



School of Animal Sciences
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Heat stress affects everyone!

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The effects of heat stress on lactating cows have been well-studied over many years. Lowered feed intakes, reduced production, an increase in metabolic diseases, and poor reproductive performance are all results of heat stress. A lactating dairy cow is like an engine producing heat that needs to be dissipated to prevent overheating. Heat stress can begin in lactating dairy cows when the temperature-humidity index (THI) reaches 65 degrees Fahrenheit. This index accounts for the temperature and the humidity to assess the risk of heat stress at different levels.

Producers should be aware of the THI and signs of heat stress. Symptoms of heat stress include *increased respiration, sweating, standing more often or in wet areas, and panting or congregating around water*. Some things you can do to manage heat stress in lactating cows include:

- Provide fresh water; clean troughs daily
- Provide shade
- Install water sprinklers
- Maintain 3-5 miles per hour of air speed
- Cool the holding area and exit alleys
- Lower stocking densities
- Formulate rations and/or use electrolyte supplements

Lactating cows are the profit center of a dairy and the first to show signs of heat stress, but don't forget

about other areas as well. Dry cows also need to be monitored and managed to reduce heat stress. Heat-stressed dry cows have calves with lower birthweights and decreased production in the next lactation. They also exhibit lower feed intakes and increased metabolic diseases, which in turn contribute to lower production. The previous list of management tips can also be used to cool dry cows and springing heifers.

More recently, research has delved into the effects of heat stress on calves. Calves in utero are at a near-constant temperature of 101.5 degrees and they are pretty happy about that. Once born, the calf needs to be able to regulate its temperature in an unstable environment. We have written many articles on cold stress on calves, but few on heat stress on calves. Calves do indeed experience heat stress, but it doesn't happen at the same THI as lactating cows. Newborn calves for the first few weeks like warmer temperatures, but as they grow and the rumen starts to develop, the ideal THI will slowly decrease. The below chart shows an adapted THI chart for calves. Heat stress starts around 74 degrees, almost 10 degrees higher than lactating cows. Some signs of heat stress in calves include:

- Panting
- Increased water intake
- Reduced feed intake
- Depressed temperament

One thing to remember with calves vs. cows is that dehydration and death can occur *very* quickly in calves. Heat stress only speeds up this process and electrolytes are a necessity. Work with your vet to develop a plan for managing dehydrated calves on your farm.

Temperature Humidity Index (THI) for calves

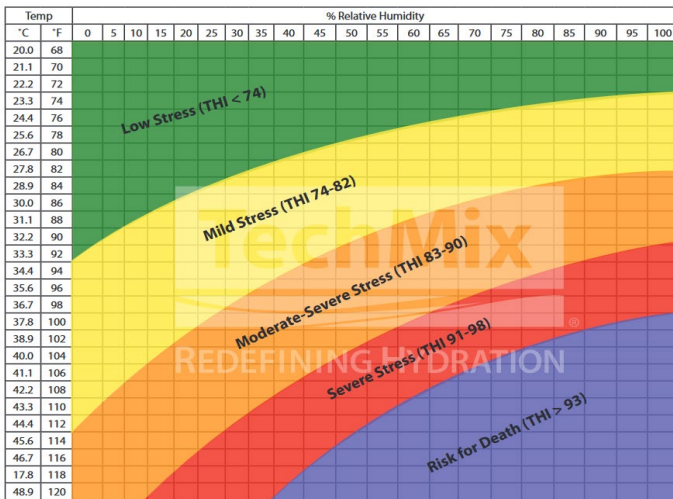


Figure 1. Color-coded temperature humidity index for calves.

Whether you manage calves in individual pens, hutches, or groups you can provide some relief during hot weather episodes. Provide fresh water at all times. Calves will drink water in all weather but will drink more if available *and fresh* during hot weather. Providing shade to decrease direct contact with sunlight will reduce body temperatures. Calves can be under a roof, trees, or a shade cloth to protect them from the sun. Increase ventilation. Calves need to have fresh air available at all times. Provide electrolytes—these could be mixed in milk or fed separately depending on the brand. Always feed to the manufacturer’s specifications. If a calf is dehydrated, oral electrolytes are necessary and if they are experiencing another stressor such as scours it is even more important. In some cases, more energy may be needed to offset a decrease in intake

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for calves. Also, try to reduce any other outside stressors such as vaccination or disbudding during the hottest times of the day.



