

RURAL SAFETY &
HEALTH ALLIANCE



Mobile plant research pack

May 2024





Mobile Plant Research Pack

A short report of the mobile plant research and findings	3
The mixed-method research approach	5
A snapshot of practices and perceptions around mobile plant safety.....	6
Mobile plant on sheep-producing farms (infographic)	15
Mobile plant on cotton-growing farms (infographic).....	16
Mobile plant on dairy farms (infographic)	17
Mobile plant on grain-growing farms (infographic)	18
A snapshot of the safety system scan tool	19
Case study using the safety system scan with mobile augers	21
Risks of mobile augers and practices on farm (infographic)	23

This pack is a compilation of various RSHA04 project outputs describing current practices and perceptions on farm around safe use of mobile plant on farm, what people in the industry see as barriers and benefits, and a way of scanning the whole safety system for opportunities to boost safe use.

The findings are from original research conducted by Work Science in 2023 and initial application of the concepts by RSHA in early 2024.

RSHA Working Group members who provided project oversight were: APL (Angela Bradburn), AWI (Ian Evans), CRDC (Rachel Holloway), GRDC (Mark Callow) and AgriFutures (Georgina Toose).

For more information, please contact the RSHA Secretariat, pauline@harrissparkgroup.com.au.

Mobile Plant Research Pack, Rural Safety & Health Alliance, May 2024.



Australian Wool
Innovation Limited



The Rural Safety and Health Alliance is a cross-sectoral collaboration comprising eight Rural Research and Development Corporations: AgriFutures Australia, Australian Eggs, Australian Pork Limited, Australian Wool Innovation, Cotton Research and Development Corporation, Dairy Australia, Grains Research and Development Corporation, and Meat and Livestock Australia.

Reducing fatalities and serious injuries in agriculture associated with mobile plant

Rural Safety & Health Alliance Research Short Report - May 2024

Aim

This research aims to foster safe use of mobile plant on farms by:

- Better understanding how to initiate and sustain behaviour change on farm.
- Developing a repeatable, scaleable method for assessing mobile plant safety on farm.
- Identifying practical ways to underpin safe use of specific plant from whole safety system assessment.

Method

Mobile plant encompasses a wide range of equipment and machinery that has some form of self-propulsion, is under the direct control of an operator and is typically not used on a public road.

Tractors and quad bikes are much studied mobile plant associated with about 1 in 3 fatalities on farm. The scope of this research was the *other* mobile plant types which can also cause traumatic injury and are associated with 1 in 10 farm fatalities.

The research was conducted by Work Science in 2023 using a mixed method approach.

A scoping literature review and semi-structured interviews with 49 people in the agricultural sector provided insight into potential safe (and unsafe) behaviours and perceived barriers and benefits to taking action.

A survey of 229 growers was used to describe current practices and perceptions around 10 different types of mobile plant: what was used on the farm, how often, and what they saw as riskiest.

Work Science chose two conceptual models: the Health Belief Model for describing factors that influence the behaviour of individuals; and a Rasmussen-inspired model for assessing how the whole safety system can affect safe use on farm.

Results and discussion

The grower survey covered diverse farming enterprises ranging from 60 to 1,600,000 hectares, many (over 80%) involving livestock, and two-thirds producing more than one commodity.

Most of the survey farms used multiple types of mobile plant (six of the 10 plant types on average).

What growers saw as the riskiest plant to operate differed between farms.

Each of the 10 mobile plant types were nominated by at least one farm. Post-hole diggers/drivers and augers were chosen most often by farms that had these items (35% and 33% respectively).

Most growers (90%) believed others on farm expect a high standard of safety when risky plant is used.

Work practices support safe operation of the riskiest equipment. Many check equipment before use (90%), restrict who can use it (66%) and give safety briefings before starting high risk jobs (73%).

The survey reinforces that mobile plant is an essential part of farming, used in every business. Yet the term covers very different equipment types with different applications and safety risks. Industry-wide safer use of mobile plant is likely to require a specific focus on each type.



RURAL SAFETY &
HEALTH ALLIANCE

Author Rural Safety Health Alliance
Research by Work Science
Project RSHA04



The interviews and survey reinforced that Australian farmers are very aware of the potential for injury associated with mobile plant. People in the sector see the big risks to safety as time pressures, fatigue, distraction, lack of operator competency, machinery neglect and equipment modification.

This is a significant shift in attitudes prevailing in the early 2000s where incidents were often regarded as “just part of being a farmer”.

Concern about serious repercussions of injury for the farming family or farm business, a feeling of being vulnerable and that ‘it could happen on my farm’, is one of the pre-conditions for taking preventative action.

Under the Health Belief Model, perceived benefits and barriers to acting are strong predictors for adopting preventative practices - and the benefits need to outweigh the barriers for individuals to act.

While many benefits of adopting safe practices were mentioned at interview (such as avoiding harm to family or co-workers, reducing the costs and disruption of an incident, and the risk of regulatory action), the perceived barriers (such as time pressures, workload, the expense of doing proactive maintenance, availability of experienced staff, training resources etc) are substantial.

RSHA piloted use of the Rasmussen-inspired model recommended by Work Science to systematically examine risks across the safety system for augers. This approach readily identified areas that would benefit from better alignment and advocacy within the agricultural sector.

Summary

This report shows that safe use of mobile plant is a concern for those in the sector and on farm. The findings suggest that reducing perceived barriers, building self-efficacy and reinforcing the benefits of adopting safe practices will encourage behaviour change. The auger case study shows the potential for on farm practices to be made universally safer by acting on significant issues identified in non-farm aspects of the safety system.



Recommendations

The following recommendations are in accordance with the RSHA objective of using evidence-based information to make targeted collaborative RD&E investment decisions, where investment can have both human and economic impact.

Recommendation 1: Focus specifically on the different mobile plant types when aiming for industry-wide safer use of mobile plant.

Recommendation 2: Work with the benefits, barriers and cues for action when designing safety campaigns for specific mobile plant types.

Recommendation 3: Consider using the Rasmussen-inspired model to fast-track factors in the whole safety system that may be influencing safety on farm (for a mobile plant and potentially other aspects of WHS).

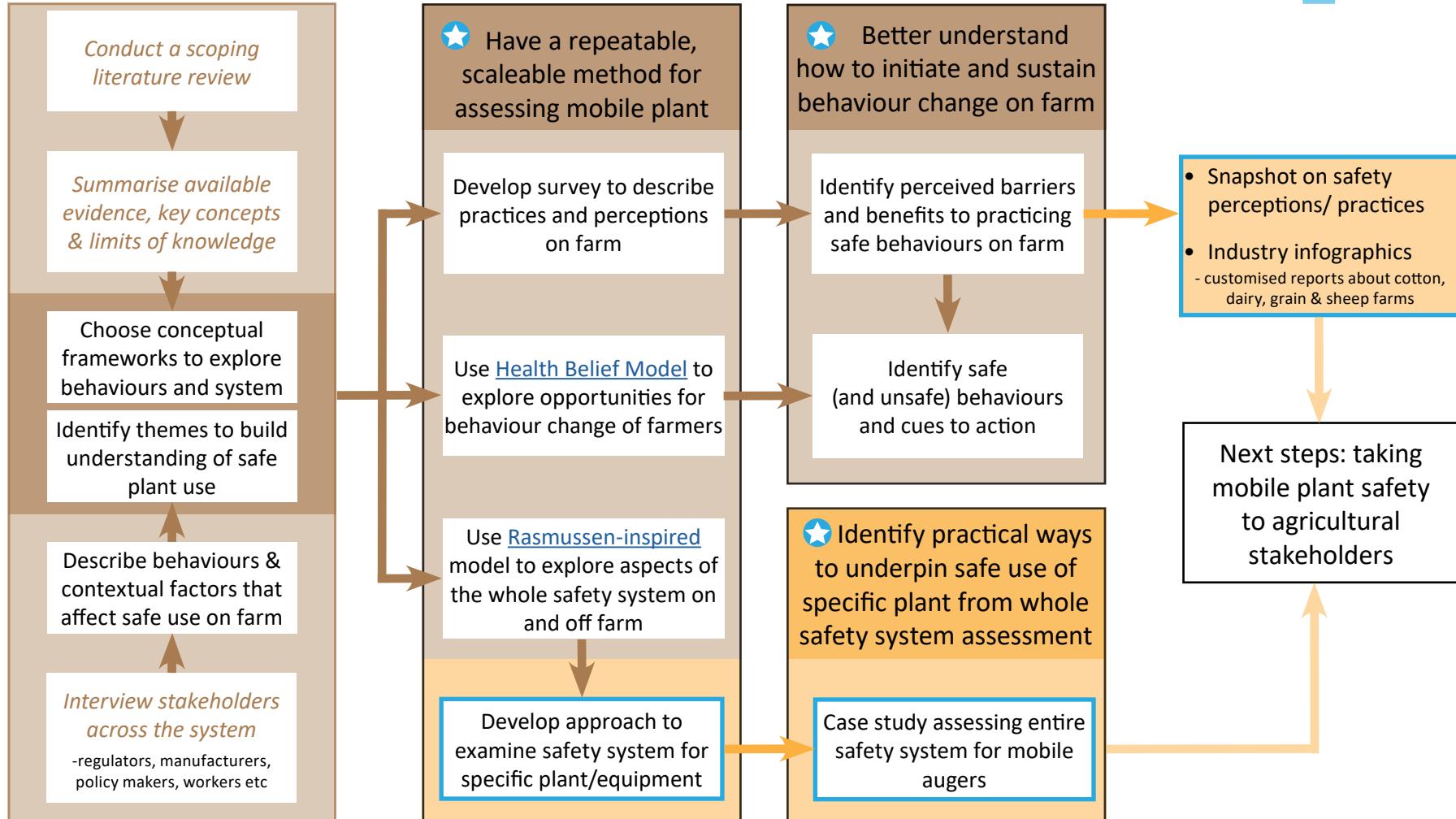
The Rural Safety and Health Alliance is a cross-sectoral collaboration comprising eight Rural Research and Development Corporations: AgriFutures Australia, Australian Eggs, Australian Pork Limited, Australian Wool Innovation, Cotton Research and Development Corporation, Dairy Australia, Grains Research and Development Corporation, and Meat and Livestock Australia.



