FACT SHEET

H — The impact of genetics on mastitis and cell counts

Most mastitis control is based on management of cows and their environment to minimise the number of bacteria around the teats and maximise teat health. But there is also a small amount of mastitis resistance that is influenced by the cow's genetic makeup.

ADHIS calculates a breeding value for mastitis resistance (based on cell count) for all AI bulls. Although the heritability of mastitis resistance is low (10%), benefits accrue each generation. Include mastitis resistance in your herd breeding objective by choosing bulls from the Profit or Mastitis Resistance tables in the Good Bulls Guide.

What are Cell Count ABVs?

Cell Count ABV

Mastitis lowers farm profitability, reduces product quality and quantity. Dairyfarmers can select bulls that produce daughters that are less susceptible to mastitis using the Cell Count ABV.

While most reduction in mastitis comes from improved management, breeding for more resistance to mastitis can have considerable long-term benefits. Genetic variation for Cell Count does exist and some bulls have been found to produce daughters that are more resistant to mastitis than others.

Cell Count ABV Expression

To simplify bull selection, ADHIS has improved the expression of ABVs. Cell Count is expressed as a percentage more or less than the average of 100. To improve mastitis resistance, select bulls with an ABV for Cell Count more than 100. Average represents the modern dairy cow. ADHIS has analysed the national milking population to determine the group of cows that represent the average of the current milking population. This is set at 100 for traits such as Cell Count.

Cell Count ABVs that are higher are an indicator of greater mastitis resistance, while Cell Count ABVs that are lower are an indicator of less mastitis resistance. Therefore:

- A bull with a Cell Count ABV that is higher will increase mastitis resistance (reduce cell count)
- A bull with a Cell Count that is lower will reduce mastitis resistance (increase cell count)

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Benefit of breeding for Cell Count

Mastitis has an impact on the farm profit. Therefore Cell Count ABVs are included in the Australian Profit Ranking (APR). Every 1% change in Cell Count is estimated to be worth $0.66 net profit per cow per year. The difference between the best bull (Cell Count ABV of 171) and worst bull (Cell Count ABV of 20) is estimated to be $100 net profit per cow per year. For most bulls (66%) Cell Count ABVs range between 78 and 122.

The benefit each dairyfarmer gets from selecting for lower cell counts relates to their herd's cell count levels. The higher the herd's bulk milk cell count, the higher the potential benefit. Herds with a very low bulk milk cell count will see less benefit. Given that most of the variation in herd mastitis levels is explained by non-genetic factors it is critical that the dairyfarmer continues to manage herd mastitis.

Heritability

The heritability used to calculate the cell count ABV is about 0.10 (or 10%). This is an estimate of how much of the variation of a trait is explained by genetics. In other words an estimated 10% of the variation in the Australian dairy cow population is explained by genetics, the other 90% of variation is explained by the management environment of the cow.

The heritability of Cell Count is lower when compared to other traits such as protein percentage (25%), protein kg (25%) and milking speed (25%). However, at 10%, there is still enough genetic variation to warrant genetic selection.

How is Cell Count ABV calculated?

From about the middle 1990s all test-day records were accompanied by a Cell Count therefore ADHIS has a large data source for Cell Count analysis. ADHIS officially publishes Cell Count ABVs for individual bulls when their reliability reaches 50% with daughters in at least 15 Australian herds (Holstein and Jersey) or 30% with daughters in 5 herds (other breeds). If the bull is proven overseas and has very few or no daughters in Australia, a Cell Count ABV(i) is published.

In 2008, scientists refined the techniques used to calculate Cell Count ABVs using herd recording data. A cell count score is produced for each bull using test-day information from daughters. Each test day is treated as a separate measurement which is a better reflection of what really happens than a whole lactation average. The new technique allows scientists to model the trends in cell count through the lactation as well as the variations from the 'norm' which occur. The result is an improvement in the reliability of Cell Count ABVs and a greater number of bulls with publishable Cell Count ABVs.

Conclusion

Management is the predominant influencer of mastitis in a herd so genetics isn't a 'silver bullet' to solving a mastitis problem. However, for little or no cost, a dairyfarmer can make a long-term difference to the mastitis resistance of the herd by selecting bulls from the Mastitis Resistance list on the Good Bulls Guide.

Visit the ADHIS website to download the Good Bulls Guide containing top active bulls, based on various traits.