**Episode Title:** Grain Bin Safety, Part 2: Considerations for Preparing Bins for Grain

**Topic:** How to Prepare Bins for Grain Storage to Reduce Grain Engulfment

**Episode Summary:** In this episode of the *FarmSafe* Podcast, we continue our grain safety series by examining how poor grain quality and improper storage conditions can create dangerous situations inside grain bins. The episode features Anita Howard, who shares the heartbreaking story of losing her 18-year-old son, Colton, in a grain bin incident that she believes was entirely preventable. To help prevent these tragedies, Iowa State Extension field agricultural engineer Kristina TeBockhorst explains how strong grain management practices directly improve safety. She introduces the "three Cs" of stored grain management: Cooling it, Coring or Cleaning it, and Checking it regularly. Rich Gassman, safety and compliance director at Engineering Services and Products Company, adds that keeping grain in good condition reduces the need to enter bins in the first place—one of the most effective ways to prevent injury.

**Expert:** Kristina TeBockhorst

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**Episode Quote:**

*"Safety is really related to grain management. When we have issues with people getting caught in the grain or entrapped in the grain, most of the time those cases involve poor quality grain."*

– Kristina TeBockhorst, Iowa State Extension

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# Transcript

**00:10 E Presnall**

Welcome to the *FarmSafe* Podcast brought to you by the Great Plains Center for Agricultural Health. In the blink of an eye, an injury can change your life and your farm forever. During each episode, we share first-hand stories and real-life tips for making safer and healthier decisions while on the farm.

**00:32 E Presnall**

In our first episode of our series on grain-related safety, we discussed general hazards associated with grain bins, including bridged grain and vertical masses of grain.

Grain can become bridged when it is moldy, high in moisture content, or in poor condition. The kernels stick together and form a crust which may be self-supporting. This gives a false indication that it is safe to stand on the surface of the grain. A hollow cavity will form under crusted grain when some of the grain has been removed from the bin. The surface over this cavity is not strong enough to support the weight of a person. As the person walks onto the grain, the bridge of crusted grain will collapse.

**01:15 E Presnall**

Grain can also "set up" in a large mass against the bin wall or in various formations when it has been stored while in poor condition. The mass of grain can collapse and "avalanche" down on workers who attempt to break it loose with shovels or other objects. There will be no warning when it breaks loose and cascades down. Each year across the Midwest, the farm press publicizes at least one tragic story about a farm fatality as a result of grain entrapment.

**01:45 E Presnall**

Anita Howard has become an advocate of grain bin safety following a tragic incident involving her son. Today, we are going to be sharing her story. If you would like to hear more, listen to "Don't Become a Statistic: Practice Grain Bin Safety this Harvest Season" on the Indiana Soybean Association's Movin' the Pile Podcast.

**02:13 A Howard**

My story is a tough one to tell, but I'm willing to share it because I know that it could possibly reach the one person and make a difference. My 18-year-old son Colton was engulfed in a grain bin on November 22nd, 2019, while he was working for a local farmer. His accident was 100% preventable. While I'll never know the exact details from the day, I know that he had to act without thinking before he entered the bin that claimed his life.

I started researching grain bins and grain bin related fatality shortly after the accident and I discovered that this is something that happens frequently. I believe that had his dad and I been better educated about the dangers associated with working around grain bins, we would have been talking to our son about safety precautions on a regular basis. And I want to reiterate that my son's death was preventable. And I do feel like we let him down because we were not talking about it, we were not educated. We did not know the things that we should have been telling him. Every time we got in a vehicle, you know, we taught him to put his seat belt on. Every time he got on his dirt bike; we taught him to put a helmet on. Those were just things that we instilled in our son and had we been talking about grain bin safety; I believe he would have taken more precautions on that day.

03:48 A Howard

I have now made it my mission to help spread awareness. I am a Mama on a mission. I want every farmer and every employee to go home at the end of the day, not just a hat and pair of boots that came home to me.

The best way for someone to help would be to immediately turn off the power, stop the flow of grain. Call 911 and report a possible green bin engulfment so emergency rescue can bring the appropriate equipment for extraction. That's very important.

If possible, ventilate the band with the fan. It's important that you do not attempt to enter the band to try to save the individual, because you could become trapped as well. Do not attempt to pull the individual from the trapped grain as the force of the grain pushing down on the person could cause severe bodily damage. If possible, talk to the individual to help keep them calm. Let them know that help is on the way.