Research approach

RSHA investment into how to influence safe use of mobile plant on farm

- Work Science PRO-016219
- RSHA 'closing the loop'
- Research objectives
- Key research findings





Mobile plant safety on farm: practices and perceptions



Snapshot report, May 2024

- Mobile plant is an essential part of farming. Farms typically used 6 of the 10 plant types asked about in the 2023 survey.
- Mobile plant is risky. One in 10 fatalities on Australian farms have been associated with equipment other than tractors and quad bikes.
- What growers see as the riskiest plant on their farm differs between farms. Post-hole diggers/drivers were nominated as the riskiest on 35% of farms and augers on 33% of farms.
- Most growers (90%) believe others on farm expect a high standard of safety when risky plant is used.
- Work practices support safe operation of the riskiest equipment. Many check equipment before use (90%), restrict who can use it (66%) and give safety briefings before starting high risk jobs (73%).
- People see the big risks to safety as time pressures, fatigue, distraction, lack of operator competency, machinery neglect and machinery modification.

Industry-wide safer use of mobile plant is likely to require a specific focus on each type. The most effective changes will occur at different parts of the whole safety system for that particular equipment. The case study of augers provides an example of this.

Australian agriculture has the highest work-related fatality rate of any industry ([Safe Work Australia](#)) and mobile plant is the lead agent for fatalities on farm [134].

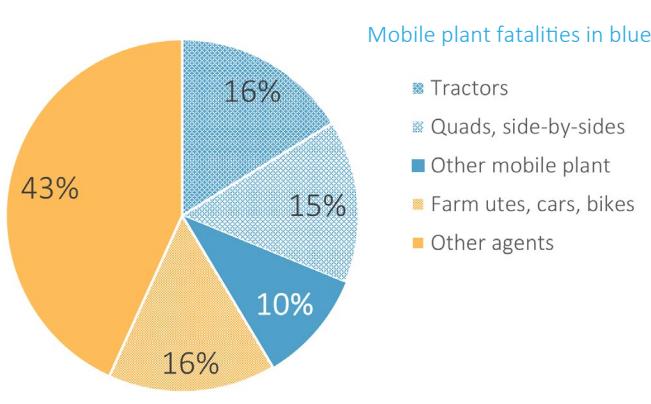
Mobile plant refers to a diverse range of equipment and machinery – including tractors, quad bikes, post hole diggers and augers – that have some form of self-propulsion, are under the direct control of an operator and are typically not used on a public road [[National Model WHS Act and Regulations 2021](#)].

While tractors and quad bikes are the predominate agents, one in every 10 fatalities on farm is associated with other mobile plant types (Figure 1).

People's attitude to safety shapes their behaviour [13,180, 335]. Having safety front of mind is important for all farm machinery as even some less common injuries can be extremely traumatic when they happen (with [augers](#), [post hole diggers](#) [281], hay baling equipment [293] as examples).

Figure 1. Farm fatality data over 20 years

AgHealth Australia data 2001-2020 [134]



This snapshot describes practices and perceptions around mobile plant safety on Australian farms in 2023. The information comes from research conducted by Work Science, including 49 interviews and a survey of 229 growers.

Work Science used the Health Belief Model to help assimilate interviewees' perspectives on why people on farm do, or don't, adopt safe practices when using mobile plant.

Practices and perceptions

A better understanding of what farmers think and do around mobile plant safety will help the agricultural industries foster safer behaviours.

Growers were asked about 10 different types of mobile plant (listed in Figure 2): what was used on the farm, how often, and what they saw as the riskiest.

Each of the 10 mobile plant types were nominated by at least one of the farms with the equipment as the riskiest to operate. The most commonly selected equipment were post-hole diggers/drivers and augers.

A diverse range of farm businesses contributed to this description. The farms ranged from 60 to 1,600,000 hectares in size, over 80% had livestock, and about two-thirds produced a mix of commodities (Figure 3). Most were family farms (95%) and eight were corporate farms.

The median workforce at peak was 5 people (range 1 to 350), and more than half of the farms (57%) had used one or more contractors in the previous year.

Farms typically used six types of mobile plant (Figure 4), with augers, spray booms, planters, slashers and post-hole diggers/drivers used on four in every five farms.

Questions were then asked about practices associated with use of the riskiest equipment.

Who used the plant on farm was often restricted (66% of farms) and it was typically checked before use (93% of farms) (Figure 5). (Figure 6, pages 4-5, show this for each mobile plant type.)

Figure 2. Plant that is seen as the riskiest to operate

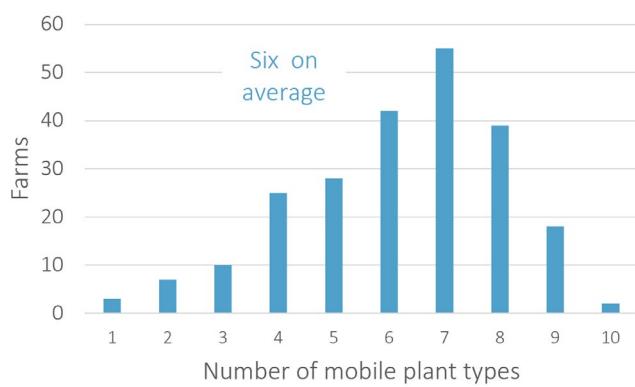
Mobile plant type	Proportion of farms with plant that see it as riskiest
Post-hole diggeredriver	44%
Auger	39%
Telehandler	22%
Harvester	13%
Hay wrapper / rake / spike	10%
Slasher	8%
Forklift	7%
Spray boom	2%
Planter	<1%

Note Cotton gins not reported as used on less than 10% farms.

Figure 3. Characteristics of the 229 survey farms

Farm focus	Farms in survey	Size (median)	Workers at peak (median)
Beef	36	2,200 ha	3 people
Dairy	26	700 ha	7 people
Sheep	12	805 ha	5 people
Beef-Sheep	24	950 ha	4 people
Cotton-Grain	36	2,000 ha	5 people
Grain-Sheep	29	1,700 ha	5 people
Livestock-Crops	63	2,000 ha	5 people
Other	3	1,800 ha	4 people
All	229	1,600 ha	5 people

Figure 4. Multiple mobile plant used on farms





Growers generally felt that others on the farm expect the highest safety standard when that particular piece of mobile plant is used (90% of farms), and that workers regularly tell each other about changes in conditions that could affect how it is used (73% of farms).

Notably 8% of growers had themselves been in a situation where they felt their level of knowledge or skill had been inadequate. This was associated with seven different plant types, including post-hole diggers/drivers (for 7 growers) and augers (for 4 growers).

Fifteen percent of growers had mobile plant, which they identified as the most risky, that had been modified for use on their property. Again augers were a feature having been changed on 14 farms.

While it is not possible to say whether modifications were to improve safety or utility, it is of note that a person who modifies plant has the same obligation as a designer and a manufacturer under the WHS Regulations.

The Work Science survey suggests an upward trend in safe practices on farm when it is compared to a 2011 survey of 628 farms (Figure 7). While indicators such as regular hazard inspections, safety briefings and safety management plans are more prevalent, it is important to note that none have been universally adopted.

