Effect of climatic conditions on milk yield and milking frequency of automatically milked dairy cows

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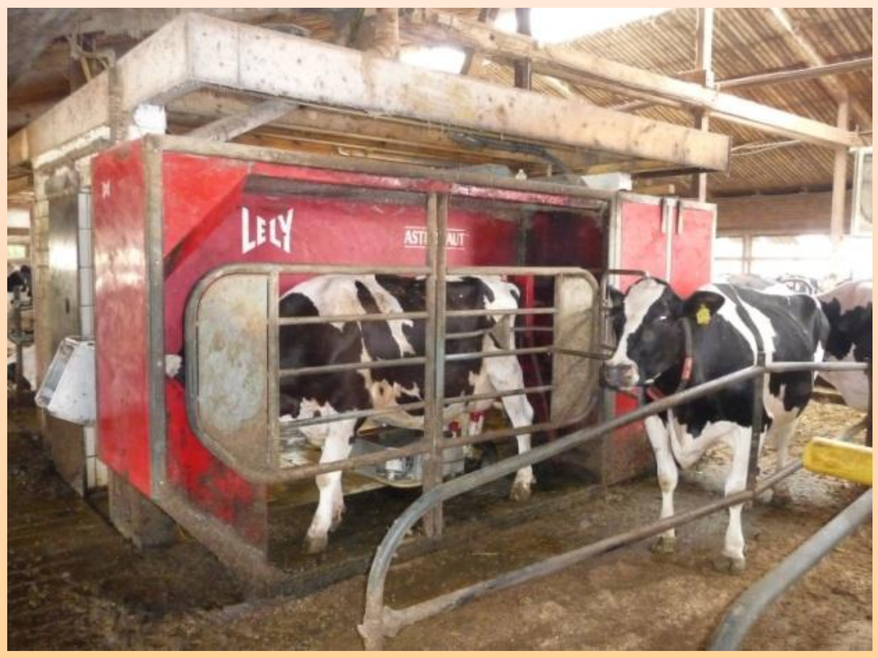
INTRODUCTION

According to regional climate models, in average winters will become milder and wet, while summers will become hotter and drier in middle Europe (Hollweg et al., 2008). To which extent the present climatic conditions will have an effect on the milk yield and behaviour of dairy cows in automatic milking systems (AMS) is to the authors knowledge unknown. Therefore, the aim of the present study was to investigate the impact of temperature and temperature-humidity index (THI) on the milk yield and milking frequency of dairy cows in AMS.

MATERIALS AND METHODS

- Study conducted from April to September 2009 on 2 dairy farms in Lower Saxony, Germany (farm 1: 130 cows in a cold loose-housing system; farm 2: 120 cows in a warm loose-housing system) each with two AMS and free cow traffic
- Meteorological data (temperature (T) and relative humidity (RH) were recorded hourly
- THI = (1.8 * T + 32) – (0.55 – 0.0055 * RH) * (1.8 * T – 26) (NRC, 1971)
- 3-days average values of temperature and THI divided into classes (T: < 20°C, ≥ 20 °C; THI: < 55, 55 – 60, ≥ 60)
- Daily milk yield and milking frequency per cow recorded



RESULTS AND DISCUSSION

The average daily temperature and daily THI were 15.5 °C (± 3.4 °C; min 8.3 °C; max 25.7 °C) and 59 (± 5.0; min 47.8; max 71.4), respectively. The lactating dairy cows were on average 166.4 ± 97.4 days in milk (DIM) with a mean daily milk yield of 30.9 ± 9.6 kg and a frequency of 2.82 ± 0.75 milkings per cow.

Tab.1 Least squares means (SE) of daily milk yield and milking frequency according to temperature class (different superscripts: p<0.001)

Temperature class	Daily milk yield (kg)	Daily milking frequency
< 20 °C	32.98^{a} (0.4)	2.70^{a} (0.04)
≥ 20 °C	32.19^{b} (0.4)	2.78^{b} (0.04)

The daily milk yield differed significantly (p<0.001) between the two temperature classes. Compared to temperatures below 20°C, the milk yield was about 0.8 kg lower when compared with the second class. Additionally, the frequency of daily milkings per cow increased from the low to the high class (p<0.001).

