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DON‘T UNDERESTIMATE HEAT STRESS IN DAIRY COWS!

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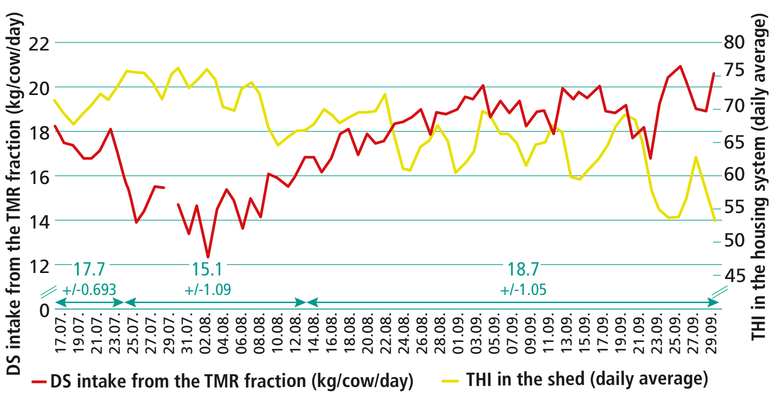
Measures to combat heat stress in the cows’ housing system are essential if cows are to feel as comfortable as possible when housed indoors on summer days, not least because of last summer’s heatwave. Heat stress in cows has an enormous impact on their health, performance and on the calves of heat-stressed mothers.

The effects of high external temperatures on dairy cows and on their health and performance is the subject of worldwide research. The Temperature-Humidity Index (THI) – a calculation based on the combined effects of environmental temperature and relative humidity – is often used to estimate the risk of occurrence of heat stress. Under local climatic conditions, a THI above a daily average of 60 is associated with reduced feed intake in lactating cows.

Apart from reduced feed intake, another of the most obvious consequence of heat stress is reduced milk performance – and this has a direct impact on farm profitability. However, only around 35% to 50% of the decline in milk performance induced by heat stress can be explained by reduced feed intake. Various studies suggest that heat stress disrupts the energy and protein metabolism of cows.

Fig. 1: Average daily DM intake from the TMR fraction (determined on a herd basis) and average Temperature-Humidity Index in the housing system



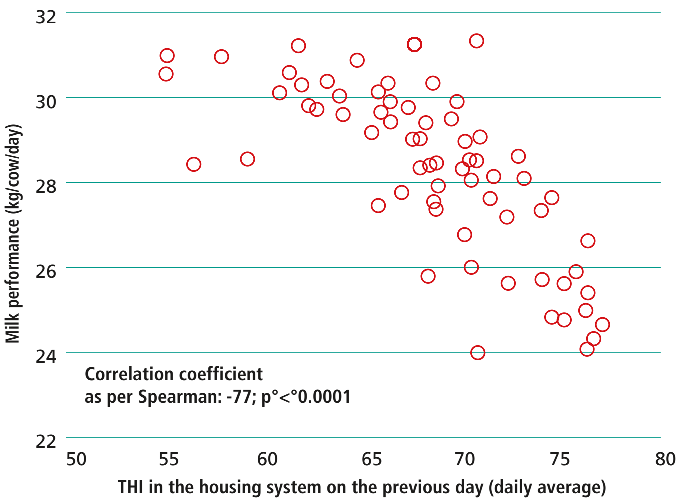
Heat stress has enormous impacts on dry cows

Furthermore, a decline in milk performance is likely to occur not only when cows are exposed to heat stress during lactation, but also as a result of unfavourable climatic conditions during the previous dry period when the cows were not lactating. Slight involution (shrinkage) of the udder is thought to be the reason for this. Moreover, different studies have shown that heat stress in the mother during gestation can adversely affect the calf – not only in the womb, but also after birth. Preliminary investigations indicate that heat stress in in-calf cows can even affect the subsequent milk performance of heifers born to them.

Animal health also suffers

How sensitively cows react to high ambient temperatures depends among other things on their level of performance. High-performance cows are particularly susceptible due to their high metabolic performance. Different breeds are also known to respond differently. For example, Holstein cows are more susceptible to high ambient temperatures than Jerseys or Simmentals. Genetic factors have been identified in Holstein cows which are associated with increased heat tolerance, so in principle it may be possible to selectively breed for heat tolerance.

Fig. 2: **Correlation between Temperature-Humidity Index in the housing system the previous day and milk performance the following day (herd average)**



Climatic conditions also play a role in animal health. For instance, it has been shown that high THI values lead to an increase in the incidence of clinically relevant mastitis. Results from Italy and France have shown that cow mortality rises during hot periods, i.e. animal losses in dairy herds increase.

Feed intake and milk performance decline

Studies of a dairy herd (approx. 75 lactating cows housed in a loose housing system) on the Ruthe Farm for Education and Research at the University of Veterinary Foundation Hanover, made between mid-July and the end of September 2018, showed that extreme climatic conditions were reached intermittently in the housing system (average daily temperature up to 28.2° C), especially during the heatwave from the end of June to the beginning of August (in the subsequent more detailed analysis: 24.07.–13.08.; see Fig. 1). The cows responded to these elevated temperatures with reduced feed intake and lower milk performance: The DM intake from the TMR fraction fell by around 15% during this period, while the milk performance declined by around 8 %.

When considering these figures, it is important to take into account the fact that high THI levels were already recorded in the housing system even at the start of the investigations (Fig. 1).

The respiratory rate and rectal temperature of ten lactating cows in the herd was recorded daily at around 5 pm. A negative correlation is known to exist between rectal temperature and feed milk performance (approx. -8 %) were substantially reduced during this phase. It should be considered that in practice a reduced basic ration intake does not necessarily imply that the (separate) concentrate intake is reduced to the same extent. This may have significant effects on the intake of physically effective fibre (increased risk of rumen acidosis).

A significant proportion of these ten cows (up to 100% on several occasions) showed a rectal temperature above 39 °C in the afternoon without showing clinical signs of illness. Rectal temperatures in excess of 40°C were regularly recorded on days when the outside temperature was particularly high – values significantly above the reference range of 38–39 °C. Respiratory rates also routinely increased to the point where some cows were panting.

Under these conditions, the affected cows were clearly unable to dissipate excess heat on a sufficient scale. Against this background, reducing feed intake is a sensible mechanism in biological terms, since the conversion of metabolisable energy (ME) from feed to NEL in milk is associated with heat losses of around 40% The correlation between climatic conditions in the housing system and milk performance is illustrated in Figure 2.

Summary

The studies have shown that during a phase when outside temperatures are very high, rectal temperatures in excess of 39 °C and sometimes even exceeding 40 °C can occur in clinically healthy cows. Feed intake (approx. -15%) and Measures should be taken to counteract heat stress in dairy herds not only in view of the economic impact of reduced feed intake and milk performance but also bearing in mind the potential indirect consequences of heat stress (e.g. on animal health and the development and performance of the next generation) and in the interests of animal welfare.

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