Heat stress matters for transition cows too: it is better to be prepared

Heat stress can disrupt milk production, but new tools (linked at the end of this article) are available to help nutritionists and farmers around the world estimate their losses – and take steps to regain production.

by The Technical Team,
Lallemand Animal Nutrition.
www.lallemandanimalnutrition.com

Recent research investigates the link between heat stress, immune response, and inflammatory and antioxidant status of the cows. It appears that, for transition cows, the situation can be even more challenging.

Heat stress: a trigger for postpartum dairy cows

Elevated temperatures trigger cortisol secretion, which is also known as the stress hormone. Scientists have shown that heat stress can affect the cow's innate immunity, disrupt inflammatory patterns and affect her antioxidant capacity.

Research has shown that increases in the temperature and humidity index (THI) increases the incidence of uterine diseases and retained placentas. Uterine diseases already affect up to 40% of postpartum cows.

Other studies show that milk somatic cell counts (SCC) increase as the THI increases, as well as the number of milk samples with bacterial contamination. This can mean that the host's resistance or ability to fight against pathogens is reduced when the cow reaches the maximum of its temperature comfort zone, which can start at 18°C, depending on humidity, and corresponds to a THI of around 68.

Heat stress decreases milk production

In a recent study, heat stressed cows showed a decrease in milk production (35.8 to 31.9kg/d), consistent with previous findings. They are also more likely to have increased inflammatory responses in the postpartum period compared to cows not submitted to heat stress. The same findings were shown by Menta et al., 2022. Reduced milk yield is also associated with heat stress, whether the hot period occurs before parturition, after parturition or both.

Milk yield reduction is observed both in heifers and multiparous cows with a reduction of milk yield from 1.7kg milk/cow/day to 2.4kg milk/cow/day during the first 90 days postpartum.

The consequences of heat stress seem to be almost the same when cows were exposed to hot periods before or after calving or during the whole period (THI >72).

This information shows that measures to alleviate the consequences of heat stress should be considered during the entire transition period, from dry-off to the first months into lactation.

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Fig. 1. Effect of live yeast supplementation on the average interval between rumination bouts under heat stress.

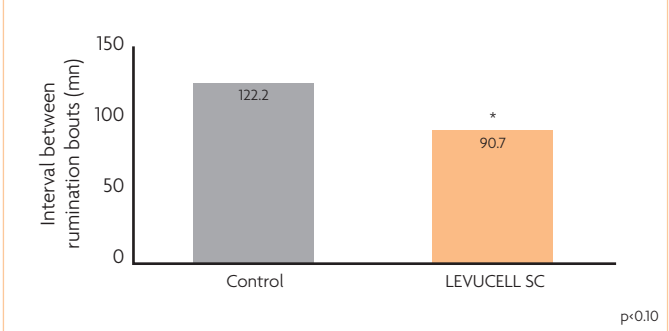
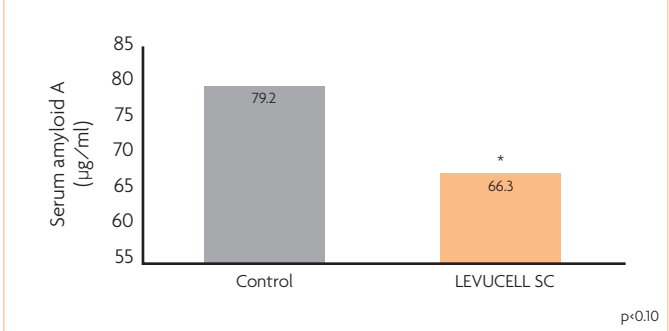


Fig. 2. Effect of live yeast supplementation on blood inflammation biomarker.



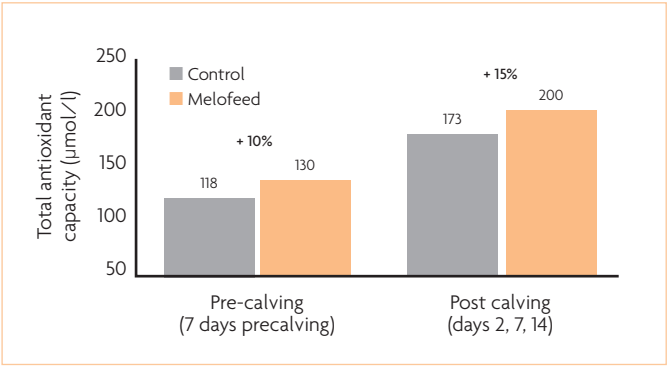


Fig. 3. Effect of Melofeed supplementation on cows total antioxidant status around calving (Lallemand Animal Nutrition internal data. 2020. Commercial farm, Germany 2020).