Figure 2. Calf hutch with attached fan. Photo courtesy of Jeremy Daubert.

Don’t forget about the people on your farm. Every year farm workers end up in the hospital from heatstroke and dehydration during the summer months. Most cases could have been avoided if care was taken to maintain hydration. If you are feeling thirsty, you are already in the early stages of dehydration. If possible stay out of direct sunlight during the hottest part of the day. Wear a wide-brim hat and light loose clothing to keep the skin cooler. Drink plenty of water and stay away from drinks that may cause dehydration. Put a chilled towel on your neck to cool your temperature. If you or someone with you exhibits signs of heat stroke, call 911 immediately. Signs of heat stroke are:

- Dizziness
- Confusion
- Headache
- Nausea
- Rapid pulse
- Dry skin after heavy sweating

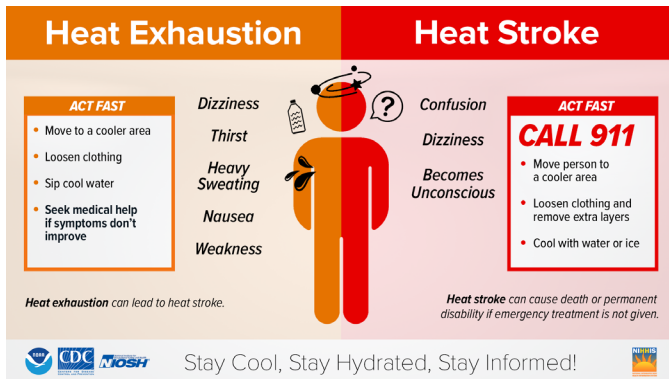


Figure 3. Heat Exhaustion vs. Heat Stroke.

Scours in dairy calves: a common but dangerous condition

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As global demand for food continues to rise, the dairy industry stands as a crucial pillar to support the consistent supply of superior-quality milk. Dairy farmers strive to raise healthy animals contributing to this essential food chain. However, the early stages of a calf's life present a significant challenge, including diarrhea before weaning. In this article, we delve into the impact of calf diarrhea, explore its main causes, and discuss effective management strategies. Whether you are a seasoned dairy farmer, a veterinarian, or simply interested in animal health, understanding calf diarrhea is crucial for animal well-being and farm productivity.

Calf diarrhea, commonly known as calf scours, remains a prevalent issue among calves under four weeks of age. It can significantly impact productivity and cause economic loss for dairy farmers during the preweaning period. According to the USDA 2021 report, mortality and morbidity

(sickness) rates during the first weeks of life are 5% and 34%, respectively. Digestive illnesses, such as diarrhea, are the primary contributors to both mortality (32%) and morbidity (51%). Diarrhea is also linked with reduced milk replacer intake, low body weight, and growth, consequently increasing age at first calving, and decreasing milk production during the first lactation.

Several factors can contribute to diarrhea in dairy calves, with viral, bacterial, and protozoa infections being the most common. The primary infectious pathogens associated with diarrhea in calves include *Escherichia coli*, *Salmonella* spp., rotavirus, coronavirus, and *Cryptosporidium*, but other agents can be responsible for these diseases. In the United States, rotavirus, coronavirus, and *Cryptosporidium* are responsible for 95% of infectious calf scour cases during the first weeks of life.

Understanding the risk factors that increase the impact of infectious pathogens is crucial in managing outbreaks and reducing diarrhea prevalence on dairy farms. These factors include inadequate colostrum management, environmental stressors, nutritional deficiencies, and the animal's immune status. Moreover, lapses in hygiene practices, such as improper cleaning of water buckets, bottles, or automatic feeders, can facilitate pathogen transmission and heighten the risk of diarrhea.

