

Silage safety issues for large-scale bunker silos and drive-over piles re-visited: avalanches

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Keywords: silage, avalanche, fatality, bunker silo, drive-over pile

Introduction Few farming operations invite as many different opportunities for injury or fatality as a silage program. One of these is an avalanche or collapsing silage. It only takes a fraction of a second for part of a silage face to silently break off and fall, and the result can be deadly for anyone located beneath it. There have been numerous avalanche fatalities in the United States the past few years, including an 11-year old boy in New Hampshire, a 30-year old truck driver in Idaho, and a 63-year old employee in Pennsylvania (Bolsen and Bolsen 2012; Bolsen and Bolsen 2013). Although rarely reported, the authors have heard many stories about someone having a near miss or suffering a serious injury in a silage avalanche. This paper documents silage avalanche tragedies and looks at ways they can be avoided in the future.

Materials and methods The most common hazard in managing bunker silos and drive-over piles, avalanche or collapsing silage, is presented and discussed.

Results and discussion On January 13, 2014, Jason E. Leadingham was working in a bunker silo when a massive amount (10 to 15 tonnes) of maize silage collapsed on him (Tucker 2014). Pirtle Farms LP of Roswell, New Mexico who employed Jason as a truck driver owned the bunker silo. Jason's body was not recovered from the silage until about 2 and 1/2 hours later, and it was determined that he died of mechanical asphyxia. There was a sample bag near Jason's left hip. He was clutching silage in his hands and had silage in his mouth, which suggest that Jason struggled to survive in the final moments of his life. This tragedy should never have happen.

A Nebraska newspaper reported the following fatal accident in October 2013 (Bolsen and Bolsen 2014). A 53-year old Norfolk man died Monday, October 21, 2013 in a feedlot accident. Stanton County Sheriff Mike Unger said Matthew Winkelbauer died after he was buried by a large silage pile that fell in an open silage pit at Four-Quarters Feedlot east of Norfolk. Winkelbauer, who was the owner and operator of Four-Quarters, was pronounced dead at the scene. A co-worker was seriously injured in the accident. The victim was standing in front of the feedout face, which was about 4 m height, and the avalanche pushed the falling silage more than twice that distance away from the face.

A New York newspaper reported the following tragedy on a farm in Ontario County (Sherwood 2010). Sheriff deputies said David Mark Crouch was shoveling silage into a feeder for cows on his family's Fort Hill Road farm when part of the silage pile collapsed on top of him. The pile was estimated at about 3 m high. He was buried under about 1.2 m of the wet, heavy

silage and suffocated. He was found unconscious by a family member and taken by ambulance to Geneva General Hospital where he was pronounced dead.

Similar tragedies happen all over the world (Bolsen and Bolsen 2014). In a July 2013 email, Professor Ali Assadi-Alimouti, University of Tehran, Tehran, Iran, described the serious injuries he received in a silage avalanche. “It was March 15, 2010 and I went to see a large dairy farm client. Two of the herdsman and I went to the large bunker silo (8,000-tonne capacity). The height of the feedout face was about 6 meters. After visual appraisal of the silage, we were walking out of the bunker and a large silage avalanche fell on us. Observers testified later that it was around 10 tonnes of silage. One of the herdsman remained outside of the silage from his head, and thank God, he could call to others to save us. The worst injuries happened to me, including multiple fractures to my tibia and femur, and I was in a coma for 30 hours in a hospital. The other herdsman suffered a broken leg and had respiratory problems due to inadequate oxygen for 10 minutes. I was the last one rescued, being trapped under the silage for about 20 minutes. It is by the grace of God that I am alive. God gave me another chance for life.”

Far too many bunkers and piles are just too large to ever be safe for the crew filling them and the one feeding it out. Higher crop yields and/or growing herd sizes mean more silage needs to be stored. But unless new bunkers are added, the footprint for drive-over piles is enlarged, or packing density is increased significantly, there is nowhere for additional silage to go but up. As it does, so does the risk of an avalanche tragedy. It is not uncommon for cattle feedlots and large dairies to have bunkers and piles with silage faces that are 5.5 to 7.5 m tall. Common sense tells us that a 6 to 7 m tall silage face is far more dangerous than one that is only 3 to 3.5 m tall.

Here are guidelines that can decrease the chance of having a fatality or serious accident caused by a silage avalanche: 1) Never allow people to stand near the feedout face, 2) A rule-of-thumb is never stand closer to the feeding face than three times its height, 3) Suffocation is a primary concern and a likely cause of death in any silage avalanche, so follow the ‘*buddy rule*’ and never work alone in a bunker or pile, 4) Use caution when removing plastic or oxygen-barrier film, tires, tire sidewalls or gravel bags near the edge of the feedout face, 5) Never ride in a front-end loader bucket, 6) Never park vehicles or equipment near the feedout face, 7) Post warning signs, ‘*Danger! Silage Face Might Collapse*’, around the perimeter of bunkers and piles, and 8) Avoid being complacent and never think that an avalanche cannot happen to you.

Conclusions Unfortunately, the global silage industry has a long way to go to eliminate these senseless fatalities and serious injuries. Keep in mind, an avalanche can occur anywhere, anytime, in any bunker or pile, without warning, and in any ensiled forage. We cannot stop avalanches from happening, and they are impossible to predict, but we can prevent people from being under them. Every farm, feedlot, and dairy should have safety policies and procedures for their silage program, and they should schedule regular meetings with all their employees to discuss safety. If a silage program is not safe, then nothing else about it really matters.

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