

Tips for Recognizing and Managing Heat Stress in Dairy Cattle

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What is heat stress?

In the most basic sense, heat stress occurs when a cow must change her behavior and physiology to cope with environmental conditions.

On the farm, we can use the Temperature-Humidity Index (THI) to define the onset of heat stress. We also can use THI to calculate the best time to implement strategies that will help alleviate this environmental challenge. The THI is a way to factor both the ambient air temperature and humidity into the overall heat load that the cow is experiencing. You can calculate THI with the following equation:

$$\text{THI} = T - [0.55 - (0.55 \times \text{RH}/100)] \times (T - 58)$$

T = dry bulb temperature

RH = relative humidity

As humidity increases, the strategies a cow utilizes to keep cool are less effective, so she will experience heat stress at a lower air temperature.

When does heat stress occur in dairy cattle?

Increased respiration rates are one key sign:

- > 60 breaths per min (bpm) = onset of heat stress.
- > 75 bpm = moderate to mild.
- > 85 bpm = moderate to severe.
- > 120 bpm = severe heat stress.

Rectal temperatures will also increase:

- > 101.3 F = onset of heat stress.
- > 104 F = Moderate to severe heat stress; increased risk of death loss.
- > 105.8 F = severe heat stress.

Other visible signs:

- Decreased in dry matter intake.
- Decreased rumination.
- Decreased milk production.
- Increased somatic cell counts.

The invisible effects include:

- Increases in mastitis and other diseases.
- Impaired rumen function and increased incidence of acidosis.
- Decreased immune function.
- Increased maintenance costs.



Photo 1: Lactating cow demonstrating visible signs of increased respiration in response to heat stress.



Photo 2: Dairy cows crowding around available water source.

Key behavioral changes to look for:

- Increased standing times.
- Crowding around water and increased water consumption tremendously.
- Crowding around shaded areas or cooler areas of the barn.

What can be done to minimize the effects?

Water is critical to the cows during heat stress, as cows will increase their water consumption by up to 50 percent. So, providing access to cool, clean water is a must.

A few considerations to achieve this:

- Provide at least 2 inches of linear water space per cow; more might be needed depending on severity of heat.

- Locate a water trough every 50 feet within a barn or close to shade on pasture.
- Water in troughs should be at least 3 inches deep.
- Refill rate of water troughs should be between 3 to 4.5 gallons per minute.
- Providing water close to the exit of the milking parlor and multiple sources of water in each pen is also beneficial.

The other critical factor for controlling heat stress is the presence of fans. To achieve sufficient air movement, the following is recommended:

- Fans capable of moving roughly 500 cubic feet of air per cow per minute. It may be necessary to move closer to 1,000 cubic feet of air per cow per minute to provide mitigation.
- Fans able to move air at a speed of 2.5 to 5.5 miles per cow. Fan placement is also important.
- Fans should be located about 12 feet above the cows and angled down at 20 degrees.
- Fans 36 inches in diameter should be located every 30 feet. Fans 48 inches in diameter should be placed every 40 feet.
- For best results, include fans in the holding area. This area is potentially one of the most stressful places for a cow, as she is forced to be crowded in with other herd mates at a time when you want the least amount of stress on the cow.



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