04:53 E Presnall

The annual report from Purdue University indicates that there was a sharp increase in agricultural confined-space related cases of injuries and fatalities in 2022, with cases of grain entrapment rising by about 45%. In 2022, there were nine cases of grain entrapment in Iowa, more than any other state. Improved grain management could avert incidents in the future, as nearly all of these cases had problems with grain flow due to spoilage. To give farmers practical advice on how to maintain the quality of their grain and keep themselves and their families safe when handling it, I talked with Kristina TeBockhorst.

05:36 E Presnall

Kristina is the field ag engineer in southeast Iowa for Iowa State extension and outreach. She serves the southeast corner of the state, working with engineers on campus and other engineers across the state to answer different engineering-related questions for people in ag and homeowners or land owners in general. To kick off our conversation, I asked Kristina to begin by explaining what stored grain management is and what it involves.

06:04 K TeBockhorst

We have quite a bit of on farm grain storage in the state of Iowa compared to other states. So, a lot of farmers manage grain on their farms. After the fall throughout the winter into the spring, some may even hold it into the summer, and it gives them a good marketing edge. Gives them some chance to chase a little bit better prices so a lot of benefit to storing grain on the farm outside of the Co-op and things like that, but it takes a lot of– a lot more hands on, a lot more management. The grain bin itself is expensive and then that's a lot of value sitting there and it's a perishable product. There's safety concerns as well. Dealing with grain, moving equipment, that's moving grain a lot faster than it used to and large storage bins bigger than they used to be, a lot of inherent safety issues with those. So there's safety things to think about.

07:06 K TeBockhorst

They're all related. Safety is really related to grain management. Most of the time when we have issues with people getting caught in the grain or entrapped in the grain or things like that. Most of the time those cases involve poor quality grain in that bin that's not flowing through the sump or something like that. Or maybe it kind of stuck on the wall or a crust or a bridge. Good grain management

is important for the bottom line. It's also important for safety. Good grain management really comes down to kind of the three Cs. Cooling it down, getting it to a good store cooled stored temperature. Coring it or cleaning it. Making sure we have level service with good promoting better aeration with fans, getting rid of fines or spreading the fines, by coring or spreading. Those are the two first ones, the last one is checking it. We don't get a kind of set it and forget it, leave it in the bin through the winter and the temperatures are cool outside, we should be good. But really it takes management throughout the winter and then again into the spring as temperatures start to warm. Checking it frequently at least every couple of weeks or a couple times a month or something like that to make sure we find any signs of spoilage or issues before it becomes a big problem that we have to deal with. There's more that goes into each of those but cooling it down, coring it or cleaning it, and checking it. That's kind of the big ones for management.

08:42 E Presnall

It's also interesting to me that, more farmers know about the hazards of equipment and machinery and those guards, and you know rotating points and pinch points, even though there are so many stories about entrapment and engulfment, and so I think the interesting thing will be to figure out, how do we improve grain management so we can kind of minimize people entering grain bins. How do we come up with new ideas. If there's something that's absolutely necessary to get in there, what are other ways that you can kind of approach those problems from outside of the grain bin?

09:18 K TeBockhorst

We always hear about those cases in Iowa, in the Midwest of entrapment. And unfortunately, Iowa's kind of leading the way in the number of incidences in the in the US and part of that has to do with we have a lot of grain storage on farm or in co-ops and things like that. So, we do store a lot of grain here, but yeah, it's not something we like to be the leader in entrapment or confined space incidents. It is on the rise and there are some things, you know, the biggest thing I talked to people about is just the good grain management.

09:57 E Presnall

I then asked Kristina if there were ways in which farmers could prepare their grain bins prior to the storage months to help keep grain in good condition.

10:07 K TeBockhorst

Really, the first step in storing grain well is having a good clean, well-prepared bin to store it in. The big things with preparing your bin is while it's empty, checking all the mechanical features in there, doing any needed maintenance like that, sealing any gaps or cracks in the bin where moisture could find its way in and cause damage to the grain. Really, starting with a clean bin on the inside. That includes getting in there and obviously sweeping out all the grain but getting all the dust and debris and all that stuff that can collect in the sump or the auger in the prongs or the ladders on top of doors and things like that. Getting all of that dust and debris out of there, getting all the old grain out of there and also around the bin.

