Heat stress reduces fertility in Dutch Holstein cows from 16-22 °C

From paper

SHORT SUMMARY FOR PRACTITIONERS:

As summers become hotter and more unpredictable due to climate change, heat stress is increasingly affecting dairy cow fertility — even in traditionally cool countries like the Netherlands. This study analysed records from over 416,000 first-calving Holstein cows in Dutch dairy herds to identify when and how rising temperatures start to harm reproductive performance, and whether some animals are genetically better equipped to cope.

Four fertility measures were analysed: conception rate at first insemination, calving-to-first insemination interval, first-to-last insemination interval, and overall calving interval. All traits declined beyond temperature thresholds. Conception rate and first-to-last insemination interval started to decrease at maximum daily temperatures above ~22 °C, while calving interval started to rise at maximum temperatures above ~16 °C. These thresholds are lower than in warmer countries, likely because Dutch cows are less heat-acclimatised and farms have fewer cooling systems in place.

Importantly, genetic variation in heat tolerance increased at higher daily temperatures for all four traits, and sire rankings shifted meaningfully under heat stress conditions. This means not all bulls pass the same level of heat sensitivity on to their daughters — a finding with practical implications.

The key recommendation is that genetic selection for heat-resilient fertility is feasible in the Netherlands. Incorporating heat stress tolerance for fertility traits into sire selection and national breeding programmes could help future-proof Dutch dairy herds against increasingly frequent summer heatwaves, reducing reproductive losses without relying solely on costly on-farm cooling measures.

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