

Feeding Strategies to Combat Heat Stress in Dairy Cattle

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As we embrace the heat of summer, it's essential to implement tactics to minimize the impact of heat stress. Your herd can be negatively affected by the combination of temperature and humidity. To determine when heat stress may occur, it's helpful to keep an eye on the temperature-humidity index (THI).

Researchers in Arizona have indicated a THI threshold of 68°F for dairy cows. The severity and length of time of index values over 68°F has been shown to impact herd health and productivity.



A cow's "comfort zone" is between 41°F and 68°F. Cows start to experience mild to moderate heat stress at the THI threshold. They will start to reduce their dry matter intake (DMI) and begin to reduce milk production; at this point, we may see milk losses of 5 pounds per cow, per day.

When the THI climbs over 78°F, cows will be in moderate to severe stress with a possible milk loss of 8 pounds per cow, per day. Respiration rate increases to the point cows will begin to pant. While panting, cows lose saliva, sodium bicarbonate and water, which exacerbates the situation. Rumen pH may decrease due to less DMI and chewing, which then leads to rumen acidosis.

Other effects of heat stress can lead to:

- Poor reproduction efficiency
- Lowered immune response
- Transition cow diseases
- Milkfat depression
- Lameness
- Mastitis

In the U.S., approximately \$1 billion is lost annually as a result of poor performance during periods of heat stress. The inability of a cow to dissipate heat effectively compromises their ability to function normally all the way down to the molecular level.

Reduce the Risk of Heat Stress

There are several ways to mitigate heat stress, such as environmental and feeding strategies. After implementing environmental measures such as shade, fans, misters, and reduced parlor holding time, it is critical to consider the cow's diet:

1. Water: It's essential to provide clean quality water to animals, especially during heat stress. It is also important to test the water consumed by cows. Consider monitoring water usage with a water meter. Since lactating dairy cows consume more water than any other nutrient – it is the greatest component of milk (approximately 87%) and manure (approximately 88%) – water is essential.

Young calves, transition dairy cows (three weeks before through three weeks after parturition) and high-producing dairy cows have increased metabolic rates and greater water turnover, and therefore greater requirements for water compared to other groups of animals.

2. Forages: Lower-quality forages tend to stay in the rumen longer and result in more heat production, while high-quality forages are digested faster and result in less heat being produced.

3. Energy: This can be a concern, as most energy is derived from the fermentation of forages within the rumen. Increasing the energy density might require greater amounts of concentrate or byproducts. But keep in mind that shifting the grain-to-forage ratio may increase the risk of not having enough rumen-effective fiber to optimize rumination. When the rumen mat formation is inadequate, there is less cud chewing activity and less saliva production, which can lead to a reduction in rumen pH and subacute rumen acidosis. Consider adding a good source of bypass fat in the diet which will help cows meet their energy requirement.

4. Protein: Consider increasing the protein density in the dairy ration by providing ruminal-digestible protein sources, slow-release nitrogen or bypass amino acids. During heat stress, a decline in DMI can decrease the amount of available protein and result in less microbial protein being available to the cow.

5. Minerals: Sweating aids in heat dissipation, where sodium, potassium and phosphorus are lost from the body. Some diet changes can be used to help with this nutrient loss. Buffers such as sodium bicarbonate should be increased to 8 to 12 ounces per head per day. Consider dietary cation-anion difference (DCAD) balancing or ensure ration potassium is targeted at 1.5% to 1.7% of DMI. When environmental temperatures are above 86°F, make sure diets contain at least 0.2 to 0.25 pounds of salt per cow, per day.

Supplemental chromium helps improve performance during heat stress

Other minerals such as chromium can also aid in combating heat stress. Chromium is an essential micronutrient that potentiates insulin action at the cell level, thereby allowing tissues to take up more glucose from the bloodstream. Increased glucose availability and utilization has significant benefits for the dairy cow.



Chromium supplementation also minimizes the negative effects of the stress response by consistently decreasing serum cortisol during stressful periods for cattle. KemTRACE® Chromium has been shown to increase insulin sensitivity and glucose utilization and improve DMI during heat stress to help maintain milk production.

Increased glucose availability and utilization may have significant benefits to milk production during extended periods of heat stress at different stages of lactation. Research studies designed to test the effect of chromium on milk yield under heat stress conditions, have all shown cows supplemented with chromium yielded more milk than control cows.

When facility improvements such as proper working fans, misters and shade are present, cows can still experience heat stress. Be proactive. Making dietary adjustments can help cows overcome the challenge of heat stress and thereby avoid decreased milk production and lowered fertility.

Not All Chromium is Alike

KemTRACE® Chromium — the first product of its kind on the market — is a water soluble, highly bioavailable, organic source of chromium propionate that helps stabilize insulin receptors in cattle. This improves glucose utilization for increased energy and proper cell function, resulting in better immunity.

KemTRACE Chromium is supported by more than 20 years of Kemin research and is the only U.S. Food and Drug Administration-reviewed form of chromium propionate. **See the KemTRACE Chromium mode of action at work.**

Kemin is built on exacting science at the molecular level to provide data-driven solutions. **Contact us today** to learn more!