



River Valley Veterinary Clinic

June 2016 Newsletter

Heat Stress and Abatement

What do cows and hair dryers have in common? Any guesses? Through rumination and high metabolism, high producing cows create as much heat as a 1500-watt hair dryer. A cow is a walking furnace, and that means she has a very poor tolerance to heat. The ideal temperature range for a cow is 40-60 deg F; anything above this and she needs to use energy for cooling. If her core body temperature rises above 102.5 deg F, she's in heat stress.

Heat stress comes from a mixture of temperature and humidity, measured by the Temperature Heat Index (THI), which is checked on a chart. Even 72 deg F can bring mild heat stress if humidity is moderate to high, like we often see in Wisconsin, resulting in a THI of 68. Prolonged THI of 72 can bring moderate heat stress (body temperature of 103-104), and severe heat stress is 106, which is life threatening. Cows experience the most severe heat stress in the holding pen due to high animal density in an often poorly ventilated space.

Contributing to the heat stress, cows aren't able to dissipate heat well. They have sweat glands only on their muzzles and udders. They depend heavily on breathing to regulate their body temperatures through evaporative cooling. The moisture in their lungs is exhaled and takes some heat energy with it. Increased respiratory rates are a good rough estimate of heat stress. The normal cow respiratory rate is around 26-50 breaths per minute. If a cow is breathing around 80 breaths per minute, her body temperature is likely 103-103.5 deg F, a warning of heat stress. When a group of cows is breathing that fast, something should be done quickly to enhance heat abatement and reduce heat stress.

Even at a THI of 68 (mild heat stress), there is a significant impact on the cow. The three most important impacts are on dry matter intake, milk production and reproduction. A heat stressed cow has a decreased dry matter intake because less heat is produced if there is less to metabolize. With a THI of 65-73, a cow will lose about 5 lbs of milk per cow per day. In 2015, there were 127 days of potential heat stress in Wisconsin. At the current milk price for a 150 cow herd, that would be \$13,335 of lost income due to heat stress without any heat abatement. Heat affects the dry cows as well, as they will develop fewer milk secretory cells in the udder and therefore decreased capacity for milk production during the next lactation. In a pregnant cow, the embryo is very sensitive to heat stress in the first six days of pregnancy with a greater risk of embryo loss with a cow body temperature of >102.2 deg F. Fertility is also reduced for 60 days after a heat

stress event. The last day of possible heat stress in Wisconsin in 2015 was in October, so the effects of heat stress on fertility would be seen through December.

Based on all this, heat abatement systems are a sound investment. A study from 2002 in the midwest found that a free-stall barn that cooled cows with fans and soakers had an average of 10 lbs more milk per cow per day than with fans alone. The most economical location to install cooling systems is in the holding pen, followed by the far-off and close-up pens, maternity pen, fresh cows groups and then high production lactating groups, although all areas would be ideal.

The approach to cooling cows can be broken into three parts: shade, air velocity and water.

1) Shade

Cows on pasture should have access to actual shade, not just the dead tree in the middle of the pasture. Shade can be a specially installed structure or trees and brush. Either way, 65 sq feet of shade per cow should be available for resting. Shade over feed bunks and waterers will increase feed and water intake, as cows are more likely to congregate there.

2) Air Velocity

Regardless of barn design, be it free stall, tie stall or stanchion, the air speed around the cows should reach 4-6mph, called the Effective Cow Velocity (ECV). Proper air speed combined with proper ventilation, or air exchange, removes stagnant air, brings in fresh air and aids in cooling cows.

Fans are a great way to increase air speed, but they do not aid in ventilation. All fans are rated by their ability to move air in cubic feet per minute (CFM) and some are more efficient than others, but overall a poorly maintained fan reduces efficiency by over 40%.

A properly designed naturally ventilated free-stall barn will result in proper ECV and ventilation, so fans can be used solely for cooling cows. Most tie-stall/stanchion barns are tunnel ventilated: fans on one end of the barn blow air outward, which pulls new air into the barn at the opposite end. There should be enough total CFMs from the fans to move and exchange the entire volume of air in the barn at ECV. The size of the openings where new air enters the barn affect how efficient the fans are and can be easily modified to reduce stress on the fans.

