How to mitigate your cows' heat stress in the summer

Written by James Kleinke for *Progressive Dairyman*

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It is mid-July, it is hot, and heat abatement is the topic once again.

Considering that we have been researching the impact of heat stress on milk production, feed efficiencies, how it affects herd health and conception rates for more than 65 years, one would think we would have it mastered, but we haven't, as we live in a world with constant changes, new ideas, better information and an ever-increasing demand on our resources. Perfecting our heat abatement strategies will be an ongoing lesson.

After spending the cold weather season listening to new ideas, looking at research and visiting with many experts, let me share with you some of the insights.

Economic benefits of heat abatement

First, the majority of studies strongly support the economic benefits of heat abatement. This was consistent among testing environments, including those conducted on actual farms, within institutions or test chambers.

Even with increased fixed and variable costs such as feed, marketing, utilities, permitting and water usage, a proper heat abatement plan will yield you a positive result on your bottom line.

Measuring heat stress

When we talk about heat abatement, Temperature-Humidity Index (THI) is the measurement referred to most often. THI is calculated using the dry bulb temperature and relative humidity (dew point temperature). Cows producing 77 pounds of milk per day or more will begin to experience heat stress at about 68ºF.

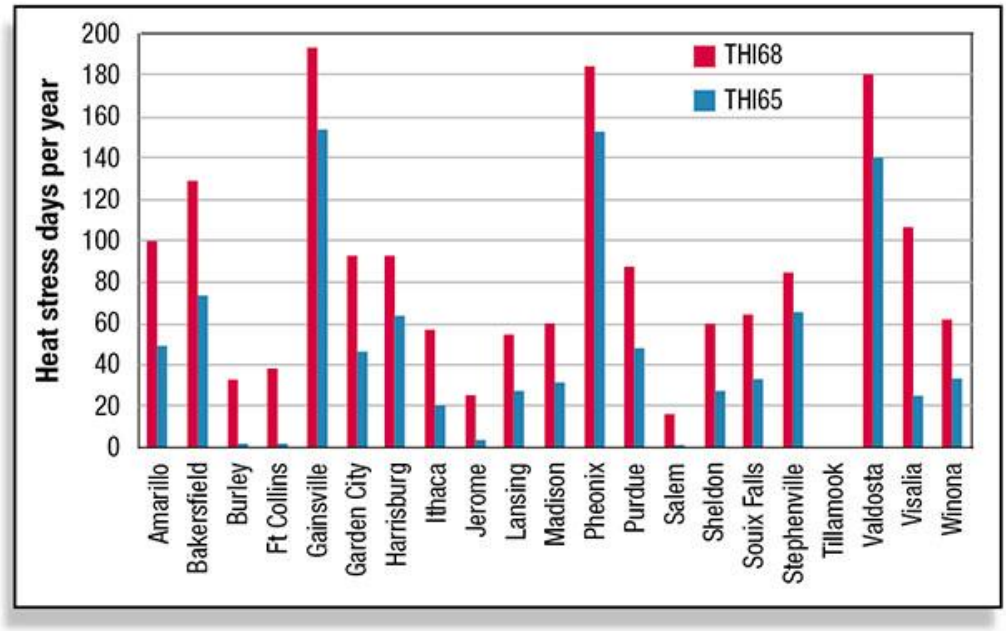
There has been some discussion that the Black Globe Humidity Index (BGHI) is a better indicator; however, researchers in 2006 concluded that there is no advantage of replacing THI with BGHI. So as the THI rises and you use the many tools and applications to evaluate heat stress, the benchmark of 68ºF THI should be the starting point.

When evaluating the weather on your dairy, remember to utilize meteorologist data provided by the National Weather Service. There are about 10 regions across the U.S. where 20 years of average hourly weather data have been recorded and can be used to evaluate heat stress (Figure 1).

Figure 1 Regions across U.S. where 20-year average hourly weather data was used to evaluate heat stress

For example, this data shows the following cities with their corresponding average number of days with a THI above 68 (**Figure 2**): Bakersfield, California, 130; Gainesville, Florida, 190; Garden City, Kansas, 90; Sioux Falls, South Dakota, 70; and Harrisburg, Pennsylvania, just under 100.

Figure 2 Comparison of days per year when the temperature humidity index averaged 68 for the day or the minimum THI for the day was 65



This can be a great tool when planning your heat abatement strategy to help you understand what you might expect your region to experience in heat-stress days and, more importantly, when. Each location will vary as to when the heat-stress season begins and how long it is likely to last.

Determining the hours your dairy experiences temperatures above a THI of 68 will help you determine your cow heat-stress hours (CHSH). This metric factors in THI plus heat abatement from air movement, direct cooling and air exchanges, and determines the hours an animal is exposed to heat stress.

Cow heat balance (CHB) can be calculated over a 24-hour period or any interval you prefer to help determine the effectiveness of your heat abatement system.

The recent introduction of heat-stress monitoring applications for smartphones further integrates technology with heat abatement strategies. Apps for Android and Apple products such as Heat Stress and Thermal Aid put science at your fingertips.

Conserving energy and water

With energy consumption and cost on the rise, managing when you apply heat-stress relief and how long to apply your strategies will be a significant factor in getting the best return on your investment. In addition, placing the correct product in the correct application for the correct durations will help you manage your energy and water costs.

Water usage is clearly becoming an emerging focus as well. Currently, the typical cooling procedure is to leave the soaking system on 24 hours per day. This practice is in question, however, as most cows only spend five-and-a-half hours a day exposed to feedline soakers.

One possible solution is to install sensors that only allow water application when the area is populated with cows. As an alternative to this technology, some dairies install two water lines. This may actually be more cost-effective and reduce water usage by at least half, from 16 gallons per day per cow down to about 7 gallons.

A mainline system is installed with full coverage and a timer to run two hours or so after milking. When feed is pushed up, the system kicks on for another hour or so. A secondary line with only about 10 percent of the nozzles would then run for the duration of the day, available to the cows at the bunk during the lower-utilized times. This is a viable option for managing heat stress and reducing water consumption.

Don’t forget about dry cows

In recent years, researchers at the University of Florida have shed light on cooling benefits for dry cows. Particularly, they have demonstrated the importance of heat abatement during late gestation, noting it will increase milk production for current and subsequent lactations.

Cooling during the dry period also yields better feed intake and improved bodyweight for cows along with healthier, heavier calves. Why? Because cooling improves immune function of the animals during the transition period.

Immune cells are more prolific with greater killing ability when exposed to pathogens ex vivo in early lactation. This enhanced immunity combats metritis and mastitis, primarily for neutrophil function.

Furthermore, when you eliminate heat stress, you no longer shorten the gestation period, which can be shortened by as many as four days. A shortened gestation period due to heat stress will reduce the size of your calf by as much as 13 percent.

Oocyte health is critical for fertility, but it can also be disturbed by heat stress. When an oocyte is not formed properly in the early stages or when negatively affected by heat stress, the embryo is less likely to be viable.

Since ovarian follicles initiate the oocyte three months earlier, any heat stress during this period will compromise follicular function.

In summary, proper heat abatement is becoming a science in itself as information, technology and research come together. When combined, these tools allow you to look at the THI forecast in your region so you can apply strategies at the correct times, durations and at specific locations within your dairy for heat-stress relief. ***PD***

More details are available in the proceedings by Dr. Joe Harner, Kansas State University, from the Western Dairy Management Conference in Reno, Nevada, held in March.

References have been omitted due to space but are available upon request.