

## **Silage Safety Practices that Save Lives**

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### **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 an exposed silage feed-out face to break off silently and fall, without prior warning. The result can be deadly for anyone beneath. Many bunker silos and drive-over piles are too large to be safe for the persons filling and feeding out. Bigger livestock units have resulted in greater amounts of silage being stored in outdated bunkers and piles. Unless new silos are built, the footprint of drive-over piles enlarged, or packing density increased significantly, there is nowhere for additional silage to be stored but in bunkers or piles of ever-increasing height. Thus, the risk of an avalanche tragedy is increased. It is not uncommon for cattle feedlots, large dairy units and anaerobic digestion plants to have bunkers and piles with silage feed-out faces that are 5.5 to 7.5 m high. 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 high.

Unfortunately, the silage industry has a long way to go to eliminate serious injuries and fatalities from silage avalanches. There have been several 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 2013; Bolsen and Bolsen 2014). Although rarely reported, the authors have heard many stories about someone having a near miss or suffering a serious injury in a silage avalanche.

In this paper silage avalanche and fall from dangerous height tragedies are documented and guidelines for reducing the risk of injury and death are outlined.

### **MATERIALS AND METHODS**

Documentary evidence concerning silage avalanches and falls from dangerous heights is presented as four detailed case studies. Guidelines for improving the safety of bunkers and piles, based on the case studies, are presented with the objective of reducing the risk of injury or death in a silage program.

### **RESULTS AND DISCUSSION**

#### *Case studies*

A New Mexico online news organization reported the following fatal accident (Tucker 2014). On January 13, 2014, Jason Leadingham was working in a bunker silo when a massive amount (10 to 15 tonnes) of maize silage collapsed on him. Pirtle Farms LP of Roswell, New Mexico who employed Jason as a truck driver owned the silo. Jason's body was not recovered from the silage until about 2.5 hours after the avalanche. The cause of death was determined to be mechanical asphyxiation. A silage sample bag was 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.

A Nebraska newspaper reported that a 53-year old man died on October 21, 2013 in a silage accident (Bolsen and Bolsen, 2014). 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 feed-out face, which was about 4 m high, and the avalanche pushed the falling silage more than 8 m from the feed-out face.

William John Davidson who was 52 years old died at Poldean Farm, Moffat, Scotland at about 2:38 pm on January 26, 2013 (<https://www.scotcourts.gov.uk/search-judgments/judgment?id=619a8ea6-8980-69d2-b500-ff0000d74aa7>). The cause of William's death was a severe head injury sustained in a fall from a height of 4.9 m after he lost his footing while working on top of a silage pile. A reasonable precaution whereby his death might have been avoided would have been that of keeping a safe distance from the edge of the silage pile. A defect in the system of working, which contributed to the death, was the

absence of any measure whereby the need to work close to the edge of the silage pile was avoided.

Professor Ali Assadi-Alimouti, University of Tehran, Iran (personal communication 2013) 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 tonnes capacity). The height of the feed-out 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.”

#### *Guidelines for improved safety procedures*

Guidelines to decrease the risk of a serious accident or fatality caused by a silage avalanche or a fall from a dangerous height have been formulated (Bolsen et al., 2015). The important principles are i) avoid excess height when filling bunker silos and building drive-over piles and ii) avoid working close to the unstable exposed feed-out face.

Specifically:

- 1) Bunker silos and drive-over piles should not be filled higher than the unloading equipment can reach safely, and, typically, an unloader can reach a height of 3 to 3.5 meters;
- 2) Do not exceed the height of the safety rail on the bunker walls;
- 3) Never allow people to approach the feed-out face;
- 4) Never stand closer to the feed-out face than three times its height;
- 5) Suffocation is a primary concern and a likely cause of death in many silage avalanches, so follow the ‘buddy rule’ and never work alone in a bunker or pile;
- 6) Never drive the unloader parallel to and in close proximity of the feed-out face in an over-filled bunker or pile;
- 7) Take silage samples from an unloader bucket after it is moved to a safe distance from the feed-out face;
- 8) Use caution when removing plastic or oxygen-barrier film, tires, tire sidewalls or gravel bags;
- 9) Do not work or stand close to the top edge of the feed-out face;
- 10) Do not “pitch” surface spoilage. It is simply too dangerous to remove spoilage from the top of many bunkers and piles;
- 11) Never ride in a front-end loader bucket;
- 12) Never park vehicles or equipment near the feed-out face;
- 13) Post warning signs around the perimeter of bunkers and piles saying, ‘*Danger! Silage Face Might Collapse*’; and
- 14) Avoid being complacent and never think that an avalanche or a fall cannot happen to you.

## **CONCLUSIONS**

A silage 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. A fall from a dangerous height does not have to happen; it is avoidable.

Every farm, feedlot, dairy and digester plant 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, nothing else about it really matters.

## **REFERENCES**

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