10:55 K TeBockhorst

Weed whacking and taking care of all the vegetation around the bin. Basically trying to get rid of any grain or vegetation nearby the bin that insects could find their way to live kind of throughout the winter and come back and feed on the grain. So we want to get rid of any of the food material or kind of refuge places for any of those insects. That's a big one. It's important to check or look for the bins that have the aeration floors. Take a peek under their aeration floor and make sure we don't have any potential plugging with insect silks and webs and things like that in fines. Some bins are easier than others to clean out under the floor and some of them are, that's probably one of the worst jobs people would want to do is to take the floor off and clean that out, but if it is really starting to plug up, we're not going to get good aeration and it's going to be harder to manage that grain. So, if they're starting to plug up, do what you can to blow out or vacuum out that material under the floor. And then if you have had insect issues, you could think of also about hiring someone to come fumigate that bin to get rid of any insect, carry over through the next year. Starting with a good, clean well-prepared bin is really the first major step.

12:14 E Presnall

I also talked with Rich Gassman, who has a lot of experience working around grain bins. Rich is currently the safety and compliance director at Engineering Services and Products Company, where they mostly do catalog, retail, and building manufacturing. I asked Rich if he had any advice for farmers when it comes to stored grain management so that entry into bins can be avoided.

12:39 R. Gassman

If you're keeping your grain in condition, if you're doing a good job, whether it be you know from drying it to aerating it, to getting air in it when it needs it, keep that grain in condition, it'll reduce the number of times you need to go into a bin. There's still going to be times you're going to have to go into a bin. Things break down, things like that happen. The worst incident that I've seen happened because of out of condition grain. The old habit, we don't see it a whole lot anymore, but walking down the grain. Those are the things that you got to try to avoid. And it could be a fine line for farmers when they do that. When you're removing moisture from grain, you're removing money. Because you know you're paid by the weight. So you want to keep it as close to that 15%, maybe a little bit more. But the more you have, the shorter period of time you have to keep it in storage so.

13:24 E Presnall

If you didn't do it this year, take a positive step toward protecting your 2024 season-long investment by ensuring that your grain bin is ready to accept grain in this upcoming year. Prevent grain from "setting up" and grain bridging by storing grain in good condition and avoiding spoilage.

As a reminder, here are a few things to keep in mind this spring and summer to maintain good grain management and avoid scenarios that could lead to engulfment or entrapment, check the grain frequently to monitor for signs of spoilage, such as crusting, damp or warm spots, musty or sour odors, or rising $CO_2$ levels; seal fans when they are not being used to prevent warm air from entering the grain through the floor; and, ventilate the headspace between the roof and the grain to minimize warming of the grain surface.

Make sure to check out the grain safety shorts included in this episode's resources. These are short articles published by Kristina TeBockhorst, who was featured in this episode. One of the articles focuses on grain bin preparation and the other on aeration.

14:36 E Presnall

For this week's episode, I want to ask our listeners to take the time to refamiliarize yourself with the numerous risks that are present when working with stored grain. Included in the resources for this episode is a link to North Dakota State University's website, where you can find a list of safety precautions to follow for the three major hazards of working with grain– including the collapse of bridged grain, the collapse of a vertical mass of grain, and flowing grain.

In our next episode, we will go into more detail about the three Cs for improved stored grain management– Cooling It, Coring It, and Checking It.

15:17 E Presnall

Listen in on the *FarmSafe* Podcast to join in on the conversation about keeping safe on the farm. We want to hear from you. Share your stories about health and safety issues on the farm, about injuries that made you change the way you work, or about the ways you keep yourself and others safe on your farm. Also let us know if there's questions you have or topics that you want to hear about on the air. You can visit our website, gpcah.org, or email us.

Original music for the *FarmSafe* Podcast was written and performed by Ben Schmidt. This work was funded by the Centers for Disease Control and Prevention as part of the National Institute for Occupational Safety and Health's Great Plains Center for Agricultural Health.

## Episode Resources

- Caught in Grain: Safety Precautions
- Grain Safety Shorts: Aeration – why, when, and how? by Kristina TeBockhorst
- Grain Safety Shorts: Bin Prep, by Kristina TeBockhorst

Photo