

# Mastitis Resistance ABV

## Technote 25

### HIGHLIGHTS

- The (multi-trait) Mastitis Resistance Australian Breeding Value (ABV) offers a more direct way to breed for improved mastitis resistance than the Cell Count ABV alone.
- Management practices have the most impact on mastitis incidence in dairy herds however, breeding is a useful tool for improving mastitis resistance
- To breed for improved mastitis resistance, select animals that have a Mastitis Resistance ABV greater than 100. When selecting bulls to breed replacements, look for Good Bulls (high BPI) with a Mastitis ABV greater than 100.
- It is available for all breeds – including young genomic bulls and heifers.

The Mastitis Resistance Australian Breeding Value (ABV) allows dairy farmers to add breeding to their toolkit for managing mastitis in their herds. It is available for females as well as bulls.

### Mastitis

Reducing mastitis in dairy herds improves animal health, welfare and productivity. It also improves milk quality and reduces the need for antibiotic treatments.

While most reduction in mastitis comes from improved management, breeding for low susceptibility to mastitis has considerable long-term benefits. Genetic variation for mastitis resistance does exist and some bulls have been found to produce daughters that are less susceptible to mastitis than others.

### Cell Count ABV

A barrier to developing a direct mastitis ABV has been the lack of clinical health (mastitis) records in Australia's genetic evaluation system.

The Cell Count ABV, has been used as an indirect selection criterion for mastitis since it was introduced in 2002. It has worked well to identify bulls with daughters that are more resistant to mastitis. In an analysis of the top and bottom 10% of bulls for Cell Count ABV, the daughters of better bulls had 6.2% less cases of mastitis. However, direct selection for improved mastitis resistance is desirable.

DataGene continues to publish the Cell Count ABV in addition to the new Mastitis Resistance ABV because there is economic benefit to reducing individual cow cell count and therefore the herd's bulk milk cell count.

### BPI, HWI, TWI

Because it affects dairy farm business profit, Cell Count is included in the Balanced Performance Index (BPI), Health Weighted Index (HWI) and Type Weighted Index (TWI).

Farmers will improve cell count in their herds by selecting females and bulls using any of the three indices. However, the HWI has the greatest weighting for cell count (see table).

### Mastitis ABV: a multi-trait approach

The Mastitis ABV is based on a multi-trait approach to provide a more reliable breeding value for selection to improve mastitis resistance. After a detailed analysis of many trait combinations, researchers have confirmed the optimum approach is a combination of average 305-day somatic cell count, udder depth and clinical mastitis records.

Udder depth and somatic cell count data is available on many more animals than clinical health records.

This multi-trait approach has been possible due to herd records available through Ginfo, Australia's national data base of genomic information. The mastitis ABV includes information from overseas relatives through Interbull and genomics for genotyped animals.

**Relative emphasis of traits in Australia's breeding indices**

	Production (ASI)	Fertility	Cell Count	Feed Saved	Type	Workability
<b>BPI</b>	55%	13%	10%	3%	12%	7%
<b>HWI</b>	42%	15%	12%	7%	16%	8%
<b>TWI</b>	48%	8%	10%	3%	24%	7%

BPI: Balanced Performance Index    HWI: Health Weighted Index    TWI: Type Weighted Index

## Mastitis ABV expression

The Mastitis ABV is expressed relative to an average of 100, with higher breeding values indicating cows with less mastitis. In April 2020, the Mastitis Resistance ABV of Holstein bulls in the Good Bulls Guide ranged from 94 to 111.

To breed for improved mastitis resistance in your herd, breed replacements from Good Bulls (high BPI) with a Mastitis ABV greater than 100.

### Reliability

Reliability is a measure of confidence in ABVs. The higher the reliability, the closer the ABV is to an animal's true breeding value.

The average reliability of the Mastitis Resistance ABV is 65% for Holsteins in the Good Bulls Guide. This compares with 73% reliability for the Cell Count ABV.

The reliability of the Mastitis Resistance ABV for a young bull (with no Australian daughters) is expected to be 60% whereas a bull with 100 daughters is expected to have a reliability of 96%.

### Heritability

The heritability of mastitis is low at about 5%. This is similar to fertility.

A low heritability means that environmental conditions and management practices have a big impact on a cow's likelihood of developing mastitis and genetics plays a smaller role.

However, there is significant genetic variation within Holstein and Jersey breeds which creates the opportunity to identify and breed from animals with better mastitis resistance. Over generations this can have a positive impact on mastitis in a herd.

A lot of cell count data is available and udder depth has a higher heritability than mastitis, so including them in the multi-trait approach improves reliability.

### Relationship between Somatic Cell Count and Mastitis Resistance ABVs

Somatic Cell Count and Mastitis Resistance ABVs are strongly and positively correlated (0.77) but they are not the same trait. There will be bulls who are stronger for one or the other. Variations between the two traits will be most noticeable in bulls with daughters milking in Australia as their clinical mastitis history will be utilised in the genetic analysis.

### Correlated traits

Mastitis resistance is favourably correlated with fertility and other health traits and unfavourably correlated with production.

This means selecting for mastitis resistance will improve health, fertility and well-being of dairy cows. However, a narrow focus on selecting for mastitis resistance could compromise genetic gain for production.

*In all populations there is genetic variation so look for animals that have a combination of high BPI and a Mastitis ABV of greater than 100.*

### Bull rankings

The Mastitis Resistance ABV will not affect bull rankings by index. This is because it is not included in any of the three indices (BPI, HWI, TWI).

### Summary

The Mastitis Resistance ABV is more reliable and available for all breeds – including young genomic bulls.

*To breed for improved mastitis resistance in your herd, breed replacements from Good Bulls (high BPI) with a Mastitis ABV of greater than 100.*



### Acknowledgement

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### Scientific papers

Abdelsayed, M., Haile-Mariam, M., & Pryce, J. E. (2017). Genetic parameters for health traits using data collected from genomic information nucleus herds. *Journal of Dairy Science*, 100(12), 9643-9655. doi:10.3168/jds.2017-12960

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## 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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