Figure 5. Practices associated with the riskiest mobile plant

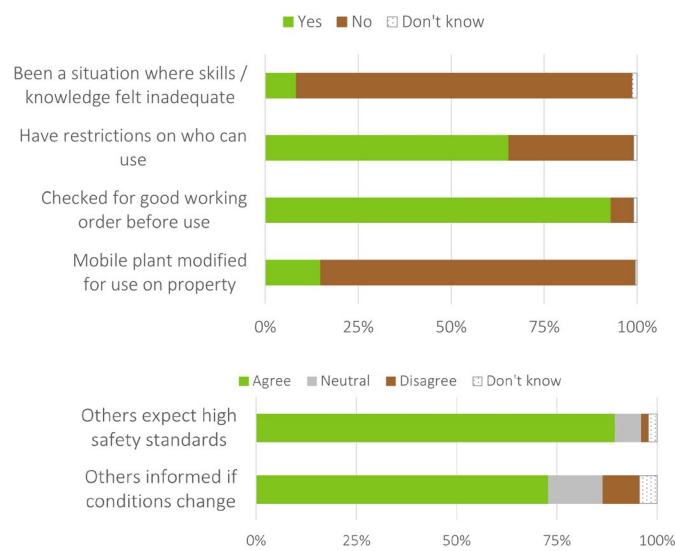


Figure 7. Increase in indicators of safe practice

2011 survey of 628 farmers [329]

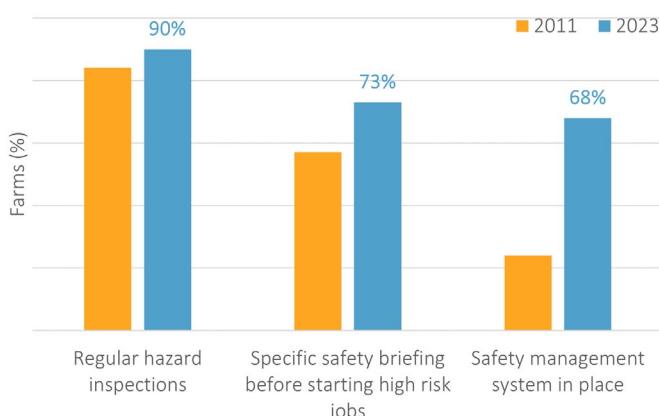
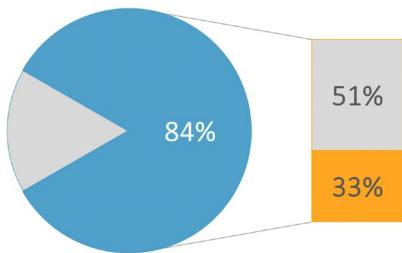


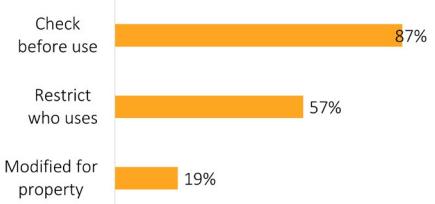
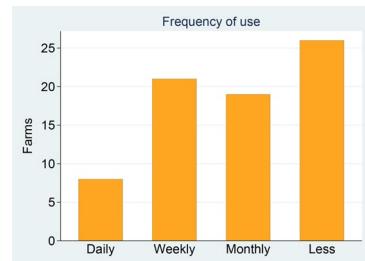
Figure 6. On farm practices and perceptions for each mobile plant

● Proportion of farms with plant (229) ■ Number of farms that see it as the riskiest plant to operate

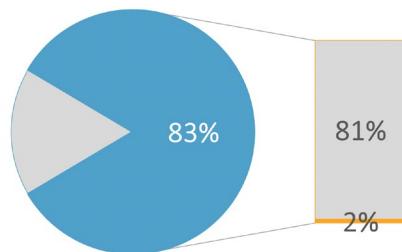
Auger



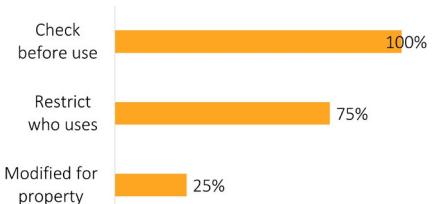
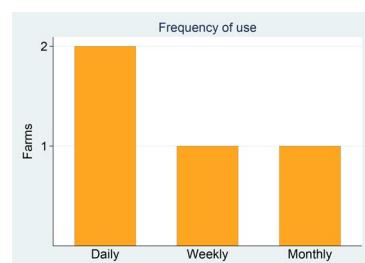
On the 75 farms that see as riskiest:



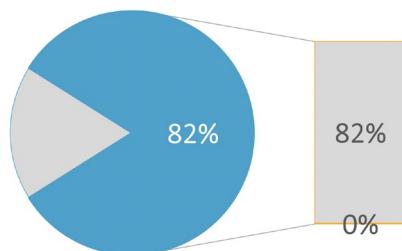
Spray boom



On the 4 farms that see as riskiest:

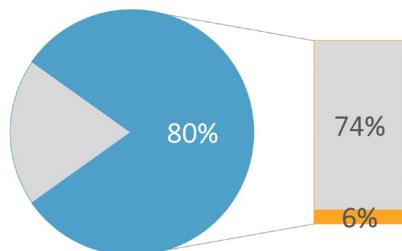


Planter

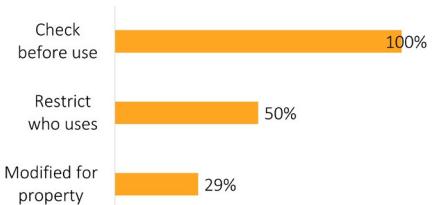
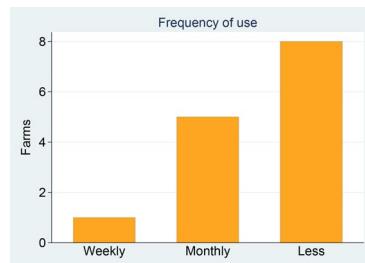


One farm nominated a planter as their riskiest equipment, and it was used less than monthly.

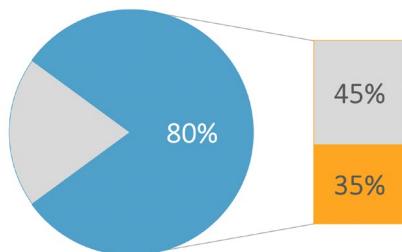
Slasher



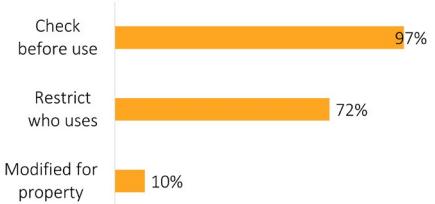
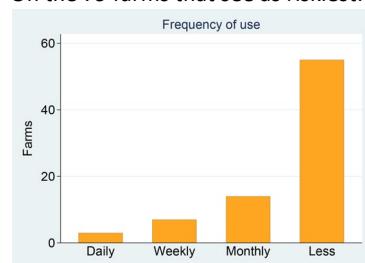
On the 14 farms that see as riskiest:



Post-hole digger / driver

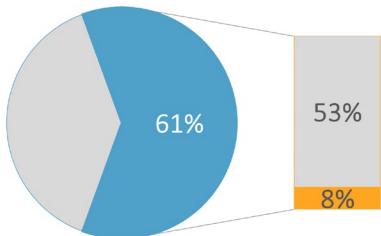


On the 79 farms that see as riskiest:

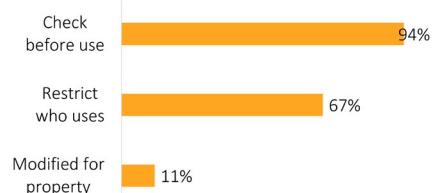
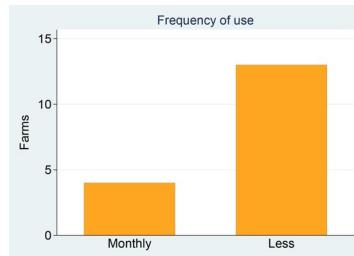




