Closing the Utilisation Gap: Converting Routine Milk Analysis Data into Decision Support for More Sustainable Dairy Farming

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The dairy sector often calls for new innovations to improve sustainability, yet a major near-term opportunity lies in using existing milk recording tools far more effectively. This study investigates how the carbon footprint of milk production can be reduced by better utilising routine Dairy Herd Improvement (DHI) indicators already available to most dairy farmers.

We analysed test-day records from Denmark and Thuringia, Germany, focusing on somatic cell count (SCC), differential SCC, milk β-hydroxybutyrate (BHB), and urea. Comparative analyses and mixed-effects models were applied to quantify the yield impacts of health and feeding deviations and to translate avoidable milk losses into greenhouse-gas (GHG) consequences.

Cows with SCC between 250,000 and 1,000,000 cells/mL (15% of test days) produced 3 kg/day less milk than cows below 250,000 cells/mL, while cows above 1,000,000 cells/mL (5%) produced 6 kg/day less. These avoidable losses correspond to approximately 60 t CO_2e per 100,000 cows per day. Ketosis-risk cows (high BHB; 30% of test days) also showed clear yield penalties versus low-risk cows. Furthermore, 20% of samples had elevated urea levels, indicating protein oversupply and substantial opportunities to improve nitrogen efficiency. Overall, the results highlight a utilisation gap: efficient milk testing and data analysis systems already exist, but their decision-support potential is not fully realised in daily herd management. Bridging this gap—rather than waiting for entirely new measurement technologies—offers an immediate and practical pathway to more sustainable dairy farming