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The heat you cannot see: Summer stress, gut integrity, and udder health

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Ask a producer what a bad stretch of summer heat costs, and the answer usually starts with milk in the tank. The more expensive problem may be the one that shows up in the parlor two weeks later. Mastitis, clinical or subclinical, is already the most common and costly disease in our industry, with a single clinical case in the U.S. running approximately \$100-\$500 once drugs, discarded milk, and labor are counted, before any accounting for milk loss, premature culling, and decreased reproduction performance (Rodriguez et al., 2024). Heat stress may not simply sit beside mastitis on the list of summer headaches. It may help set the stage for it.

When the gut springs a leak

Picture the lining of the gut as mortar between bricks. The bricks are cells, the mortar is a set of protein seals called tight junctions, and as long as the mortar holds, nutrients pass through while bacteria and their debris stay out.

Heat changes that. Once the temperature-humidity index (THI, a single number combining heat and moisture in the air) climbs above ~68, a cow begins to produce more heat than she can shed. To cool herself, she sends blood from the core out toward the skin, and the digestive tract pays for it. This reaction causes reduced blood flow to the gut lining and consequently less oxygen, the tight junction seals loosen, and material that should have stayed in the gut slips into the bloodstream. Researchers call this gastrointestinal barrier dysfunction, or leaky gut. The signs are familiar ones: she eats less, produces less milk, and picks up infections more easily.

Leaky gut in dairy cows may facilitate the translocation of bacterial products, particularly lipopolysaccharides (LPS), which are fragments of the outer wall of certain bacteria and one of the strongest alarm signals the immune system recognizes. A study at the University of Saskatchewan infused LPS directly into the udder and found local and whole-body inflammation, along with a drop in milk and milk fat yield for an extended duration (Bertens et al., 2026). Work at the University of Georgia took a similar approach and analyzed cow behavior after LPS infusion (Marins et al., 2025). They reported that cows ate less, ruminated less, and were less active.

It is important to be clear about what this shows. Both studies placed LPS into the gland on purpose, which tells us how the udder responds to the arrival of LPS; however, it is unclear how much LPS can undermine the local immune defense of the mammary gland. Direct causality of heat stress predisposing dairy cows to mastitis is yet to be characterized. What is clear is that a cow with a compromised gut barrier carries a heavier inflammatory load which leaves a poorer defense at the teat end.

Summer months increase the risk of heat stress; however, as temperatures continue to rise in other seasons, it is important to remain aware of potential risks and implement effective mitigation strategies.

Mitigation

The most direct protection is keeping her from needing to redirect blood flow at all. Overhead sprinklers in the holding pen remain one of the most reliable tools available, since a lactating cow generates considerable metabolic heat and wetting the skin lets water carry that heat away as it evaporates. Fans work the same principle from the other side, moving air across wet skin so evaporation keeps going instead of stalling in humid, still air. On their own, fans lower rectal temperature modestly. Paired with sprinklers in a soak and dry cycle, the two do far more than either method alone.

Nutrition offers an additional tool to improve health status during summer heat. Researchers at Huazhong Agricultural University reported that probiotic and yeast supplementation reduced inflammation and improved immune status, with shifts in the microbial populations of both gut and milk (Gao et al., 2020). Other work suggests probiotics may reinforce the mammary epithelial layer itself (Zheng et al., 2021). These results are encouraging rather than settled, since product, dose, and timing vary widely across studies. Supplements are best treated as support for a cooling program, not a replacement for one.

Conclusion

Mastitis will not leave the summer calendar, and neither will heat, but treating them as separate problems may be a mistake. If a hot week is quietly loosening the gut barrier and raising the inflammatory load a cow carries, then the sprinkler line and the fan motor are mastitis prevention tools as much as milk production tools. Warm stretches now arrive outside the traditional summer window, so cooling capacity is worth checking in spring and early fall. Although some of the methods may be costly, prevention outweighs the potential losses as it helps maintain health and performance of the herd.

The Day Bunker Silo Safety Got Personal

Authored by Andy Overbay, Sr. Extension Agent, ANR—Smyth County, Virginia Cooperative Extension; aoverbay@vt.edu

I often share with the non-farming public that farming can be compared to professional sports. Farming requires a good bit of physicality, but unlike professional athletics, there are no injured-reserve lists and certainly no timeouts.

Any farming accident hurts, physically and financially, but fatal accidents often result in the sale of the farm. As I've shared with you before, "You are the most important part of the operation."