High Volume/Low Speed or Low Volume/Low Speed fans, such as the BigAss fans, do not provide adequate ECV alone. They push air downward, then outward and away, and since

they are usually centered in the barn, the air velocity isn't where the cows need it most: in stalls where they should be lying down for 50% of the day. These fans are beneficial in the holding pen where the cows will be directly under the air flow.

In a free-stall pen, fans to supplement ECV and cool cows should be installed over the feed lane to encourage eating, especially when combined with soakers in the feed alley. Over the stalls, fans should be centered over each row. In the holding pen, air speed should reach the upper end of ECV and fans should be mounted in a row so that air moves from the parlor back. Cooling effects are increased with drop hose soakers in addition to fans.

Positive Pressure Tube Ventilation Systems (PPTS) are able to bring cooler, less humid air in from the outside and exchange the entire volume of air each minute. Where a fan moves air across the cows, PPTS direct air downward at the cows at ECV. They are incredibly useful in the holding pen where they can be combined with drop hose soakers, in barns with poor natural ventilation and in calf barns. The PPTS should be designed by a professional or veterinarian trained by the Dairyland Initiative and installed by someone with prior experience as there are lots of calculations involved to ensure that the system works correctly. A few veterinarians at RVVC have gone through the training and would enjoy working with you to design one for your barn.

3) Water

Lactating cows drink more than twice as much water as dry cows and so should have water available at all times. There should be three feet of linear watering space per 10 cows in a free-stall and at least two watering areas per pen with a waterer within 80 feet of any cow. Cows will drink >10% of their daily water consumption immediately after milking, so waterers should be placed along the exit lanes and return alleys. They could even be installed along the sides of the holding pen.

Milking Workshop

On June 23rd in Richland Center, the Professional Dairy Producers (PDPW) is hosting a Milking Science Workshop taught exclusively in Spanish! This is an excellent opportunity for those employees who want to enhance their milking and disease detection skills in the parlor, but are limited by a language barrier. The workshop will be run by Dr. Oscar Duarte DVM and Dr. Robert Leder DVM. Dr. Duarte's company provides bilingual consulting and training within the dairy industry. He received his veterinary medicine degree in Colombia before immigrating to the US. Dr. Leder has more than 30 years of experience practicing in Wisconsin. The day-long workshop held at Junction View Dairy covers topics such as milking techniques, correct use of equipment and tools, detecting and recording mastitis, general safety and the special handling of down cows. For more information and registration, visit www.pdpw.org. This is a great teaching opportunity that will benefit the entire farm, don't miss out!

Since cows aren't able to sweat much, only 10% of what humans can by body volume, evaporative cooling with soakers mimics sweating and significantly decrease heat stress. Soakers placed along the feed alley and holding pen create large droplets of water that soak the cow to the skin from the shoulder to the hooks. Fans or natural ventilation then evaporate the water and provide the cooling effect. Soakers should be on for 1-1.5 minutes, then off for 5-15 min depending on the THI. A thermostat can be set to turn the system on at 68 deg, and controls can shorten the soaking frequency as the temperature rises. Soakers in the holding pen can be electrically connected to the milk pump so that the soaking cycle is on only during milking.

When used alone, fans don't reduce heat stress or body temperature at all and soakers alone only decrease body temperature a little. But combined, fans and soakers mitigate heat stress. If, for financial constraints, the fans and soakers can't be installed together, install soakers first and follow with fans when feasible.

As the holding pen is the most likely area to create heat stress, here are a few methods to maximize cooling:

- Reduce time in the holding pen/waiting areas
- Prevent overcrowding
- Improve ventilation
- Install fans and soakers

Even if you have good cooling systems in place, they should be checked to ensure that all cows will be comfortable as we head into the summer. All the ventilation methods, fans, soakers, PPTS and barn designs have been highly researched and there are very exact specifications to follow for maximum cooling effects. Your veterinarian knows or has access to all this information and should be involved in your next remodeling project to improve heat abatement.

Alpha7

Our most commonly used clostridial vaccine, Alpha7 and Alpha7 MB-1 (with pinkeye), are currently on backorder. Until we can get more, we will have Vision 20/20; also a clostridial and pinkeye vaccine. The only difference between the two is that Vision 20/20 needs to be boosted 3-4 weeks after the first dose. We will keep you informed as to when Alpha 7 is available again.