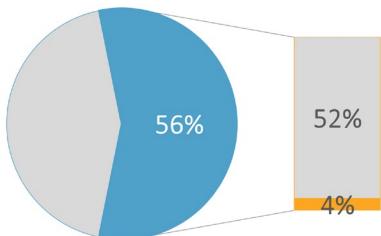
Harvester



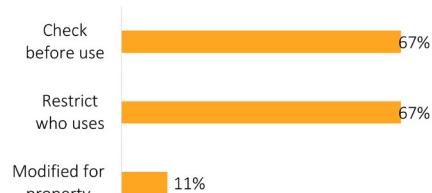
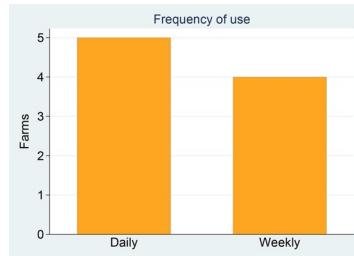
On the 18 farms that see as riskiest:



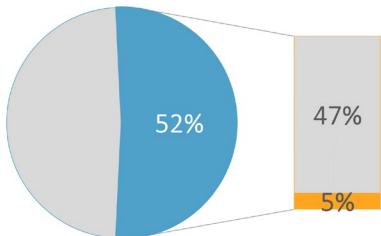
Forklift



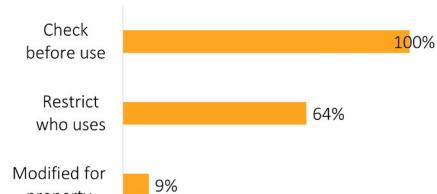
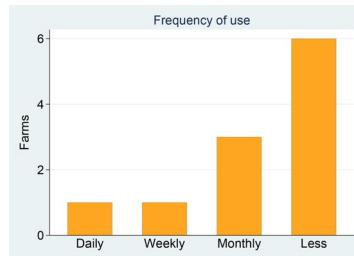
On the 9 farms that see as riskiest:



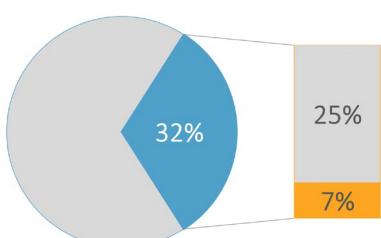
Hay wrapper / rake / spike



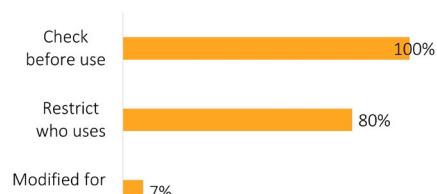
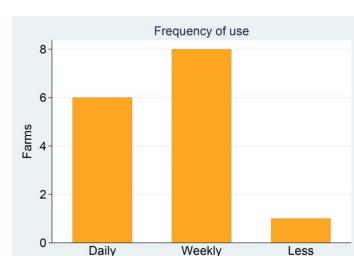
On the 11 farms that see as riskiest:



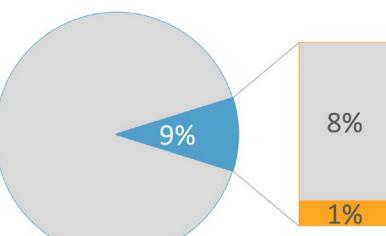
Telehandler



On the 15 farms that see as riskiest:



Cotton gins



Results not presented
as cotton gins used on less than
10% of survey farms.

Behaviour change opportunities

Work Science interviewed 49 people from agricultural sector to explore attitudes and beliefs around mobile plant safety. More than two-thirds of interviewees were from farms (Figure 10) and 80% of them were in the grains, beef or cotton industries.

Interview responses were framed in terms of the Health Belief Model.

The Health Belief Model examines why people do or don't adopt preventative practices – and over the last 60 years has been applied to issues from breast screening to covid vaccination. The model is used to design messaging that aligns with the beliefs and attitudes of the target audience [320].

In this model, whether people take preventative action depends on the severity of the consequences, how susceptible they see themselves, their capacity to do something, and the benefits and barriers of acting (Figure 11).

The perceived benefits and barriers are typically strong predictors of behaviour change [343].

Figure 10. Two-thirds of the 49 interviewees were from farms

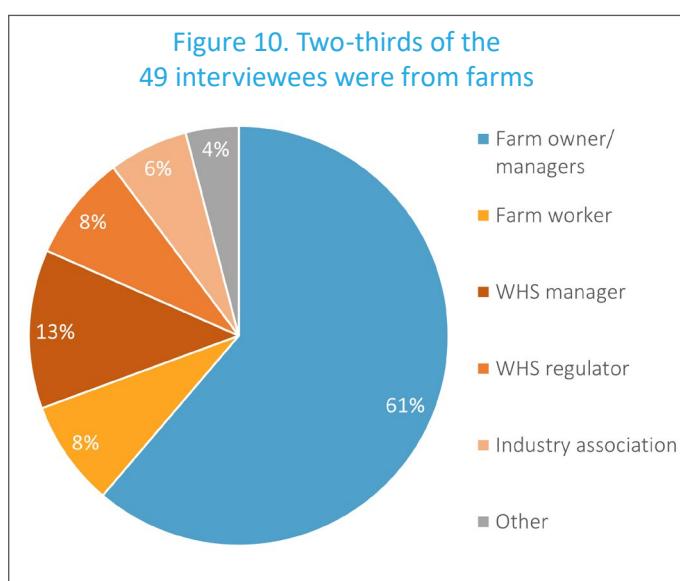
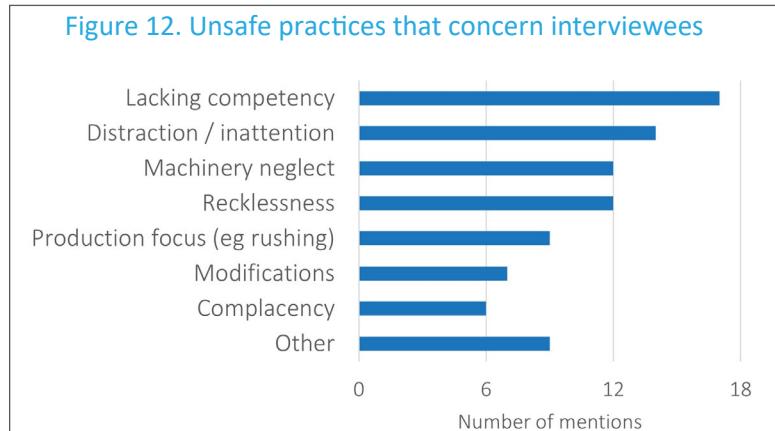


Figure 12. Unsafe practices that concern interviewees



A 2006 study of Australian farmers' attitudes to health and safety [314] found that:

- A prevailing attitude was '*it won't happen to me*' - where farmers did not feel their family or lifestyle was at risk of serious repercussions.
- Farmers believed that the barriers (largely cost and time) outweighed the benefits of changing behaviour – and many farmers had difficulty identifying particular benefits of making a change.

In contrast, the 2023 Work Science study shows that potential for injury associated with mobile plant use does concern many in the agricultural industry - with repeated mentions of several types of unsafe practices by interviewees (Figure 12).

Time pressures and fatigue were also felt to be important contributing factors to unsafe operation by interviewees (43% and 26% respectively).

A feeling of being vulnerable / threatened ('it could happen to me') is one of the pre-conditions for taking action under the Health Belief Model.

However the types of barriers mentioned by interviewees in 2023 may still outweigh the perceived benefits of making change (Figure 13).



