Heat stress significantly affects milk components and somatic cells

Heat stress is a common and growing concern in dairy cows and we are now fully aware that even at low levels it can significantly impact herd production and welfare.

For several years now, Lallemand Animal Nutrition has been focusing on identifying and monitoring indicators to assess rumen efficiency on-farm and help producers manage their herd for optimum production and welfare (Fig. 1).

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This approach has allowed thousands of data to be gathered from different regions and production systems which reveals the impact of heat stress beyond experimental trials, in real-life conditions.

Data obtained from dairy farms in multi continents under moderate to severe stress were compiled (Fig. 2), indicating that during heat stress, various indicators were affected:

- Milk fat and fat/protein ratio appears significantly lower compared to other seasons (milk fat: 3.79% in summer vs 3.95 on average during other seasons; milk fat/protein ratio: 1.15 in summer vs 1.18 on average during other seasons), highlighting reduced rumen efficiency.
- The percentage of cows in good body condition is lower.
- The percentage of clean cows is reduced.
- Manure screening shows reduced digestion efficiency: the occurrence of manure with more than one undigested but processed grain is increased.

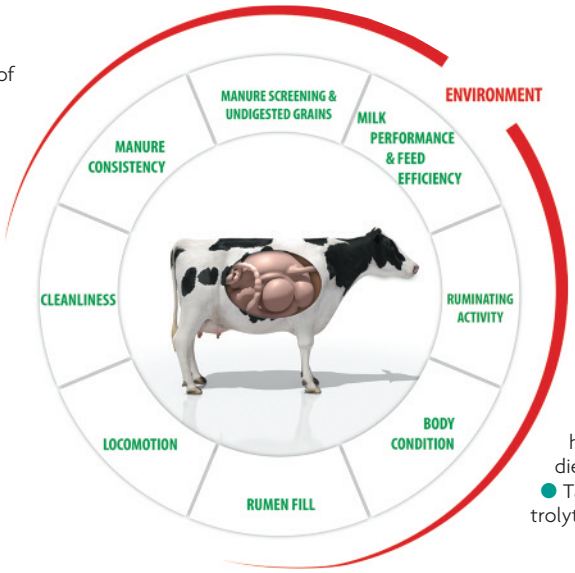

Fig. 1. Identifying the indicators to assess rumen efficiency on farm.

- Somatic cells count in milk is significantly increased (an indicator which is partially affected by poor rumen conditions but also impaired antioxidant status).

Lallemand's rumen audit approach, which is based on objective and measurable indicators of rumen efficiency on farm, is very much in line with current trends across the industry.

For example a recent study from Penn State Extension reveals a clear correlation between heat stress level (THI), daily rumination time, and milk production.

According to this study, it is estimated that for 10 points increase in THI, daily rumination could be reduced by one hour and dairy production by 2.7kg/day.

Rumen efficiency is clearly affected by heat stress and, besides the use of heat abatement methods; Lallemand recommend focusing on ensuring optimal rumen function by adapting the ration.

The main objective is to improve feed efficiency to compensate for reduced feed intake, while protecting the rumen environment from acidosis risks:

- Increase the energy density of the diet.
- Feed high quality, aerobically stable and highly digestible forage. It has been shown that heifers' DMI can decrease by up to 1kg/day with unstable corn silage.
- More starch or added fat can be useful. Fat is not fermented in the rumen, hence does not release heat during digestion.
- High quality fibre sources in the diet are essential for optimal rumen efficiency, especially for high-producing herds receiving high starch diets.
- Take care of the mineral electrolytes balance since excessive

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Fig. 3. Effect of rumen specific yeast Levucell SC on energy corrected milk yield in dairy cows under moderate heat stress: THI: 63-73 (Fustini et al., 2013).

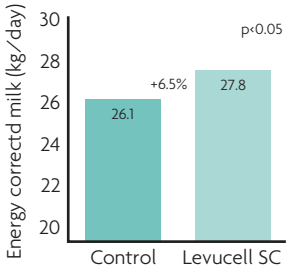
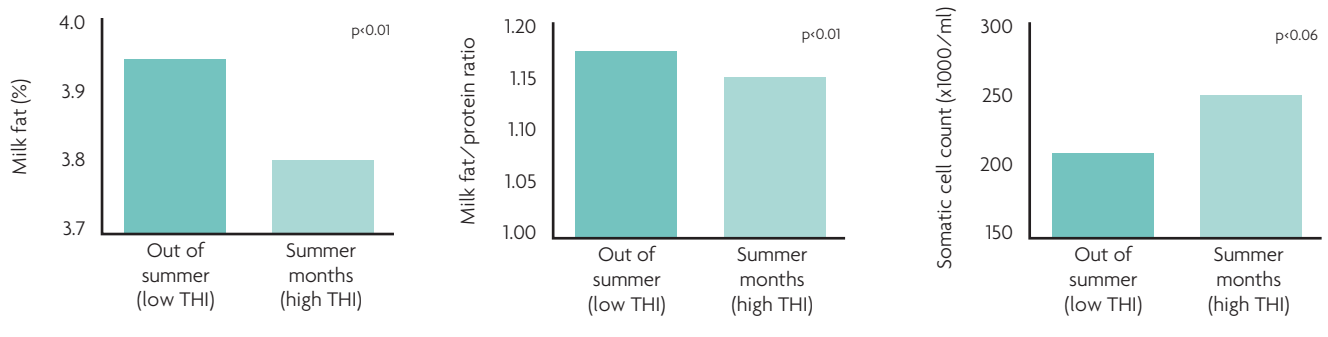


Fig. 2. The impact of heat stress on milk components and somatic cells count in farm conditions (Lallemand Animal Nutrition, internal data).