These risks became very real for a family whom I consider to be among my dearest friends. Luckily, there was no fatality, and the farm remains in the family today, but I would not wish the ensuing nightmare on an enemy, much less a friend.

John (not his real name) was going about his daily chores, feeding the dairy herd while his twin brother tended to an issue at the barn. It was an icy January day, and the wind was out of the south, which contributed a bit to the mishap.

John was working alone, cleaning some spoilage from the top of the bunker when he stepped too close to the edge. The silage gave way, and John plummeted 14 feet to the concrete silo floor below.

His head struck the concrete, and several hundred pounds of silage fell on top of him. Fortunately, a hired hand found him and rushed to get his brother to come help uncover him.

John's injuries and the dairy's remote mountainous location resulted in him being transported by helicopter to the hospital. And the MedFlight ride is where we can appreciate just how badly John was injured.

The dairy is within just a few miles of the North Carolina line. The trauma centers equipped to handle such serious injuries were in Winston Salem, North Carolina and Johnson City, Tennessee.

MedFlight took John to Johnson City because by air, the Tennessee hospital was 2 MINUTES closer, and every second counted.

When John arrived at the hospital, the trauma team assessed his injuries and began treatment. My wife and I arrived at the hospital that evening and learned from John's brother that the doctors gave him a less than 2% chance of survival.

John not only survived but returned to work on a limited basis by the summer.

His speech was slow and he tired quickly, but he made progress and today John enjoys a fruitful life. He was and is very fortunate and blessed.

I take the time to tell you John's story because I am astounded that similar accidents with much worse outcomes do not happen more often. Farmers sometimes take unnecessary risks with their health and safety without even realizing they are doing so.

After nearly 63 years on the farm, I have taken some of those chances myself and suffered the consequences on several occasions.

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Managing bunker silos for quality and safety

Many farms use silo facing tools to keep the faces of their bunkers as close to 90 degrees as possible, and rightly so. The shortest distance between two points is a straight line. By keeping the silo face nice and straight, we reduce exposure of the next feeding to air and the elements.

Several elements of silo design and operational realities can help or hinder our efforts to strike a balance between maintaining the highest forage quality and safety around the silo.

First, packing the silo as tightly as possible and covering it as soon as possible can reduce spoilage and the need to work on top of the silage.

Matching the width of the silo with the amount of silage fed out also helps us deliver high-quality silage while supporting safer bunker management. If the silo face dries out before you get back to that section for silo face removal, you may want to consider dividing the bunker into two separate bunkers.

Ideally, you want to feed about a foot of silage off the face daily (especially in the summer) to maintain the best possible silage quality. Feeding slower (not taking enough off the face) will result in air penetration, moisture loss, yeast growth, and decreased feed value.

Attention to detail matters

Ultimately, the most important part of bunker silo management is attention to detail. Those details include: silo design and orientation; proper filling and packing; rapid covering and weighting the cover; silo face management; and feed-out rates.

All these factors help reduce the need to work on top of the bunker by hand — the very situation that put John at risk. Proper filling, packing, covering, face management, and feed-out can reduce spoilage and other problems that tempt us to climb onto the silage with a fork. The safest place to manage a bunker is from the

tractor or loader seat, not from the top of the silage. If you think that equipment to maintain the face of your bunker silo is too expensive, think again.

Think about John. What do you think it cost to spend weeks in ICU, away from his operation? What would John give to go back and avoid that fall from the top of his bunker?

I cannot imagine those costs, but I can tell you this: After all my years farming, doing the right thing at the right time is always the cheapest way to go in the long run.

Upcoming Events

September 29-October 2, 2026

[World Dairy Expo](#)

November 2026

Private pesticide training/recertification begins — *check your local Extension office for dates and registration requirements*

- Augusta County: November 23, January 5, 2027
- Highland County: November 4
- Rockbridge County: December 8
- Rockingham County: November 18, December 3
- Smyth County: November 16 & 18

November 5-19, 2026

[North American International Livestock Expo](#)

December 15, 2026

Ag Marketing and Economics Winter Conference
Blue Ridge Community College
Details coming soon

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 dairy extension group is working with VDH to assist in distributing PPE to dairy farms. Request a kit online at <https://shorturl.at/ethov> or contact your local extension agent. Requests will be filled as supplies allow.

▪ Your input could guide future programming. Please complete the short survey at <https://tinyurl.com/dairy-extension>.

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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