Figure 11. Areas explored by the Health Belief Model

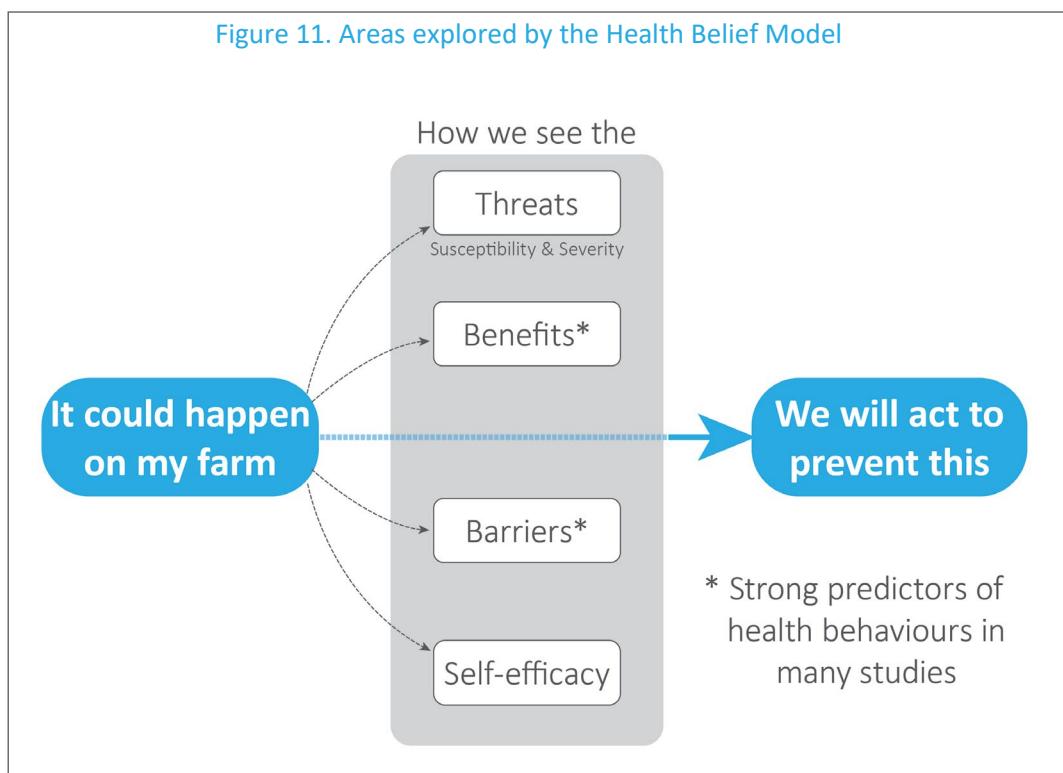
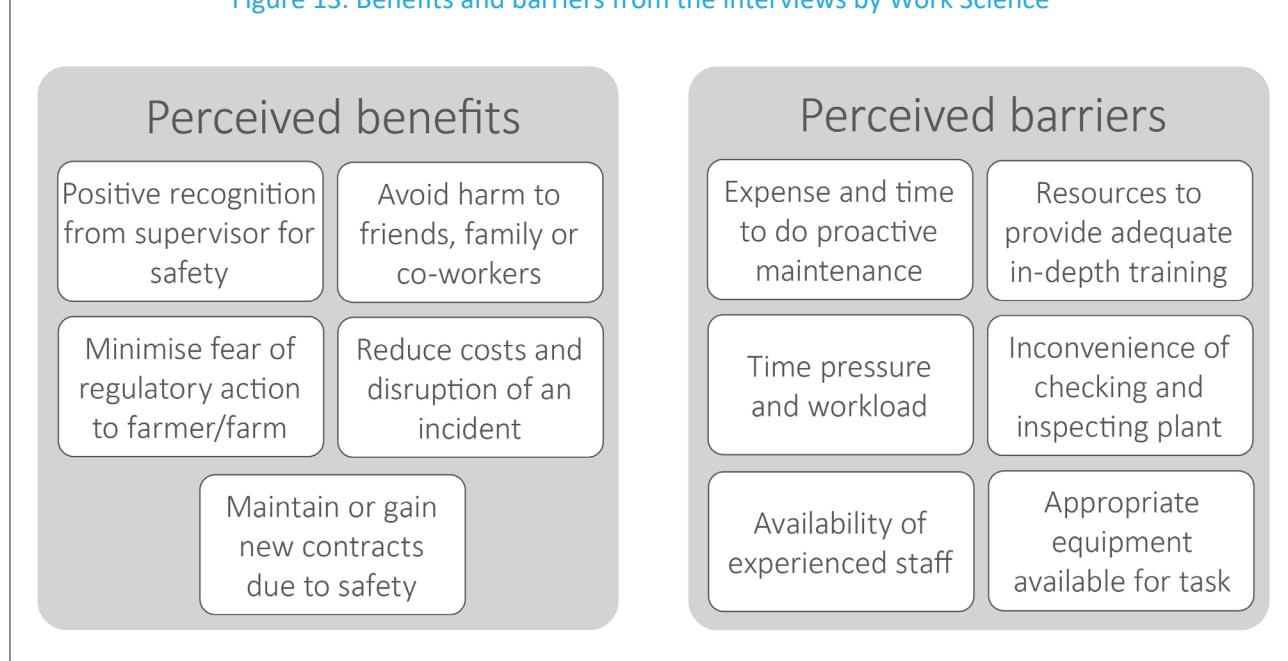


Figure 13. Benefits and barriers from the interviews by Work Science



System supporting safe use

Workplaces are legally obliged to manage hazards so that people are not harmed. The likelihood and severity of injury are influenced by many factors, some being controlled on farm (through machinery checks, purchase decisions, safety briefings etc) and some externally (such as regulation, access to training, and integration of safety features in equipment design).

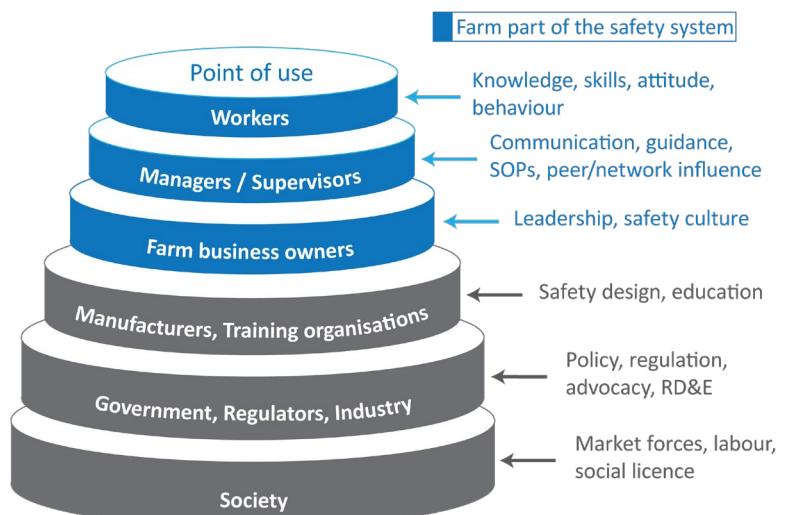
Work Science recommended a Rasmussen-inspired model as a way of systematically considering risk controls across the entire safety system for specific mobile plant (Figure 14). This framing helps identify points of consideration.

For example the difference in safety management systems for family and corporate farms becomes immediately obvious. On corporate farms, directors set the safety standards implemented by managers and formalised in standard operating procedures. On family farms - such as the 218 farms in the grower survey - these responsibilities often sit with one individual, in which case changes in attitude and behaviour will be highly dependent on interaction with significant others (such as peer groups and family) or a near miss event [180, 328] (Figure 15).

RSHA is using the Rasmussen model to map risk controls across the safety system for augers - given that they are on four in every 5 farms, typically used multiple times a month and are regarded by many growers as the riskiest equipment to operate.

This appraisal will determine its effectiveness as a tool for industry to identify gaps and strengthen safety messaging for farm.

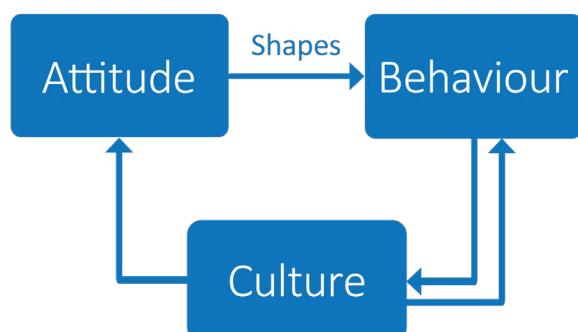
Figure 14. Safety at the time of mobile plant use is a function of the whole system



"Farm owners and insurance companies are the most influential in driving farm safety. We need to remove time pressures, earn trust of owners by demonstrating safe operation of machinery, share the lessons that we learn..."
- from 2023 interviews

Figure 15. Attitude shapes an individual's behaviour

Adapted from [180]





References

Please note the numbers are not sequential as the references come from a larger RSHA library

- [13] Franklin C et al, Exploring the barriers and facilitators to adoption of improved work practices in the primary industries, RIRDC Publication 15/068, 2015.
- [134] Lower T et al, Farm-related injury deaths in Australia (2001–20), Aust J Rural Health, 2022. <https://orcid.org/0000-0003-2243-6764>
- [281] Miller J et al, Farm machinery injury: injuries associated with posthole diggers, Australian Centre for Agriculture Health and Safety, RIRDC Publication 06/036, September 2006.
- [293] Charlwood C, Byard RW, Potential dangers of hay bailing, Journal of Forensic and Legal Medicine, 21:56-58, 2014.
- [314] O'BrienRich Research Group, Beyond common sense, a report on the barriers to adoption of safety in the agriculture industry, Australian Safety and Compensation Council, 2006.
- [320] Jones CL et al, The Health Belief Model as an explanatory framework in communication research: exploring parallel, serial and moderated mediation, Health Communication 30(6):566-576, 2015.
- [328] McBain-Rigg KE et al, Influencing safety in Australian agriculture and fisheries, Journal of Agromedicine, 22(4):347-357, 2017.
- [329] Lower T et al, Agricultural health and safety performance in Australia, Journal of Agromedicine, 16:292-298, 2011.
- [335] Bluff L, Something to think about - motivations, attitudes and perceptions and skills in Work Health and Safety, Report for Safe Work Australia, August, 2011.
- [343] Carpenter C, A meta-analysis of the effectiveness of Health Belief Model Variables in predicting behavior, Health Communication, 25(8):661-669, 2010.



