

Silage Safety Matters



An October 2013 death at a feedlot in Nebraska highlights a vital farm safety issue. Matthew Wilkelbauer died and a co-worker was seriously injured when a silage pile collapsed on them.

The accident not only tragically claimed the life of a 53-year old family man, it spurred an internationally known silage safety expert and advocate into action. For years Dr. Keith Bolsen and his wife, Ruthie, have worked to draw attention to safety issues surrounding silage management practices. Wilkelbauer's accident has them speaking out once again.

"The next tragedy is out there," says Ruthie, "and it doesn't have to happen. We still have a long way to go to eliminate these needless fatalities and serious injuries."

Keith Bolsen, a Kansas State University Professor Emeritus of Cattle Nutrition who now operates a silage management consulting

firm with Ruthie, has built a career and reputation on promoting safe and efficient silage programs. "Safety is absolutely the biggest problem facing the silage industry in the U.S.," he says. "High dry matter loss (also referred to as 'shrink' loss) is number two, but it's a distant second.

The Bolsens believe the two are connected in that the solution might be one and the same on many beef and dairy operations. According to the National Agricultural Statistics Service, the U.S. produced 117.85 million tons of corn silage and 18.45 million tons of alfalfa haylage in 2013. But 16 to 20 percent of this silage and haylage will never make it from the bunker silo or drive-over pile to the feed bunk. That's 1.4 to 1.8 billion dollars of feed inventory out the window.

The Bolsens cite two management practices – increasing silage density and more effective sealing

– that have the potential to decrease dry matter loss by 5 to 10 percentage points, while having a positive effect on safety.

"A major factor contributing to injury or fatality from avalanche/collapsing silage is over-filled bunker silos and drive-over piles," says Keith Bolsen in a 2013 presentation on silage safety. He offers these guidelines:

- The maximum height of bunker silos and drive-over piles should not exceed the height that the unloading equipment can safely reach.
- Proper unloading technique includes shaving silage down the feedout face. Never dig the bucket into the bottom of the silage face. That can create an overhang that can loosen and fall.

In addition, never park vehicles near the feedout face and never stand closer to the face than three times its height. Always follow the

“buddy” rule and never work near a bunker or pile alone. Many accounts of injuries have occurred while taking feed samples directly from the silage face. When sampling, take the sample from a front-end loader bucket after the loader has moved a safe distance from the feedout face.



This silage avalanche at a Clovis, New Mexico, feedlot occurred where the corn silage was only 12 feet, however anyone standing near the face might not have survived, especially if they were alone. The driver of the pay loader escaped without serious injuries.

Packed corn silage typically weighs 40 to 48 lbs. per cubic foot, meaning a breakoff of just two cubic yards weighs more than a ton. In addition, if that breakoff falls from near the top of a 20 to 25 foot pile, it will be traveling nearly 20 miles per hour as it approaches the ground.

“Complacency is a safety issue unto itself,” says Ruthie Bolsen. “Always pay attention to your surroundings and be alert. Don’t think it can’t happen to you.”

Increasing Density and Proper Sealing

A higher silage density increases storage capacity without over-filling. To achieve the desired minimum corn silage density of 44 to 48 lbs. fresh weight per cubic foot and beyond, the Bolsens recommend:

- Estimate silage density prior to harvest with spreadsheet software and be prepared to make adjustments as harvest progresses. Good communication is key.
- Add an extra pack tractor at any time during the day if forage delivery increases. As the size and speed of forage harvesters has increased, the need for additional packing has increased as well.
- Technique matters. Forage should be spread in uniform layers of six inches or less and packed throughout the filling process, with at least two tractor passes over the surface of each

layer. Form a progressive wedge and maintain a maximum slope of 1 to 3. Also, when pushing up, forage should be skimmed from the edge of the load. Driver-over piles should be packed from side-to-side as the progressive edge allows. It also helps to increase the number of pack tractor passes near the wall of bunker silos to increase the density of forage within three feet of the wall.

Employee training in proper packing technique and safety standards is key, as well as training and experience in handling equipment. Tractor rollovers account for nearly 50 percent of all farm-related accidents in the U.S.

Proper sealing of the forage surface also helps reduce dry matter loss, while making silage programs safer. The Bolsens recommend moving beyond the typical polyethylene sheeting weighed down by tires and instead use a 2-step oxygen barrier film system. They cite university studies and field trials that show an oxygen barrier fill reduces dry matter loss in the original outer 1 to 3 feet of

silage or haylage by 40 to 50 percent compared to standard plastic.

“If we properly size bunker silos and drive-over piles so they are safer, and at the same time increase silage density, we’ll get more acres and tons in a given volume,” says Keith Bolsen. Increasing the density by 3 to 4 lbs. of dry matter per cubic foot would drop the apex by as much as 3 to 4 feet in many bunkers and piles. “That denser silage is going to add to safety because of the lower height of the feedout face.”

Using several smaller bunkers and piles makes feedout more efficient as well as safer; and it can lead to overall better inventory control and nutrient management. Instead of one large bunker or pile producers should consider smaller ones that batch silage by corn hybrid or maturity at harvest.

“They’re easier to cover and create a tight seal; they’re easier and safer to uncover; and they feed out faster and safer,” says Keith Bolsen.

First and foremost the Bolsens advocate “THINK SAFETY FIRST” when working in a silage program or performing any other farming operation.

“The number one priority of silage management is safety,” adds Ruthie Bolsen. “It’s not about dry matter loss, feed conversion, cost of gain, or milk over feed cost. It’s about sending everyone in your silage program home to their families every day.”



Nutritionists are putting their lives at risk to collect silage samples. The safest way to collect samples is to obtain silage from the loader bucket after it has moved away from the silage face.