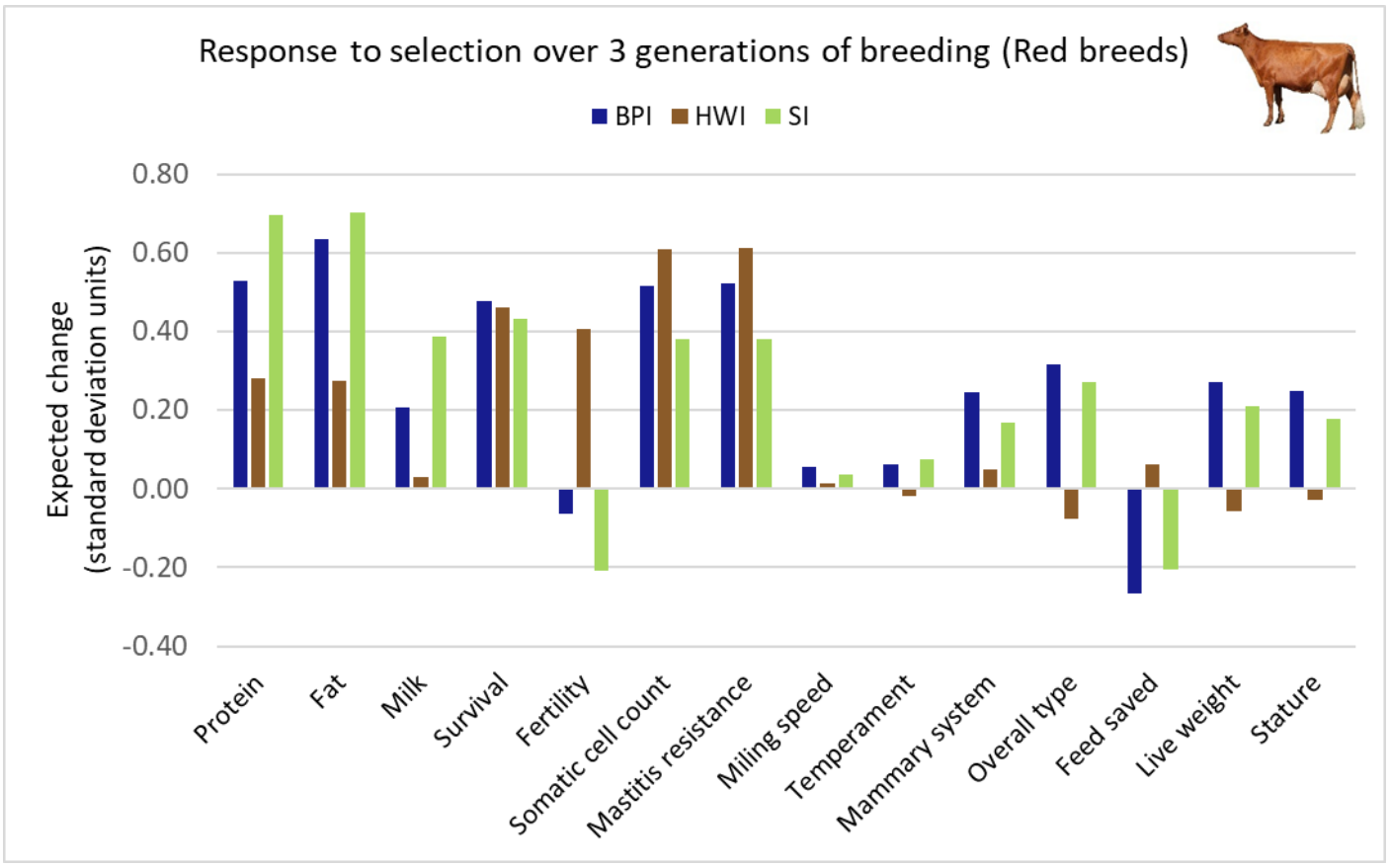

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Trait relationships affecting early and late survival

DairyBio researchers identified trait relationships that help explain genetic differences in survival between early and later stages of life. The following charts show traits with the strongest relationships with early survival for Holstein and Jersey breeds respectively.

Holstein findings

Milk production showed a strong association with early survival, but a weaker relationship later in life. Fertility, defined as the interval between calvings, was the strongest factor influencing both early and late survival.

Workability traits, including likeability, temperament, and milking speed, were also important, especially in the first lactation. As cows aged, correlations with temperament and milking speed weakened slightly, but remained relatively high for likeability.