During calf scours, animals experience an increase in the number of pathogens in their small intestine. This disrupts the normal functioning of the intestine and reduces the time available for nutrient absorption. The damaged intestinal lining may also affect the ability of enterocytes to absorb nutrients effectively. As a result, there is a significant loss of vital nutrients, water, electrolytes (sodium, potassium, and chloride), protein, and carbohydrates. Although some nutrients may be lost through

exudation into the intestinal lumen, the primary mechanism of nutrient loss during diarrhea is the failure of absorption rather than active transfer from the bloodstream to the lumen. According to NASEM 2021, severe incidents of diarrhea can result in the loss of 10–12% of body weight in the form of water. If not treated promptly, it can lead to electrolyte imbalances, nutritional deficiencies, metabolic acidosis, and even death in the affected calves.

Metabolic acidosis is a serious condition where the blood's pH level drops to a point that threatens the animal's survival. Small changes in blood pH can be problematic because the body functions within a very narrow pH range of 7.35 to 7.4. This narrow spectrum is vital for the optimal function of enzymes, proteins, and various biochemical processes. It is important to note that calves do not die directly from diarrhea but rather from complications associated with it. Due to these severe consequences, early detection and treatment of diarrhea are essential for effectively managing the health of the calf and preventing further complications.

Elevation in rectal temperature ($\geq 103^{\circ}\text{F}$) are a good indicator of inflammation and can aid in diagnosing illness in animals. Moreover, closely monitoring the calf's milk intake, observing any signs of weakness, and assessing fecal consistency are crucial for early disease detection. Researchers and dairy producers typically employ fecal scoring systems to assess the prevalence of diarrhea in calves. The fecal score is commonly classified from 1 (normal consistency) to 4 (watery feces).

A significant body of research in this field has demonstrated the effectiveness of oral rehydration therapy in treating calf scours. This therapy helps restore fluid losses and correct electrolyte and nutrient imbalances, which supports the recovery of the animals. Rehydration therapy is also beneficial

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as it is inexpensive and easy to use. However, it is important to acknowledge that the effectiveness may vary based on the severity of dehydration and the animal's overall health. In severe cases, additional interventions such as intravenous fluid therapy and antimicrobials may be required. Additionally, it is crucial to ensure that the calf must continue to receive regular milk feedings during the diarrhea period to ensure adequate nutritional support and prevent further complications.

As calf health managers, it is important to recognize the urgency of controlling diarrhea. By implementing preventative measures, promoting good hygiene, and prioritizing calf well-being, we contribute to healthier and more productive animals. Calf scours is a race against time, with the health of the calf and the livelihood of the farmer hanging in the balance. Remember: The calf of today is the cow of tomorrow!

Upcoming Events

July 8-11, 2024

Southeast Youth Dairy Retreat
Florida

July 12, 2024

VA Dairy Expo
Dayton, VA

July 29, 2024

Stop the Bleed – Farm First Aid (Youth + Adults)
Franklin County

July 30, 2024

Stop the Bleed – Farm First Aid (Youth + Adults)
Franklin County

July 30-31, 2024

Southwest VA 4-H Tractor Club 3rd Annual Farm
Toy Display Contest
Rich Valley Fairgrounds

August TBA
CPR & First Aid Class for Farmers
Franklin County

August 1, 2024
State 4-H / FFA Dairy Youth Field Day
Harrisonburg, VA

August 3, 2024
Virginia State Dairy Shows
Rockingham County Fairgrounds

September 27, 2024
State Fair Junior Dairyman's Contest

September 27-29, 2024
VA State Fair Dairy Show

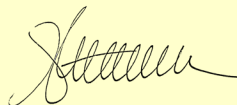
October 21, 2024
Hokie Cow Classic
Blacksburg County Club

If you are a person with a disability and require any auxiliary aids, services, or other accommodations for any Extension event, please discuss your accommodation needs with the Extension staff at your local Extension office at least 1 week prior to the event.

Additional Notes:

- The Virginia Department of Health (VDH) has made PPE supplies available to dairy producers at no charge to help reduce the risk of infection from Highly Pathogenic Avian Influenza (HPAI)/H5N1. The dairy extension group is working with VDH to assist in the distribution process. Contact your local extension agent if you would like to receive a kit. Requests will be fulfilled as supply allows.

For more information on Dairy Extension or to learn more about our current programs, visit us at VTDairy—Home of the Dairy Extension Program online at www.sas.vt.edu/extension/vtdairy.html



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