

## High yielding Holstein cows have less lying time available for exchange to more eating time

Peter Løvendahl, Lene Munksgaard

Aarhus University, Dept. Molecular Biology and Genetics; Dept. Animal Science; DK 8830 Tjele, Denmark

[Peter.Lovendahl@mbg.au.dk](mailto:Peter.Lovendahl@mbg.au.dk)

High yielding cows need more time to eat; thus they have less time for other activities which may lead to time constraints. Time-budgets (TB) were studied in a herd of 243 high yielding first parity Holstein cows by recording their complete 24 h TB using visual scans at 10 minute intervals. The scans were repeated twice in early and twice again in late lactation. Milk yield was recorded every 2 weeks and expressed as energy corrected milk (ECM). TB traits were analyzed for genetic and phenotypic variation and for covariation with milk yield. The tradeoff aspect was investigated as the change in correlation between TB traits over the range of recorded milk yield. TB traits were found to have low heritability and only moderate repeatability at all lactation stages. Overall, higher yield was correlated to more eating time ( $r_p = 0.25 / 0.29$ , in early and late lactation, respectively) and less lying time ( $r_p = -0.13 / -0.08$ ). Overall, the tradeoff between eating and lying time was shown by a negative correlation ( $r_p = -0.32 / -0.30$ ). This tradeoff was even more pronounced for time spent in beds ( $r_p = -0.62 / -0.63$ ). The sensitivity of the tradeoff to yield was further investigated by subsampling of data, so that the correlations were estimated on subsets of 40 cows re-sampled from the 243 after sorting them for yield. Then, a regression line was fitted to correlations over the yield trajectory. It was evident at both lactation stages that the correlation was strongest at the low yield, and weakest at high yield, supporting the hypothesis that the tradeoff between lying and eating time is sensitive to yield. We speculate that high yielding cows have already used up most of their "flexible part" of lying time to obtain more eating time. In conclusion, given that the high yielding cows need a large feed intake their option is to increase feed intake rate or remain longer in negative energy balance. Further studies into the genetics and tradeoff in TB traits should include more cows and that would thus be facilitated using automated recordings.

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