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sudation, or panting, leads to losses of sodium and potassium.

- Adapt the feeding strategy. Go from once to twice-a-day feeding. Consider feeding less in the day and more (60%) at night, when it is cooler, with regular push-ups.
- Make sure clean fresh water is freely available at all times (especially after milking).
- Finally, heat stress puts extra pressure on the animal antioxidant defences (consequences on immunity, SCC in milk and reproduction). It is essential to ensure an extra antioxidant supply in order to help maintain the antioxidant status of the animals.

In addition, field data and research trials in institutes have already demonstrated that, under many conditions, rumen specific live yeast Saccharomyces cerevisiae CNCM I-1077 (Levucell SC) has a positive impact on dairy performance during heat stress episodes, helping to alleviate the heat stress challenge for the rumen.

Well-controlled trials with this live yeast supplement show the following benefits on rumen efficiency indicators:

- Rumen pH is improved: The detrimental effect of heat stress on rumen pH is reduced. The number of cows in the herd under acidosis is reduced by 4-5 times.
- Rumination is improved, which is a good indicator of digestive comfort and welfare. Under heat stress, the number of cows achieving optimal rumination time (400-500 minutes/day) is increased by 25% with the live yeast.

This increased rumination will induce and increase saliva production, helping the animal to maintain optimal rumen pH.

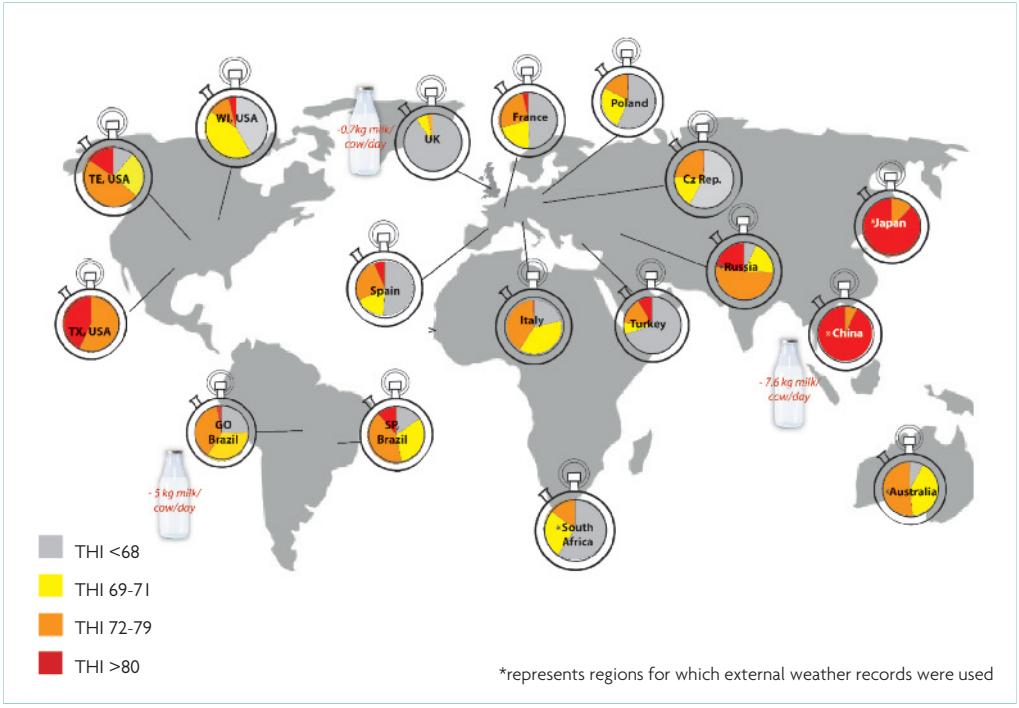

Fig. 4. World map of heat stress risk representing the amount of time spent under each stress level per 24 hours, and estimation of associated dairy production losses (Lallemand internal data).

- Feed efficiency is improved by around 7%.
- Fibre degradation is improved.
- Consequently, milk yield is improved: +6.5% Energy Corrected Milk Yield, equivalent to an extra 1.7kg ECM/day (Fig. 3).

Worldwide survey undertaken at farm level

In order to evaluate the real risks of heat stress, Lallemand Animal Nutrition has also conducted a worldwide survey at farm level under various climate conditions by recording in real-time THI variations within animals' environments.

Adding to external climate recordings, this allowed them to build a world map of heat stress risks (Fig. 4), aimed at helping producers anticipate summer problems and be prepared, even in areas not primarily associated with hot climates, such as Northern and Central Europe.

In conclusion, heat stress risk is a reality for dairy producers under various latitudes.

Heat stress represents a challenging period for the animals, putting pressure on rumen condition and efficiency, and the animal's antioxidant status, as shown by Lallemand's recent survey.

Risk monitoring (for example use of a hygro-thermometer to record THI in the barn), planning ahead, and adapted barn and herd management practices are essential to optimise production and help overcome heat stress challenges. ■

References are available from the author on request