Australian Wool Innovation Limited



A RSHA snapshot report

The RSHA enables cross-sector investment by rural Research and Development Corporations to improve safety on Australian farms. This research was commissioned by RSHA and conducted by Work Science (AgriFutures Australia Project PRO-016219).

Rural Safety Health Alliance, May 2024

Mobile plant safety

Practices and perceptions on sheep farms



RURAL SAFETY &
HEALTH ALLIANCE

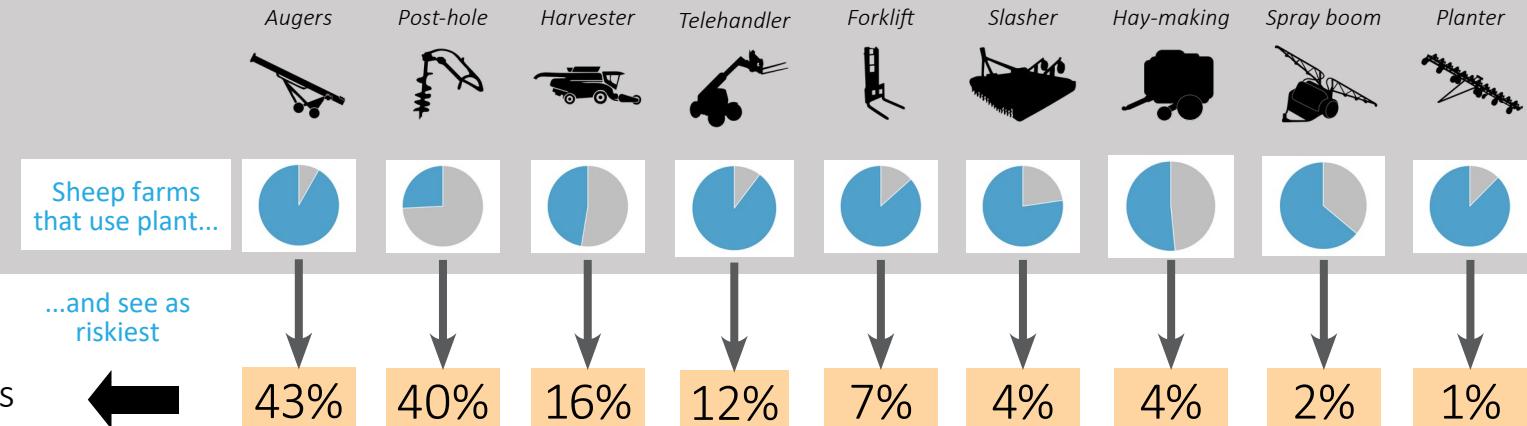
awi Australian Wool
Innovation Limited

Mobile plant is risky

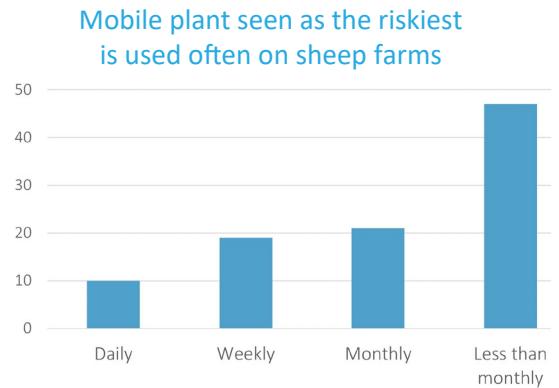
One in every 10 fatalities on farm in the last 20 years has been associated with mobile plant other than tractors and quad bikes

- AgHealth Australia, 2022

... and an essential part of farming

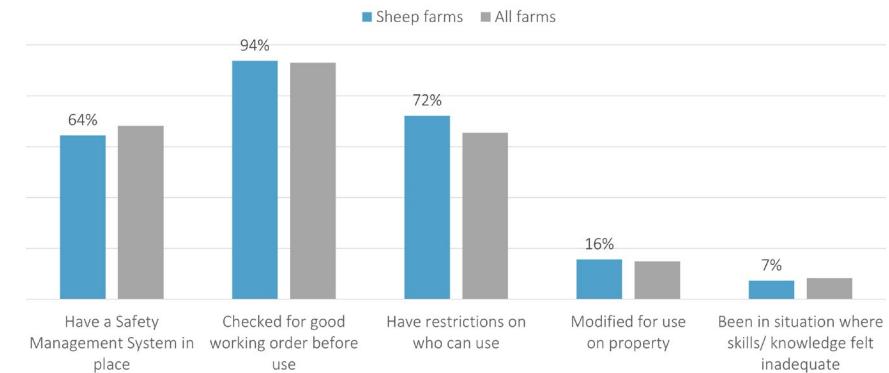


The plant producers see as riskiest differs between farms



86% of producers said others on farm expect the highest safety standard when risky equipment is used

Many farms have work practices that support safe operation but not all farms and for not all risks



A Work Science survey of 229 farms: 97 were sheep producers with a typical farm size of 1,400 ha, worked by one family member, five workers at peak and use of two contractors.

Mobile plant safety

Practices and perceptions on cotton-growing farms



RURAL SAFETY &
HEALTH ALLIANCE



Mobile plant is risky

One in every 10 fatalities on farm in the last 20 years has been associated with mobile plant other than tractors and quad bikes

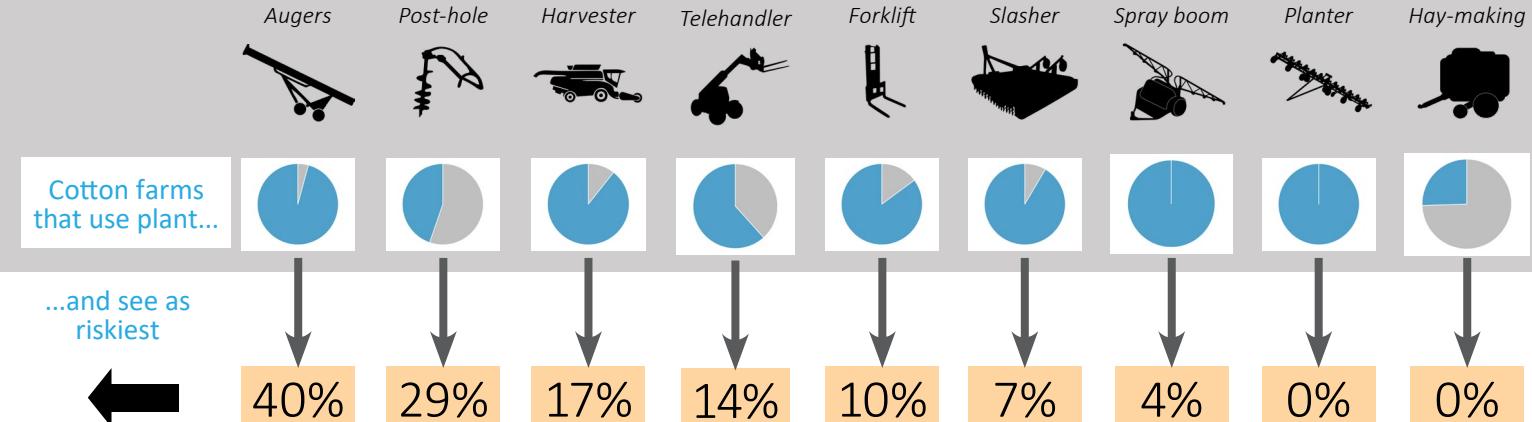
- AgHealth Australia, 2022

The plant growers see as riskiest differs between farms

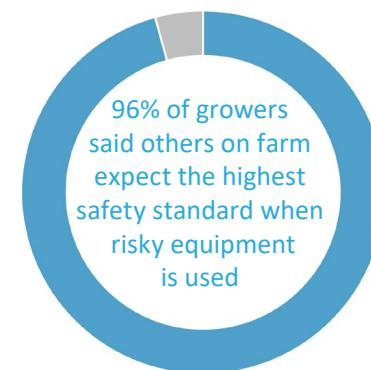
Mobile plant seen as the riskiest is used often on cotton-growing farms



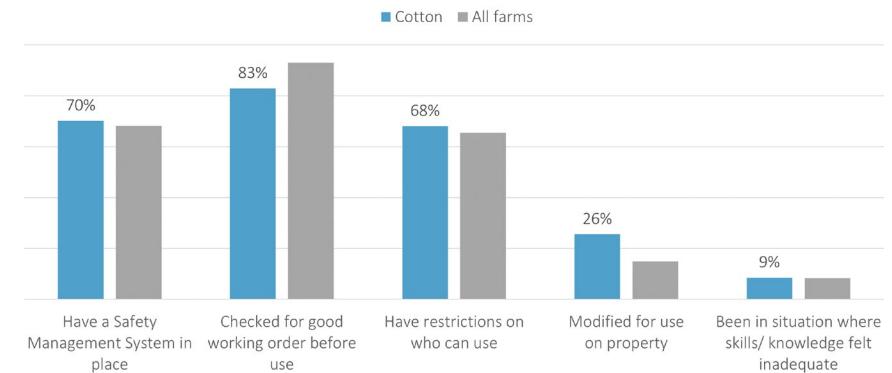
... and an essential part of farming



Cotton-growing farms use 7 of the 10 plant types surveyed on average



Many farms have work practices that support safe operation but not all farms and for not all risks



A Work Science survey of 229 farms: 47 were cotton growers with a typical farm size of 2,000 ha, worked by one family member, six workers at peak and use of one contractor.

