# GRDC VIDEO or PODCAST TRANSCRIPT

**The how-to of effective mouse baiting - techniques, machinery and safety**

**00:00:05:01 - 00:00:07:14**

**Intro:** This is a GRDC podcast.

**00:00:12:09 - 00:01:00:15**

**Shannon Beattie:** Mouse populations across a large part of grain growing regions were higher than average across the 2021 and 2022 seasons, requiring an increased effort in mouse management from growers. Hi, I'm Shannon Beattie. To help Australian grain growers reduce crop losses due to mouse damage. A GRDC investment is examining mouse bait application techniques to better understand the performance and likely efficacy of various options. Poor control through ineffective baiting operations increases the risk of crop losses caused by mice, so this investment will ultimately provide growers with guidelines for different bait spreading equipment. In this episode, I'm joined by agricultural research engineer Ben White, who is leading the project team, as well as CSIRO mouse expert Steve Henry, who starts us off with a bit of a history lesson.

**00:01:00:29 - 00:01:33:12**

**Steve Henry:** So the first really big outbreaks of mice were recorded in the late 1800s, early 1900s. And then periodically through time, mice have been a problem where they've erupted to plague levels. But now in zero and no-till systems, we're getting more and more reports of outbreaks of mice. Some of them quite localised, and farmers having to deal with them on almost on a paddock-by-paddock basis, right up to what we saw in 2021, where most of central New South Wales and southern Queensland was seriously impacted by mice.

**00:01:33:16 - 00:01:41:05**

**Shannon Beattie:** When we say plague level proportions and these really high levels, how many mice are we actually talking and what sort of damage are they doing?

**00:01:41:07 - 00:01:55:00**

**Steve Henry:** It's a bit like counting the stars in a way, but we characterise a plague as greater than 800 mice per hectare. But certainly, some of the reports during the plague, there was much higher levels than that, but impossible to quantify.

**00:01:55:06 - 00:01:59:26**

**Shannon Beattie:** Why are mice such a problem on-farm? What issues are they causing for our growers?

**00:02:00:02 - 00:02:46:25**

**Steve Henry:** They really are an intractable problem in that they can impact all phases of the crops. So right through the growing season, we particularly see damage as winter crops are being sown. And so because mice are bred starting in the springtime, continuing through the summer in favourable conditions, and the autumn when farmers are preparing to say their crop, they can be at incredibly high numbers. So that's the first phase of it. And then we see damage in the spring. If we get a high level of overwinter survivorship and then mice start breeding in the spring from that high level, then they can cause a whole lot of damage as the crop matures. And then those problems can continue through to post-harvest where we see loads of grain being rejected because of mouse contamination.

**00:02:47:00 - 00:02:56:18**

**Shannon Beattie:** I know, Steve, you have some numbers on the amount of grain that mice need to live off or to survive. Can you talk us through those numbers?

**00:02:56:20 - 00:03:43:10**

**Steve Henry:** Yeah. So a mouse needs about three grams of food per day, and that equates to about 66 grains. Now, when you're thinking about that in relation to baiting and the area that a mouse forages over to find the food that it needs, when we spread bait, we spread it at one kilogram per hectare, and that equates to three grains per square metre. If we've got 40 kilos of background food, that's about 120 grains per square metre. And then once you start to get above that half a tonne per hectare, you're up over a thousand grains per square metre. And that's a lot of competition, so for the mouse to find those toxic grains in amongst all of those other grains, it becomes quite difficult.

**00:03:43:14 - 00:03:53:27**

**Shannon Beattie:** I believe that is why uniformity of spreading is really important, is so that we make sure that those mice are finding the grain that has toxin in it. Can you talk us through that?

00:03:53:29 - 00:04:26:09

**Steve Henry:** Yeah. So we're really adamant that it's really important to get that even distribution across the whole paddock because getting effective results from baiting effort is about the probability of a mouse discovering a lethal dose. And so it's about getting background food down to the lowest level possible, so that mice encounter those grains in amongst all of the other background food that's available to them, and certainly getting enough toxic grains quickly enough to get a lethal dose before they start to feel sick.

**00:04:26:11 - 00:04:33:12**

**Shannon Beattie:** Ben, this is where you come into the piece. Let's talk about ensuring that uniformity of spreading. What have you been working on?

