

**Episode Title:** The Mechanics of Injury: Understanding Hazards of Farm Equipment

**Topic:** Farm Equipment Hazards

**Summary:** Dr. Renee Anthony joins us to unpack new Iowa trauma registry data showing that machine interactions account for roughly a quarter of farm-related hospital visits, more than half of all amputations, and a third of crushing injuries. While PTO shafts remain a well-known hazard, the numbers reveal a wide range of other machinery—combines, grain elevators, conveyors, augers, and even non-ag equipment—sending farmers to the ER. This episode also previews the Great Plains Center’s upcoming three-part Ag Health Academy series, which offers practical, case-based guidance on machine hazards, guarding, and lockout procedures to help farmers recognize risks and prevent life-changing injuries.

**Expert:** Renee Anthony

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**Episode Quote:**

*“Machine safety is...it's complicated, but then it's not complicated. Once you understand what to look for as far as hazards, then controlling it becomes a little bit easy.”*

– Renee Anthony, Director of the Great Plains Center for Agricultural Health

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## Transcript

### E Ritchie

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.

### E Ritchie

In this drop of *FarmSafe* episodes, we have a discussion on the analysis of farm-injuries that are sending farmers to the emergency room. 25% of these cases are because of contact with equipment. These cases cause fractures, open wound, and other outcomes. An average of 12 Iowa farmers, each year, have an amputation because of contact with equipment. This episode introduces you to some common on farm machine hazards and provides you with an introduction to a new Ag Health Academy series of courses on Machine Safety to dive in deeper to understand hazards and prevention guidance.

### E Ritchie

The shared story in this episode was mentioned last season in an episode where we discussed the farm-kid paradox. We are sharing this story again, as it relates to machine safety while on the farm.

### B Finch

My closest call, we were putting an elevator up, and it has a PTO lift on it. It was an older elevator. And my son – I was on the tractor, and we’re just idling, and we turned the PTO on and – where we connect the PTO shaft onto the elevator, there’s a bolt sticking out just a little ways. And that caught his shirt, and it ripped his shirt off. The tractor was only idling, and my hand was basically on the PTO shaft to turn it on and off. But it just takes an instant, and it tore his shirt off. It was very very serious. And luckily nobody was hurt but it scared me and him too. He was 18 or 19 years old.

### E Ritchie

This episode, we bring back Renee Anthony, who is leading the Ag Health Academy series. She also directs the Great Plains Ag Center.

### R Anthony

Well, we know that machines cause a lot of injuries on the farm. We also know that when we talk to farmers about their health and safety concerns, many list machine safety as something they worry about. In another podcast this season, we're going to talk to John Davis about surveillance of ag injuries, but I'm going to use some of these findings here to set us with some motivation for why machine interactions are important. If we look at farmers in Iowa, we have a database that is the Iowa Trauma Registry, and we know that about 25% of the farmer hospital visits, so when they have an event on a farm and go to the emergency room, we know that about a quarter of those are related to interactions on a machine. We also looked at the data and found out that 54% of farmer amputations are from those machine interactions, which is a pretty significant outcome. And we also know that about 33% of all crushing injuries on the farm are from interactions with machines. We do know that machines are hurting farmers and farmers are concerned about it.

**E Ritchie**

Why do we need to bring attention to machine safety?

**R Anthony**

Yeah, we've done a lot of outreach over decades talking about the hazards of power takeoffs. We know that they rotate very fast. If you get your clothing or hair or hands caught in that PTO, because it's rotating so quickly you get caught up in that machine, arms have come off, broken bones multiple times, some scalping issues could happen. PTO shafts are pretty dangerous. In the data that we looked at from 2017 to 2023, again, just in Iowa alone, we had about 17 cases of traumatic injuries because of being in contact with the PTO shaft. So, that's 17 out of 939 emergency room visits that were related to all types of machinery. It's about 4% of the serious machine injury related events on a farm. And we've done a really good job in getting those numbers lower, but we do have a lot of other machine interactions that have caused people to go to the hospital.