Mobile plant safety

Practices and perceptions on dairy farms

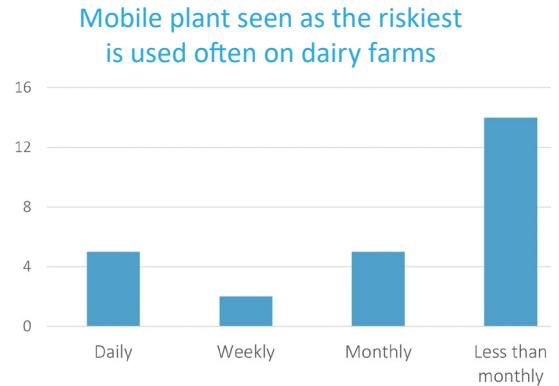


Mobile plant is risky

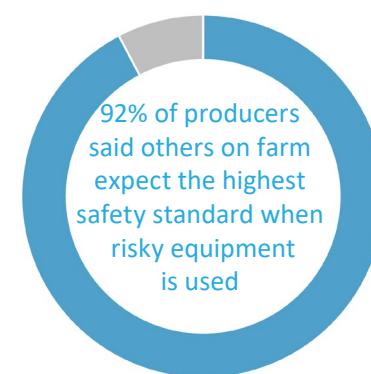
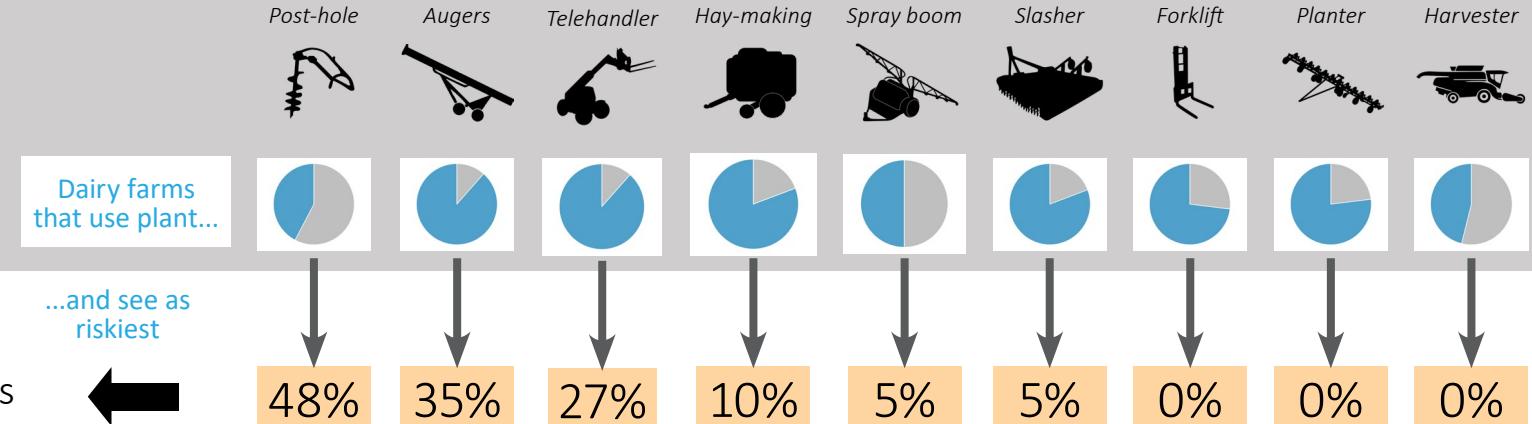
One in every 10 fatalities on farm in the last 20 years has been associated with mobile plant other than tractors and quad bikes

- AgHealth Australia, 2022

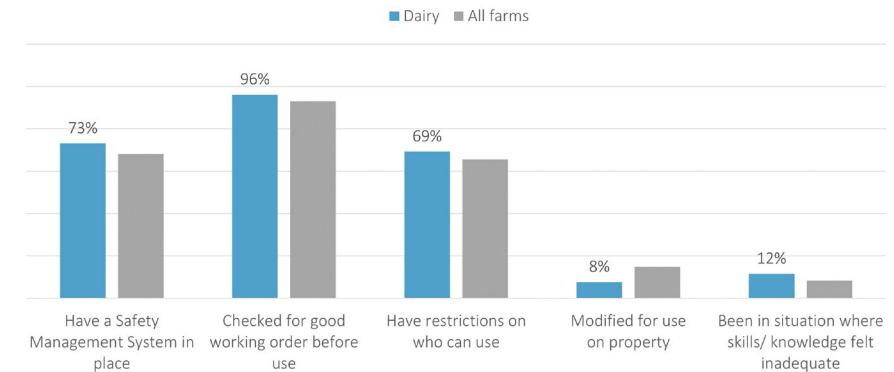
The plant producers see as riskiest differs between farms



... and an essential part of farming



Many farms have work practices that support safe operation but not all farms and for not all risks



A Work Science survey of 229 farms: 26 were dairy farmers with a typical farm size of 700 ha, worked by two family members, six workers at peak and use of no contractors.

Mobile plant safety

Practices and perceptions on grain-growing farms



Mobile plant is risky

One in every 10 fatalities on farm in the last 20 years has been associated with mobile plant other than tractors and quad bikes