**00:04:33:20 - 00:05:19:07**

**Ben White:** Yeah, Shannon, so we've been looking at a range of bait spreading options, including 12-volt small sort of ground-based spinners that might be attached to the back of a seeder bar, that might be attached to the back of a ute or a quad bike, whatever it may be, to deploy bait. We've looked at linkage spreaders as well. So they're commonly used for fertiliser, but we've heard that some growers are using them to spread mouse bait. And we've also looked at aerial application as well. And I guess in the context of what Steve was talking about, in terms of the importance of getting that bait spread uniformly, we've been looking at just how uniformly bait is spread out of those options. And of course, you know, there's plentiful options to pick from. So I think we've tested five 12-volt spreaders, a linkage spreader, and also an aircraft.

**00:05:19:13 - 00:05:24:20**

**Shannon Beattie:** Talk me through the testing that you've done. How did it work and what did you find?

00:05:24:22 - 00:06:48:03

**Ben White:** Well, it was an interesting process, I guess, Shannon. We had a look at what we had done previously with fertiliser spreaders, and that process utilises some 50 by 50 centimetre square trays. Now that's fine when you're putting out 60kg or 100kg of product per hectare. We're talking about putting out one here. So one kilogram per hectare, as Steve said, is two to three grains per square metre. Now to be able to catch that in a 50-centimetre tray, it's just you're not going to get it. So what we did was we looked at some options for increasing the catching area to a metre by a metre across the spread width of whatever spreader we were looking at, and what we need to do is figure out a way of capturing bait where it was landing without it then bouncing off. So normally with the trays, you'd use baffles to retain the bait, but that wasn't an option obviously. So we tried some hessian, and we used some high speed cameras to look at just what the bait was doing as it was coming out of the spreader hitting the hessian, and it was actually bouncing off. So we had to back out of that idea, and we ended up with artificial grass of a particular staple length of about 20 millimetres. And that worked really well with the bias facing towards the spreader, the bait would, simulated bait I should add, because the baits obviously pretty toxic, so we had to have a simulated bait coming out, it's landing in the artificial grass, and we're then able to come through and count the number of seeds or number of grains in each one metre square, and then do an analysis on that.

**00:06:48:05 - 00:07:02:00**

**Shannon Beattie:** You from there developed a little bit of a buyer's guide, shall we say, of what's the best spreaders to be using, what features people should be looking for. Can you talk us through what we can tell growers about picking a spreader for their mouse bait.

**00:07:02:03 - 00:08:50:10**

**Ben White:** So I think that if we could pick all the good features of each spreader and put them into one, we'd have the ideal spreader. But that's not uncommon with some of the work we do when we're looking at machinery. So ultimately, what you want is a machine that is are going to spread uniformly. That's what we're trying to achieve here and also at a consistent rate. So the one kilogram per hectare rate, you need to be able to calibrate for that and have the machine operate, spreading the bait uniformly across the given width at the rate of one kilogram per hectare. Then you get into some of the more, I suppose, user friendly details of each spreader, and that might be loading and outloading bait in and out of the spreader, like some of them actually are pretty easy. They're a hinged unit, so you can tip the whole thing forward and empty the hopper. Others have no way of doing that, or lips that make that more difficult. Calibration is a really important process. And I should add at this stage that of those 12-volt spinner spreader types, there are two main metering options. One is an orifice gravity fed metering arrangement where you basically open a shutter, and the bait falls through a hole. The other one is a meter rollered unit. So you've got those choices when you are looking at buying a 12-volt spinner unit that might be attached to like a seeding bar. And then of course, with a meter roller like that, you've got ultimate control of the rate delivery. So the one kg per hectare is easy to calibrate, it's easy to deliver, and you know that in a lot of cases that doesn't need agitation. And I mentioned agitation because some of the spreaders have really aggressive agitation systems above the metering unit, and that can really cause some problems with stripping bait off the seed carrier. And then what we end up with is lethal doses out the back of the machine, we end up with bridging inside the actual hopper itself and/or above the spinner. And that means that we don't know when it's running, and we might not be actually putting bait out at all, and all becomes pretty problematic.

**00:08:50:12 - 00:08:55:17**

**Shannon Beattie:** What did we learn about aerial spreading? Any tips that we can give to our growers for that one?

**00:08:55:22 - 00:09:57:17**

**Ben White:** So aerial spreading was interesting. As part of this project, we also spoke to 15 growers across the country who were applying bait. And as part of that, we spoke to a couple of aerial operators who were putting bait out with fixed wing aircraft. The meter rate is like a meter rolling unit, which goes on the bottom of the aircraft that meters the bait out accurately and then distributes it. We need that to actually meter the bait uniformly and get it out at the required one kilogram per hectare. When it comes to distribution uniformity, most of the aerial operators typically operate on a 50m run line basis, so 50m between each run line. And unfortunately, what we're finding is that the bait is only spreading to 40m. So there's potentially a 10m band that might not have any bait spread in it. So one of the things we might want to do is have a look at closing up the run lines so that we're spreading at 40m as opposed to 50. And what that does is brings our distribution uniformity back to a more acceptable level and means that we're getting bait out at the right rate, in the right place, and we don't have any gaps, I suppose, in the distribution pattern.