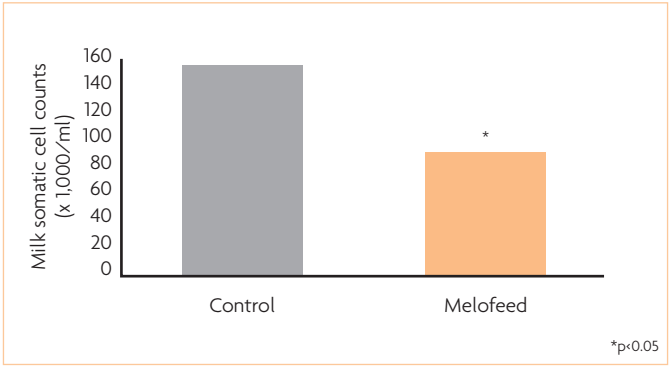


Fig. 4. Effect of Melofeed supplementation on milk somatic cell count during heat stress period (Lallemand Animal Nutrition internal data. 2020. Commercial farm, Germany 2020).

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Reduced dry matter intake may increase risk of disease

Reduction of dry matter intake (DMI) is commonly observed during hot periods. Research shows that uterine disease is linked with reduced DMI and altered feeding behaviour before calving.

Even more than multiparous cows, heifers have greater nutrient needs before their first calving because of extensive mammogenesis during late pregnancy – making supporting heifer nutrition even more important. It is possible the reduction of DMI observed during heat stress affects heifers more than multiparous cows. This could explain why heifers seems to be more predisposed to uterine diseases.

Solutions for managing heat stress

It is crucial to implement practices that can help alleviate heat stress on both gestating and lactating cows.

Physically reducing the heat burden can be accomplished through barn design, shade provisions, fans and maintaining adequate water supply.

Farm managers can also look at nutritional approaches to maintain the intake, mitigate inflammation and support the resistance of cows to oxidative stress.

Among these solutions, microbial-based solutions have proven effective in dairy cows.

1. Live yeast for improved feed efficiency under stress.

Studies show cows can improve their ability to extract energy from their diet with the addition of the live yeast strain Saccharomyces cerevisiae CNCM I-1077. Perdomo et al. showed improvement of feed efficiency with +130g milk/kg DMI in lactating dairy cows under heat stress with addition of the specific live yeast S. cerevisiae CNCM I-1077 (LEVUCELL SC), fed at specific heat stress dosage (20x10^9 CFU/head/day).

The same study also showed the addition of the live yeast improves rumination behaviour by increasing chewing time and reducing time between rumination bouts.

S. cerevisiae CNCM I-1077, fed at specific heat stress dosage (20x10^9 CFU/head/day), improves ruminating activity (Fig. 1), in addition to reducing signs of inflammation with less inflammatory compounds found in blood (Fig. 2), which confirmed findings in earlier studies in transition cows.

2. Maintaining the antioxidative balance.

Maintaining a balanced antioxidant status is one way to support an enhanced immune system and alleviate the negative post-partum consequences of heat stress such as increased inflammation and decreases in milk production.

Feeding a specific antioxidant with a high level of bioavailability such as selenium enriched yeast (Alkosel), and a supplement rich in superoxide dismutase (SOD) (Melofeed) (Figs. 3 and 4) under high heat stress environment, was shown to:

- Improve antioxidant capacity around parturition.
- Lower somatic cell counts.

Selenium supplementation is also linked to reduction of placenta retention.

Conclusion

Concern about heat stress and its consequences on both caw productivity and welfare is growing as the temperatures are rising. Recent research confirm that the heifers and gestating cows are even more sensitive to heat stress and every measure to increase their resilience should be carefully planned ahead. ■

References are available from the authors on request

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