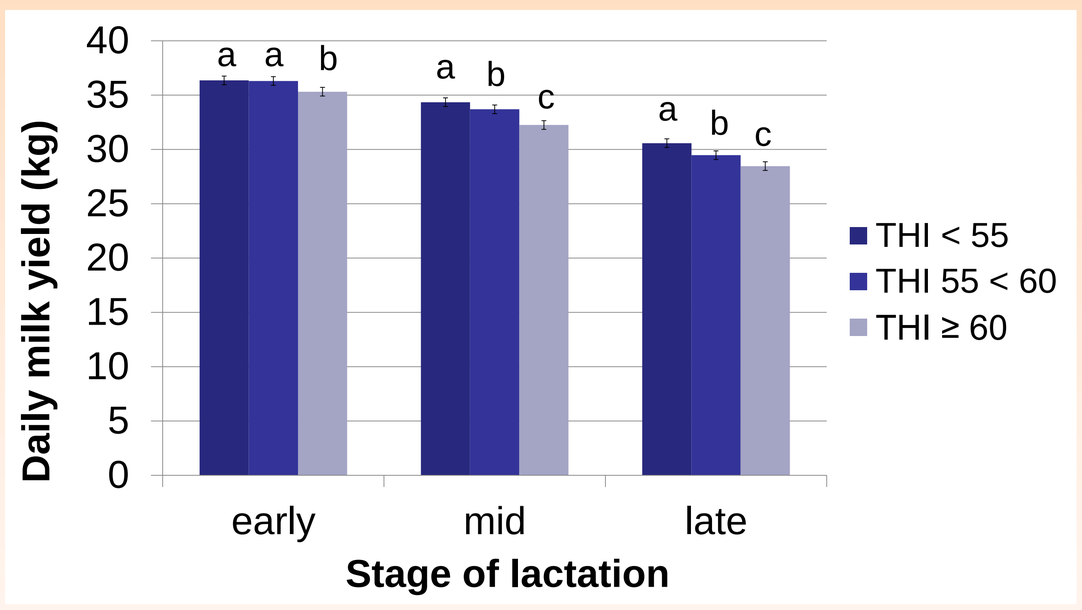


Fig.1 Least squares means (SE) of daily milk yield (kg) according to stage of lactation and THI-class (different superscripts: p<0.001).

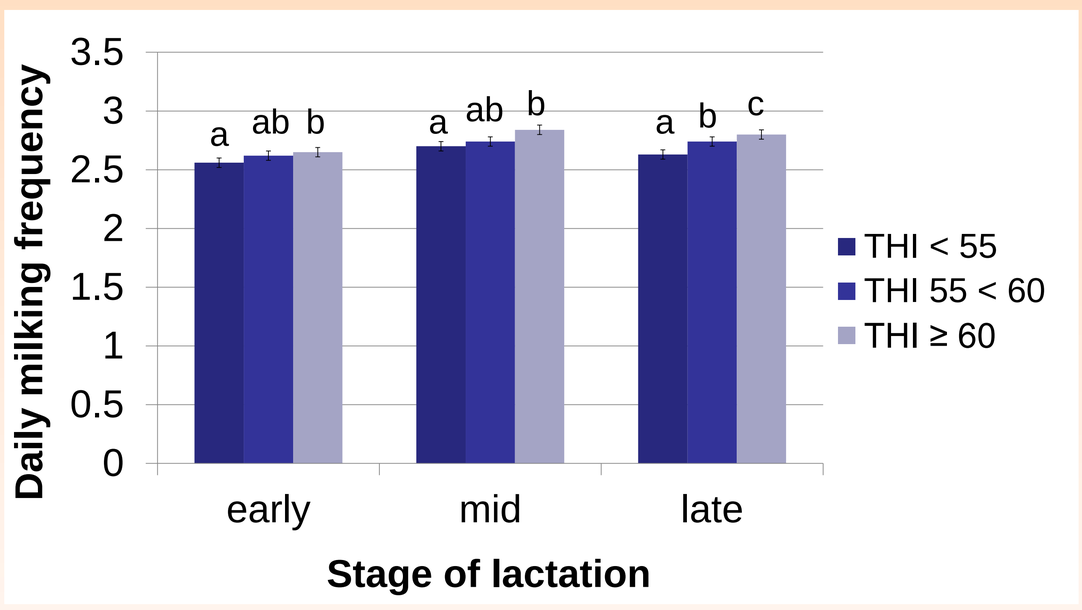


Fig.2 Least squares means (SE) of daily milking frequency according to stage of lactation and THI-class (different supercripts: p<0.001).

With increasing THI class the milk yield decreased, particularly in the mid and late stage of lactation. In contrast to results of Speroni et al. (2006), who observed a decline of milking frequency with increasing THI, the number of AMS visits increased in our study with rising THI class.

CONCLUSION

Dairy cows were exposed to heat stress conditions during the summer months, which had a significant impact on daily milk yield and milking frequency.

REFERENCES: Hollweg et al. (2008) M & D Technical Report 3, Hamburg.; NRC (1971) National Academy of Sciences, Washington, DC.; Speroni et al. (2006) J. of Dairy Science 89: 4687-4693.