**00:09:57:19 - 00:10:05:21**

**Shannon Beattie:** Let's talk about the 15 case studies that you did as part of this, you mentioned that you spoke to 15 growers. What was the importance of doing those case studies?

**00:10:05:23 - 00:11:11:24**

**Ben White:** The case studies came before the testing, and they were really important because I think they gave us a gauge as to what was happening in the paddock. They gave us an idea as to what growers were doing, I guess the practices that were being employed to distribute bait, whether that was, you know, small seed boxes on seeding rigs, whether that was a 12-volt spinner spreader on the back of a bar, whether that was in some cases, we had growers using a self-propelled sprayer with two 12-volt spreader units mounted to the knuckle on the boom arm. So there's some pretty innovative thinking out there. I think we even had one grower using a two-wheel motorbike to put bait out, where they just couldn't get on the paddock with anything else. So as Steve said, you know, mouse numbers can be pretty devastating pretty quickly. And so growers will try and get any way or any method they can get to put bait down. And when aerial applications are completely booked out, you've got to look at alternatives. So high clearance options like self-propelled sprayers become an option that gets adapted, and we've seen a few examples like that. So the case studies really drew out some of those practices and probably helped us formulate the test protocol and probably crystallise some of our thinking around what we needed to actually measure.

**00:11:11:26 - 00:11:21:02**

**Shannon Beattie:** Getting information from growers is an important part of this project. You've been doing something similar, Steve, on some mouse tours that you've been doing around the country. Can you tell us about those?

**00:11:21:04 - 00:11:57:25**

**Steve Henry:** I think one of the really important parts of the work that we do is communicating the science and talking to growers across the country to say, well, these are the things that were found, and these are the ways we can be more strategic about spreading the bait. But for me, one of the real advantages of that sort of communication effort is the two-way flow of ideas. And so it's really important as scientists, that we sit back and listen to growers, hear the problems that they're facing, hear some of the things that they're saying to us, and that helps us to tailor our research to ask questions that will make a difference for growers in the long run.

**00:11:58:00 - 00:12:14:03**

**Shannon Beattie:** I want to very quickly ask about safety. We are talking about some pretty intense chemicals, shall we say. Steve, what do we know about how growers should be storing and using these chemicals to make sure that they are doing it as safely as possible?

**00:12:14:05 - 00:12:43:14**

**Steve Henry:** I think it's really important because zinc phosphide is the only tool that farmers have available to them to control mice, it's really important that they stick to the label directions. And there's some pretty clear indication about storing zinc phosphide in airtight containers, in conditions that are not too hot, out of direct light and in cool, dark, stable conditions. So really important to follow those instructions and make sure the product's stored in the best conditions possible.

**00:12:43:16 - 00:12:48:24**

**Shannon Beattie:** And then, Ben, there's some PPE requirements that we should be keeping in mind as well. Can you take us through those?

**00:12:48:26 - 00:13:18:21**

**Ben White:** Yeah. So pretty straightforward, elbow length PVC gloves and a full-face respirator that has an appropriate set of cartridges on it that will provide the operator with fresh air filtering out any of the phosphine gas that might be coming off that bait. So really important to do those things. And of course, at the end of the day, wash your hands, wash your gloves, wash your respirator and decontaminate it so it's ready to go for next time. And I should mention that if you are using a full face respirator with those cartridges, we like to take them off and store them in a sealed container so that they last for as long as possible.

**00:13:18:23 - 00:13:21:29**

**Shannon Beattie:** Steve, Ben, thank you both so much for coming on the podcast today.

**00:13:22:01 - 00:13:22:20**

**Steve Henry:** It's been a pleasure.

**00:13:22:22 - 00:13:23:13**

**Ben White:** Great to chat.

**00:13:29:18 - 00:13:53:00**

**Shannon Beattie:** That was agricultural research engineer Ben White and CSIRO mouse expert Steve Henry speaking about techniques, machinery and safety for effective mouse baiting. More information on this topic can be found in the description box of this podcast or online at grdc.com.au. I'm Shannon Beattie and this has been a GRDC podcast. Thanks for listening.