BUILDING AND SUPPORTING CLIMATE RESILIENCE IN UPPER RHINE LIVESTOCK FARMING

| Animal health and welfare

HEAT STRESS IN DAIRY COWS

Dairy cows are sensitive to high temperatures. The comfort zone for cattle is relatively low, between –5 and 15°C. Dairy cows react to heat stress with reduced feed intake and performance, and even health problems such as uterine and udder inflammation and reduced reproductive performance. As soon as the temperature rises above 15°C, the animals start to set up physiological regulation mechanisms (see figure 1), which requires additional energy expenditure.

❯ Effects of THI on animals

The THI (Temperature Humidity Index) is used to assess the thermal discomfort of herbivores. It takes into account not only the temperature but also the level of relative humidity in the air, which accentuates the effect of heat.

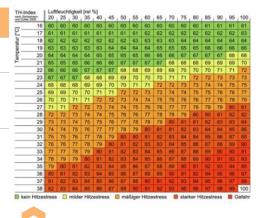| THI	Level of stress	Symptoms
< 68	no heat stress	
69–71	low heat stress	– search for shady places – faster respiratory rate – dilation of blood vessels – first effects on milk production
72–79	moderate heat stress	– increased saliva production – increased respiratory rate – increased heart rate – reduced food intake – increased water consumption – decrease in milk production
80–89	high heat stress	– discomfort due to increased symptoms
> 90	danger	– cases of death may occur

Figure 1: THI index in lactating dairy cows. According to Zimbelmann & Collier (2009)

❯ Reducing heat stress through feeding

● As cows reduce their dry matter (DM) intake under heat stress, it may be beneficial to increase the proportion of concentrates in the ration. However, this increases the risk of acidosis.

● The ruminal medium can be buffered by adding sodium bicarbonate. Live yeast can also stabilise the rumen and increase pH.

● By adding water to the TMR[1] (35-40% DM), it is possible to reduce the sorting behaviour. The animals also absorb more water via the ration.

● As sweating leads to increased elimination of minerals, it is a good idea to increase the intake of mineral foods (Mg and K) and salt (80-100g).

● To increase feed intake, the ration can be distributed at cooler times.

● When ensiling, ensure optimum compaction and tight sealing of the silo. Choose a silo with sufficient advance (>20cm per day) to avoid overheating.

● The addition of acid stabilises the TMR and reduces heating of the feed area.

● No hard-to-digest fibres, as digestion causes heat production.

● Heat production decreases when dietary fats are used. In this case, the proportion of cereals can be reduced, which minimises the risk of acidosis.

[1] Total Mixed Ration

❯ Other important management measures

● When temperatures rise, the water requirements of cows increase significantly (up to 150 l per day). To be able to absorb these quantities, it is best to install open troughs in several places, with trough lengths of 10 cm per cow and high flow rates. Water and drinking troughs should be clean and always accessible. Cold water provides additional cooling.

● Avoid overcrowding: the higher the density of cows, the higher the heat production.

● Due to the negative impact of heat on the immune system, extra attention should be paid to cubicle and alley hygiene to minimise the risk of udder and hoof diseases.

● Additional handling such as transport, dehorning and hoof trimming should be avoided or postponed to cooler times of the day.

● Grazing hours can be shifted to night hours.

In the framework of the mentioned measures, all groups of animals should be considered in the same way. Studies have shown that heat stress has clear negative effects, especially during the transition and calving phases. This can affect the vitality and performance of future calves.

❯ Additional measures

● Ensure that there is sufficient air circulation. Optimise ventilation possibilities. Installing fans can be a worthwhile investment. Critical areas, such as the milking parlour/waiting area, should also be considered.

● If there is sufficient air movement in the barn, the use of misters and showers is a good cooling option.

● Reduce unnecessary exposure to the sun. Ensure that there are shaded areas, especially when animals are put out to graze.