About a third, probably a quarter of all of the cases can be tied to a specific agricultural operation. We've had 13 cases on a grain elevator, 17 as I said on PTO shaft. Ag transport, so when equipment is not in motion, about 17 folks have been injured by working on transportation equipment while it's not doing transportation, and about 50 people injured on a combine. We've had another 50 cases where somebody has been injured on what's called unspecified ag machinery, but 279 of our cases, about half of them, are on something called other ag machinery. Our surveillance system does not do a really detailed job of specifying those because we don't have a lot of coding at the trauma registry, you know, data that's going in from the hospital that gives us specific information on ag machinery. We also have about a quarter of the cases are from other machines that are not necessarily an ag machine. Getting caught up in equipment that could be used for construction or in the workshop, some of those things, they're not specifically ag machinery, but those types of machines are causing injuries on the farm.

**E Ritchie**

Farm safety always focuses on PTO shaft hazards. Is that still a hazard that needs to be covered?

**R Anthony**

We do know that most of the time, we have this issue of a piece of equipment is rotating. There could be a motor that is turning a shaft and there's a pulley that is now rotating blades or rotating some other piece of equipment. Think of the classic power takeoff PTO shaft. That's the classic, but they're also rotating shafts that are on conveyors, chains and sprockets on equipment, compression rollers and balers, and also rotating hazards and grain augers. All of these things have the potential when a piece of equipment is rotating that the part of the machine that is rotating, if there's a nick on it or if it's sticking out, if it's not guarded, those have the potential to capture clothing, to capture somebody's finger, to capture somebody's hair. And with that rotation, depending on the speed, and your response time, it can pull you into a machine.

**E Ritchie**

What is the most hazardous machine motion that farmers come into contact with?

**R Anthony**

Yeah, it's really important that if you're doing farm work to really do an assessment to see what are the rotating hazards of the equipment that I'm working on. Are there guards that are up? Sometimes when we're doing repairs on equipment, we'll take the guards down so that we can access the equipment and oil lubricate, change parts, do maintenance, those sorts of things. And then we

do need to make sure that guards go back up. Doing an assessment before energizing a piece of equipment, really knowing what is rotating. It takes just a few seconds but having that acknowledgement so that people are aware of where the risk is, that they work at a distance from it so that they don't get caught up in something that's rotating is a really good work practice when we don't have things guarded.

#### E Ritchie

What other prevention tips are available for these hazards?

#### R Anthony

Great question. Machine safety is...it's complicated, but then it's not complicated. Once you understand what to look for as far as hazards, then controlling it becomes a little bit easy. We here at the Great Plains Center have developed a three-part series in our new Ag Health Academy course, free classes online. We hold them once a month, and we're gonna kick off our sessions in January, really looking at machine guarding and machine hazards. So, we're going to have January, February, and March, we're going to cover a lot of details in the issue area of machine safety. We'll have case-by-case examples of what some of these hazards are and what the prevention tips are. So, awareness of equipment risk is really important. Once in the course, we're going to go through a whole bunch of motions and actions and relate those back to specific pieces of ag equipment that we have seen uh adverse outcomes from.

So once people can respect the hazard and are aware that it exists, then we want to make sure that there are guards put on these hazard points. And so, a guard is basically a barrier between the hazardous in-running knit point or rotating chain and sprocket. So, there's a barrier between that hazard and where people are interacting. And we also need to know that if we take a guard off, we do need to think about locking out the equipment so nobody can start it if we're gonna go into an area where there's a hazard. And so, we'll talk about that in the class as well. But um if you take the guards off for maintenance, make sure that you put the guard back on before we put that equipment back in operation. So, in our Ag Health Academy series, we're gonna walk through best practices in detail, highlighting fatalities associated with incidents of getting caught and rotating equipment on the farm. So, if you're interested in that, please do sign up.

#### E Ritchie

We also challenge you, our listener, to do a walk-through of your equipment and identify where you can see/contact rotating hazards on equipment – pick a tractor, an implement, or a shop tool and list rotating hazards. Check to see if there was a guard that came with the equipment or was retrofitted by the manufacturer after it was sold – a quick check on the internet will help you out. Install missing or fabricate new guards to that device before it goes into service. Then, move on to the next implement.

#### E Ritchie

Visit the Ag Health Academy web page for more information on the three-part series on Machine Safety. Recordings of the lessons will be made available, but hands-on discussions will be available only during synchronous events, so contact the GPCAH if you want to be part of the conversation.

#### E Ritchie

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](http://gpcah.org), or email us.

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## Episode Resources

- [Ag Health Academy](#), GPCAH, Home Page
- [Machine Safety Resources](#), GPCAH

- [Chapter 4, Unit 10 of Ag Health 101, GPCAH](#)

## Photo

