Impact of rising temperatures on fertility-production trade-off in Holstein and Montbéliarde cows

From paper

SHORT SUMMARY FOR PRACTITIONERS:

Dairy cows have simultaneous physiological needs for both, production and reproduction, a trade-off known to generate moderate negative genetic correlations between production and fertility traits. As climate change brings frequent intense heatwaves, a key question for farmers and breeding programmes alike is whether rising temperatures worsen this trade-off. This study analysed records from over 3 million Holstein and 650,000 Montbéliarde first-parity cows in France to see how the relationship between conception rate and protein yield changes across a wide range of temperature-humidity index (THI) values.

Results were reassuring on the trade-off question: genetic antagonism between fertility and milk production stayed weak and stable across THI, ranging from close to zero up to around −0.2, with only modest differences between the two breeds. Importantly, this study is based on historical data collected in a temperate climate.

However, the study revealed a more concerning pattern: cows with highest genetic merit for milk production tend to suffer largest declines in fertility and yield as temperatures rise. They remain productive but are affected. For Montbéliarde, cows with best fertility breeding values today tend to better maintain fertility under heat, showing the current selection programme is well-positioned. For Holstein, no such reassurance exists.

The practical recommendation is that breeding programmes should begin incorporating a heat tolerance index into their selection goals. Selecting on high THI production and fertility may serve as a useful proxy for identifying animals better adapted to future temperature increases.

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