

## **Safety issues in managing large-scale bunker silos and drive-over piles**

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**Introduction** Few farming operations invite as many different opportunities for injury or fatality as a silage program. From harvesting forage in the field, transporting it to the farm, placing it into storage, and then removing the silage at feedout, employees are exposed to numerous serious risks. Silage-related tragedy knows no age boundary as workers and bystanders of all ages have been injured or killed during crop harvest and silage feedout (Murphy and Harshman, 2006). Increasingly, stories involve bunker silos and drive-over piles (Bolsen and Bolsen, 2010). Consistently protecting employees, equipment, and property throughout harvesting, filling, and feeding does not occur without thought, preparation, and training. Presented here are several major hazards involved with managing silage in bunkers and piles, and ways these hazards can be eliminated, reduced, or controlled.

**Materials and Methods** The three hazards presented and discussed include: 1) fall from height, 2) avalanche or collapsing silage, and 3) complacency.

**Results and Discussion** *Fall from height* It is easy to slip on plastic when covering or uncovering a bunker or pile, especially in wet weather. Standard guardrails should be installed on all above ground level walls. Use caution when removing plastic, tires, or pea gravel bags near the edge of the feedout face, and never stand on top of a silage overhang, as a person's weight can cause it to collapse. Where necessary, use equipment operating from the ground to remove spoiled silage from the surface of bunker silos and drive-over piles. Never allow a person to ride in the bucket of a front end loader!

*Crushed by an avalanche/collapsing silage.* A major factor contributing to injury or fatality from silage avalanche/collapsing silage is over-filled bunkers and piles (Holin, 2010a). A nutritionist had the following near miss, "I was taking a core sample at one of our large dairy customers and had just moved away from the face when a large section just fell off. This was a very well packed silo and had immaculate face management" (Bolsen and Bolsen, 2009).

It started out as a typical day for dairy nutritionist Doug DeGroff of Tulare, CA (Holin, 2010b). He pulled up to a client's corn silage pile for a forage sample, bucket and pitchfork in hand. After filling the bucket, he turned to walk back to his pickup to mix and core a sample. "The sun basically went out – I could not see any light and the feed hit me on my head and covered me completely," says DeGroff. "I knew what was happening before I hit the ground. The entire face fell on me ... about 20 tons broke away." DeGroff, who had celebrated his 36th birthday with his wife and two toddlers two days before August 27 last summer, was caught in a silage avalanche. DeGroff offered these additional comments, "This particular pile did not look unsafe at all. It was only 11 to 12 feet tall at the time that I sampled it and was mechanically shaven. I personally have taken feed samples from piles where I should not have been. I knew they were not safe, but I took the risk. This pile looked safe from any angle you looked at it from. I feel very blessed to be here and that everything still works. Yes, it was a broken back, but it could have been so much more. I am not on pain medication, and I don't think there are going to be long-term issues."

Avalanche/collapsing silage does not have to happen. Bunkers and piles should not be filled higher than the unloading equipment can reach safely, and typically, an unloader can reach a height of 3.5 to 4.5 meters. Use proper unloading technique that includes shaving silage down the feedout face and never “dig” the bucket into the bottom of the silage. Undercutting, a situation that is quite common when the unloader bucket cannot reach the top of an over-filled bunker or pile, creates an overhang of silage that can loosen and tumble to the floor. Never allow people to stand near the feedout face, and a rule-of-thumb is never stand closer to the face than three times its height. When sampling silage, take samples from a front-end loader bucket after it is moved to a safe distance from the feedout face.

*Complacency.* Always pay attention to your surroundings and be alert! A dairy nutritionist almost lost his life the day he took silage samples from a bunker silo with a 9-m high feedout face (Schoonmaker, 2000). “Even though I was standing 20 ft from the feedout face, 12 tonnes of silage collapsed on me. I did not see or hear anything. I had been in silage pits hundreds of times, and you just become kind of complacent because nothing ever happens. It just took that one time”.

“The accident happened on June 14, 1974 while making silage at Kansas State University’s Beef Cattle Research Farm. The blower pipe 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 made one more revolution. Zap! The blower blade cut the ends off three fingers on my right hand”. The injured person, Keith Bolsen, said later, “I was complacent and did something pretty stupid” (cited by Bolsen and Bolsen, 2010).

**Conclusions** Even the best employee can become frustrated with malfunctioning equipment and poor weather conditions and take a hazardous shortcut, or misjudge a situation and take a risky action. It is best to take steps to eliminate or control hazards in advance than to rely upon yourself or others to make the correct decision or execute the perfect response when a hazard is encountered. Only experienced people should be permitted to operate equipment associated with harvesting, filling, packing, sealing and feeding in a silage program. The correct sizing of bunkers and piles can reduce the risk of an accident. Spreadsheet software is available to assist producers and their silage team to better design and manage bunker silos and drive-over piles (Holmes and Bolsen, 2009). Think safety first. The silage industry has nothing to lose by practicing safety: it has everything to lose by not practicing it.

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