Jersey findings

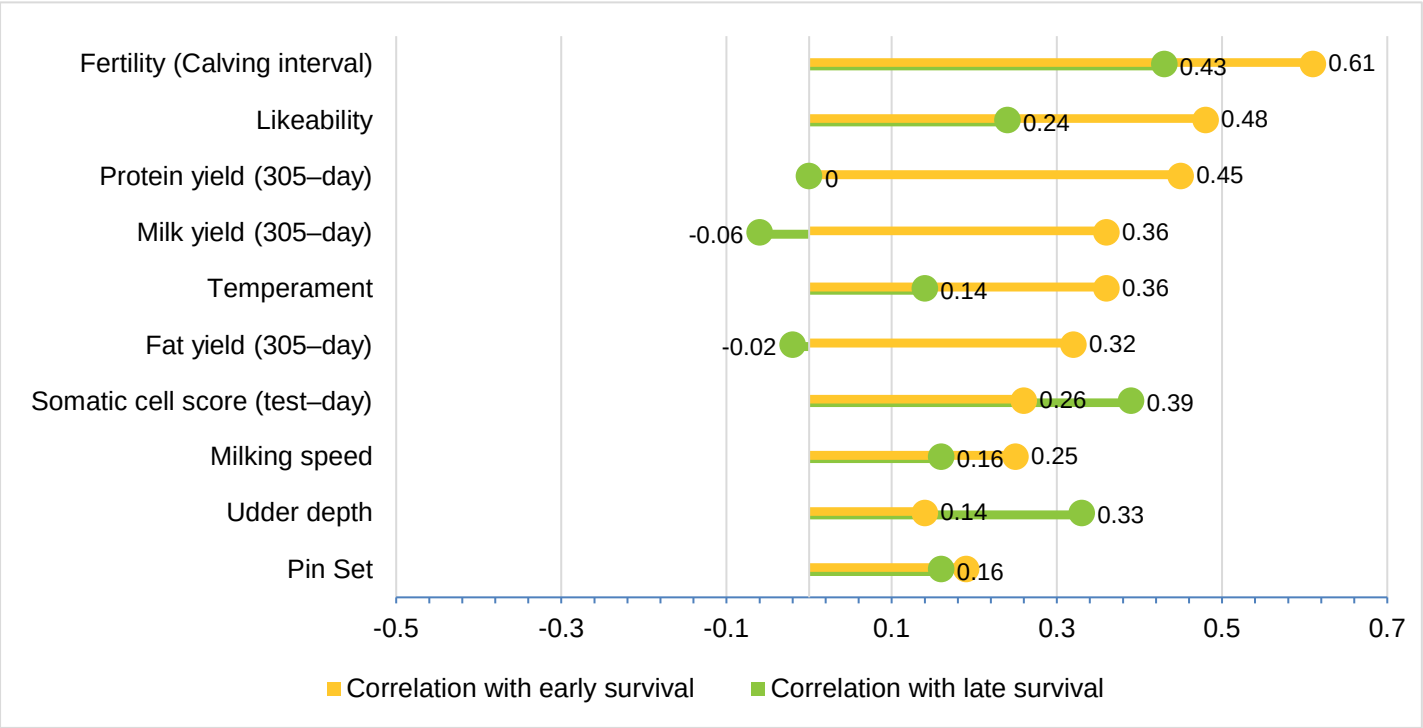
Early survival was most strongly associated with likeability, production, and udder traits Unlike Holsteins, milk production traits were strongly associated with both early and late survival in Jerseys.

Type traits had generally stronger associations with survival in Jerseys than in Holsteins. Evidence also suggests deliberate culling of Jersey cows with shorter stature or poor type.

Across both breeds, likeability, pin set, and udder depth were consistently good predictors of survival, and because data for these traits are available early in the first lactation, they are valuable candidates for inclusion in the genetic evaluation model for survival.

Genetic correlations with early and late survival.

Predictor traits and traits with the strongest relationships with early survival (Holstein)



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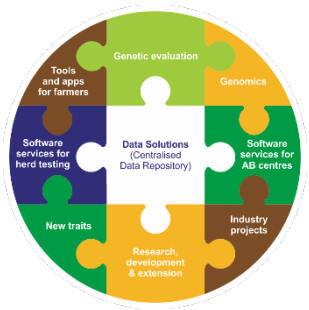
Genetic correlations with early and late survival.

Predictor traits and traits with the strongest relationships with early survival (Jersey)



About DataGene

DataGene is an independent and industry-owned organisation responsible for driving genetic gain and herd improvement in the Australian dairy industry. DataGene performs pre-competitive herd improvement functions such as genetic evaluation, herd testing and herd improvement software development and data systems. DataGene is a Dairy Australia and industry collaboration.

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