

Bunker silo and silage pile safety

By Julie Berry

People are the greatest resource on a farm. Accidents are never planned, but those few minutes can have long-lasting and traumatic impact. Proactive steps can help reduce risk during corn silage harvest and feed-out.

“The word ‘safety’ needs to be used as a verb rather than a noun on today’s dairies,” said Doug DeGroff, Diversified Dairy Solutions, who was seriously injured in a farm accident 10 years ago.

Horizontal silo forage storage systems are widely used because they are economical and maintain high-quality forage at low cost, with acceptable shrink. Known hazards associated with fatalities and serious injuries in bunker silos and drive-over silage piles are tractor or truck rollover, run-over by or entanglement in machinery, fall from height, crush/engulfment by collapsing silage and complacency or fatigue.

All farms should develop and follow written silage safety guidelines, conduct mandatory safety training and have regular safety meetings, said Curt Gooch, Cornell CALS PRO-DAIRY, to cooperative extension educators at a regional training session.

“Send everyone home safe,” is



People working near a bunker or pile should always wear a high-visibility safety vest.

the mantra of the Keith Bolsen Silage Safety Foundation, a 501(c)(3) non-profit organization dedicated to promoting safe bunker silo and silage pile management, and providing safety educational resources and materials for the global silage industry. The nonprofit was launched at World Dairy Expo 2017 by Dr. Keith Bolsen, Kansas State University Professor Emeritus, and his wife, Ruthie. In 2018, Dr. Bolsen published a review of safety considerations in the *Journal of Dairy Science*.

ROLLOVER RISK REDUCTION

Rollovers account for half of the 250 annual tractor-related fatalities reported to the United States Institute for Occupational Safety and Health, according to Dr. Bolsen’s 2018 article “Silage review: Safety considerations during silage making and feeding,” which includes profiles of several accidents.

A 62-year old Pennsylvania man was killed when a tractor he was operating rolled over on top of him.

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The accident happened when the man was driving the tractor on an incline while packing silage in a bunker silo.

A 21-year old Texas man was killed when the dump-bed truck he was driving tipped over on a bunker silo at a cattle feedyard. According to the county sheriff, the circumstances of the accident are not uncommon and “those trucks have been known to do that if not operated correctly.”

- Use low-clearance, wide front-end tractors equipped with well-lugged loaded tires with added front and back weights.
- Fill in a modified-wedge pattern. Form a progressive wedge of forage when filling bunkers or piles and maintain a packing ramp with a 1-to-3 slope, or shallower.
- Keep transverse (lateral) slopes to 6-to-1 or less.
- Use sight rails (with lights if packing at night).
- Pack each forage layer tightly.
- Don't use hay bales for bunker walls.
- Never fill a bunker silo higher than the top of the wall.
- Use cab tractors or tractors with roll-over protection structures (ROPS) and wear seatbelts.

- Unload trucks on a flat, firm surface.

RUNOVER RISK REDUCTION

The 29-year-old son of a Nebraska silage contractor was talking with an employee who was in the cab of a large forage harvester near the edge of a field. The employee, who thought the contractor's son had left the area, drove the machine out of the field. A few minutes later, another employee found the contractor's son lying unconscious in the field and he died two hours later in the hospital. Although the details surrounding the fatal accident are unclear, the son appeared to have been run over by the rear tire of the forage harvester.

- Stay in the tractor/truck while in or near a bunker or pile.
- Use radios to communicate.
- Develop a traffic plan and implement it.
- Use reverse alarm devices, including lights or beepers.
- All employees should wear high-visibility safety vests at all times.
- Never allow bystanders and people on foot (especially children) near moving harvest and transport equipment in the field or near packing and feeding equipment in a

bunker silo or drive-over pile.

FALL FROM HEIGHT

In an email to a friend, Dwight Roseler, a dairy nutritionist in Ohio and Cornell University Ph.D. graduate, told about a local dairy farm that had a tragic bunker silo fatality. A 62-year-old employee fell 10 feet from the top of a bunker silo and was killed. The man was a loyal worker and dairy industry advocate with many years of experience working on farms and prior to that as a dedicated dairyman. He was a community and church supporter.

- Install guardrails on all above-ground-level walls.
- Use caution when removing silage coverings and tether to a stationary object when on piled silage above six feet high.
- Never stand closer to the edge of the feed-out face than the face height of the pile.
- Use equipment operated from the ground to remove surface spoilage.
- Don't ride in a front-end loader bucket.

CRUSH/ENGULFMENT BY COLLAPSING SILAGE

Six tons of alfalfa haylage

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in a bunker silo collapsed on a Wisconsin dairy farmer. He was standing about seven feet from the feed-out face that was about 11 feet tall. The dairyman was rescued in a matter of minutes. However, he suffered a C6 spinal cord injury, which classified him as a quadriplegic.

NY native and California nutritionist Doug DeGroff's testimonial is featured on the Silage Safety Foundation website. In August 2009 DeGroff was pulling a routine silage sample from a feed-out face that was nearly perfect and looked completely safe. The height of the face was only 11 or 12 feet. As he walked away from the pile, 20 tons of silage fell on him.

"I didn't hear a thing. The only thing I saw was the sun going out. I knew what was happening before it actually hit me ... It registered in my brain that the feed is coming down. Immediately it hit me, and I went to the ground," DeGroff said. "I remember thinking I don't want to die here today! While I was able to push silage away from my face with one hand, my other arm was trapped below me. Thankfully, I was able to brush the feed away from my head." Months after the accident, DeGroff said that he learned the hard way that there is no such thing as a safe bunker silo or silage pile.

- Maintain a vertical feed-out face.

- Don't undermine the feed-out face.

- Don't fill a bunker or build a pile higher than the unloading equipment can safely reach.

- Don't put plastic covering down between silage crops or cuttings and leave it there.

- Don't stand closer to the feed-out face than three times its height.

- Never work alone in a bunker or pile.

- Take forage samples from a loaded bucket after it has been moved to a safe distance from the feed-out face.

- Post signs at access points of a bunker or pile to warn of danger.

COMPLACENCY/FATIGUE

A nutritionist almost lost his life taking samples from a bunker silo with a 21-foot-high feed-out face on a dairy farm in Texas. Even though he was standing 20 feet from the face, 12 tons of silage collapsed on him. He did not see or hear anything. He had been in silage pits hundreds of times and had become complacent because nothing ever happened. It just took one time.

Keith Bolsen himself had an accident. "It happened on Saturday

afternoon June 16, 1974, while making dough-stage wheat silage at Kansas State University's Beef Cattle Research Unit in Manhattan. The blower plugged for about the eighth time that afternoon, and I started to dig the forage out from the throat of the blower. The PTO shaft was making one more very slow revolution. Zap! The blower blade cut the ends off of three fingers on my right hand. Why did the accident happen? I was physically worn out, mentally exhausted, and in a hurry. When I pulled my hand from the throat of the blower, I knew immediately that I had made a terrible mistake and done something pretty stupid."

- Ensure the silage team is of sufficient size to perform all tasks safely.

- Get a good night's sleep. A tired employee is more likely to make mistakes.

- Take short, periodic breaks.

- Rotate work shifts to keep employees well-rested.

- Eat well.

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