

Smarter dairy cattle breeding: new tools to improve production, fertility and heat tolerance at the same time

SHORT SUMMARY FOR PRACTITIONERS:

Dairy breeding faces a key trade-off: selecting for higher milk yield often reduces fertility and resilience to heat stress. New research provides practical ways to better manage this.

First, the genetic conflict between milk yield and fertility is not fixed. It changes depending on which traits are included in the breeding goal. Fertility is commonly included in the breeding index, which improves outcomes, but the impact of selection must be monitored regularly, as genetic relationships between traits shift over time.

Second, a genomic selection method using gametic Mendelian sampling can deliver up to 2% more genetic gain while also reducing the increase in magnitude of negative correlations between traits due to selection. This approach outperforms conventional selection based only on breeding values and can help achieve more balanced progress.

Third, even when heat stress is considered in genetic evaluations, selecting for higher protein yield can still harm fertility. Improving heat tolerance requires explicitly including heat-related traits, such as fertility decline at high temperatures, in the breeding goal.

Practical recommendations: include fertility and heat tolerance traits in breeding indices; regularly update genetic parameters to reflect current populations; and, where genomic data are available, use gametic variance information to improve both efficiency and balance in genetic progress.