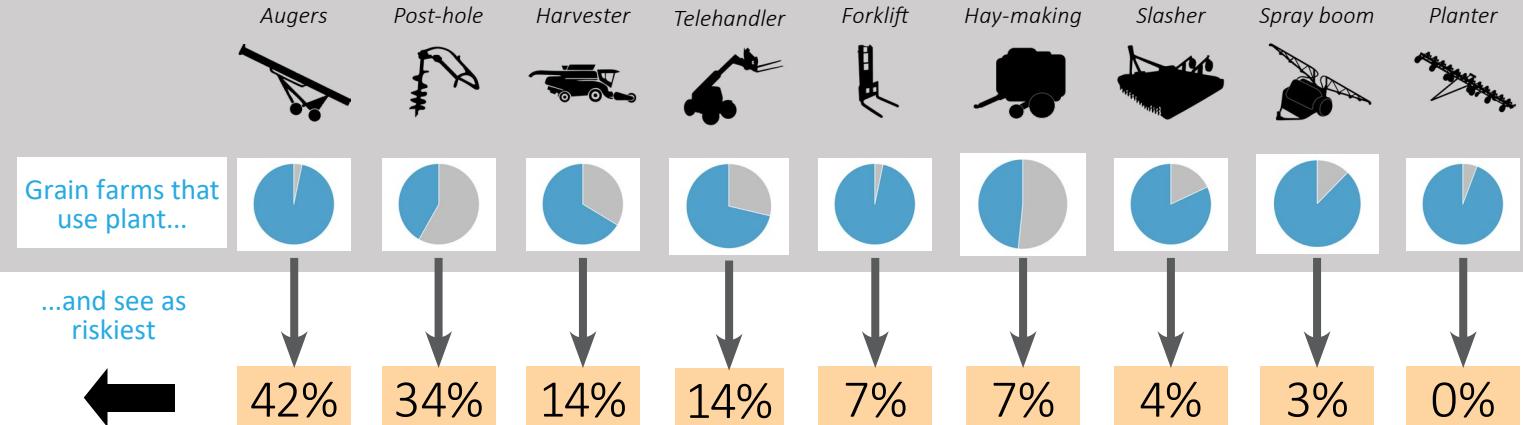
- AgHealth Australia, 2022

The plant growers see as riskiest differs between farms

Mobile plant seen as the riskiest is used often on grain-growing farms

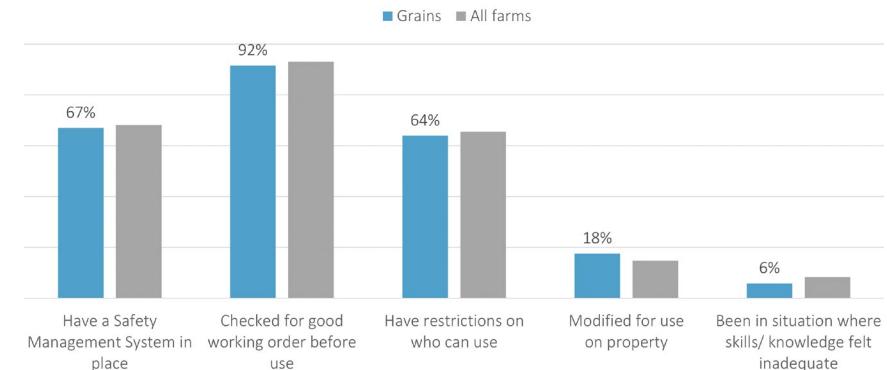


... and an essential part of farming



96% of growers said others on farm expect the highest safety standard when risky equipment is used

Many farms have work practices that support safe operation but not all farms and for not all risks



A Work Science survey of 229 farms: 122 were grain growers with a typical farm size of 2,000 ha, worked by one family member, five workers at peak and use of one contractor.



A whole-of-system safety scan for mobile plant



Snapshot report, May 2024

- A systematic scan of the whole safety system for specific mobile plant was able to identify opportunities for industry to improve safe use of the equipment on farm.

Aim

One of the outputs of the mobile plant research was to have a repeatable, scaleable method for examining the whole safety system for a specific type of mobile plant with a view to identifying practical opportunities to influence its safe use on farm.

Approach

A Rasmussen-inspired model recommended by Work Science was used to systematically consider what factors shape safe use of mobile plant across the whole safety system (as per diagram on page 20).

The safety system scan involved the following steps:

- Review of available injury burden data for machinery category and other contextual data to understand the risk profile.
- Lines of enquiry at different levels of the system (end users, suppliers, designers etc) to build understanding of the safety risks for the equipment and factors that influence its safe supply and use.
- Consultation with an independent subject matter expert for further information and clarification.
- Working Group discussions to identify gaps and opportunities for influencing safety on farm.

Mobile augers were used as a case study for the safety system scan (findings reported separately, see page 21).

Results and discussion

Development of the safety system scan and mobile auger case study took about 10 days work over three months. It provided a good overview of the whole safety system for mobile augers and helped fast-track to knowledge gaps and opportunities.

In this case the scan involved an RSHA Working Group interview with a subject matter expert, reflection and follow-up of some key information gaps via the SME, then group discussion and exploration of next steps.



The method would be highly repeatable and could be applied to other mobile plant types and potentially other WHS considerations more broadly.

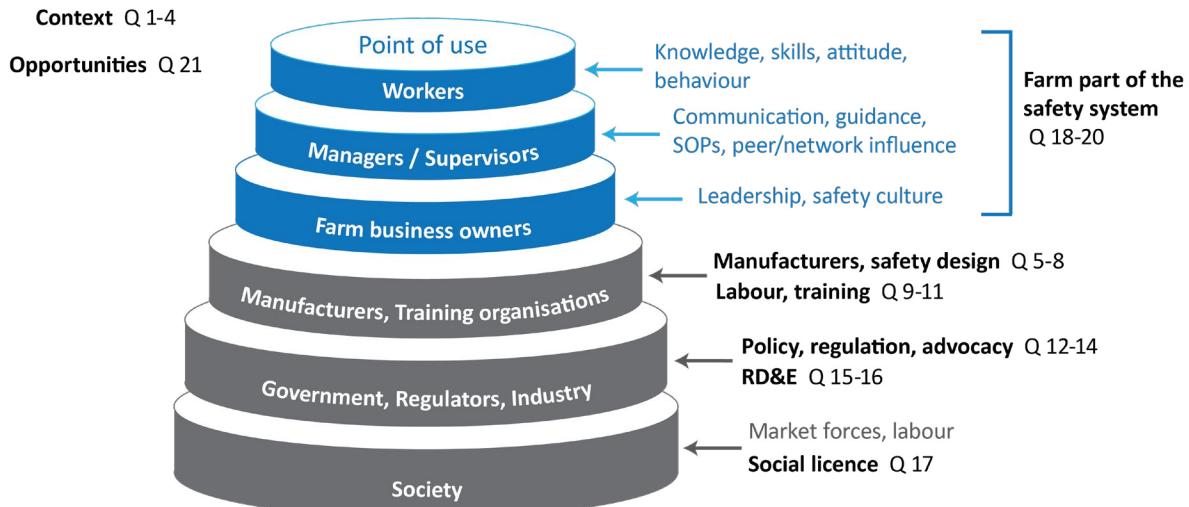
Some observations about using the scan in the case study:

- Specifying the equipment and scope of the enquiry (eg mobile and not fixed augers) proved an important first step as it very much shaped identification of the issues and their follow-up.
- Who acts as SME is important. The process was very efficient in this case as the SME had a lot of practical, farm-related experiences and was willing to explore ideas (without being locked on to an organisational position). Discussions were open, honest and exploratory.
- The Working Group members provided important depth and direction by opening the discussion to how augers are used within their industries.
- The researcher leading the enquiry needs to be both agile and thoughtful to clarify what is known, identify what isn't and deliberate on what leads to follow.

Recommendations

Consider using the Rasmussen-inspired safety system scan to fast-track factors in the whole safety system that may be influencing safety on farm (for different types of mobile plant and potentially other aspects of WHS).

Questions for a Rasmussen-inspired enquiry of the safety system



Context

1. What is the accepted definition for *plant type*? - how do we best describe the *plant type* used on farm, what is in scope / not in scope
2. How are *plant type* typically used on farm? - main types of work, what this looks like, likely to be every day or more sporadic, capture diversity – different plant types, different industries
3. Would *plant type* ever be used for a different purpose, one they were not designed to do?

Manufacturers and design

4. How many companies /businesses manufacture the *plant type*? - who, where are they located (including international), how much diversity is there in the product, are there any constraints to supply
5. What are the main hazards of *plant type*, main points about this bit of kit? - inc frequency and nature of injury
6. Where does safety design and thinking sit within their business?
7. To what extent is safety a feature? - do safety features help promote or constrain sales
8. How much do the two circles 'efficient use' and 'safe use' overlap for *plant type*? - are there examples where fixes to address hazards have been attempted on farm
9. How much do *plant type* cost (eg range)? - are they regarded as a major capital item for farm, how often are they replaced, is there a secondhand market

Labour and Training

10. Do *plant type* require a special skill set to be used on farm: such as workers who have had a formal induction, tailored training course, competency qualification or licence? - what sort of skills, is this the case for all *plant types*, all jurisdictions, all industries
11. Where do people learn how to use *plant type*? - where if external training an option, any big differences by jurisdiction or industry
12. Are there any training gaps or opportunities?

Policy, regulation, advocacy

13. What is the legislation or regulation around *plant type*? - anything specific to [plant type], to what end – what is the driver, are there differences between jurisdictions
14. Does the ag sector or specific industries have Codes of Practice relating to *plant type*? - do any jurisdictions, industry groups or manufacturers provide supporting documentation relating to this equipment
15. Is there, or has there been in recent years, advocacy relating to *plant type*? - eg around a particular point or for a particular change, if yes- who and what is the ask

RD&E

16. Has there been research on any aspect of *plant type* in the last 20 years. eg design, use, efficiency, safety etc?
17. If asked for extension resources on *plant type*, what would be your preferred resource base? - where would you signpost to

Social licence

18. Are there any expectations around use of *plant type* on farm from the general public, or people in rural communities ('social licence')?

Farm part of the safety system

Thinking about a family farm eg with 3-4 workers, mix of family and employed

19. In your experience what things – the way that *plant type* are used on farm or the environment/situations they are used in- pose risks to safety?
20. Should there be constraints to who can operate the *plant*?
21. Have you seen examples on farm where plant type have been modified? - types of modifications, reasons for modifications, implications for safe use

Closing question

22. In your opinion, what is the best opportunity across the whole system to improve safe use on farm in the next 5 years? – something that is doable.



Opportunities to influence safe use of mobile augers in agriculture



Snapshot report, May 2024

The case study identified off-farm interventions to help increase safe use of mobile augers on farm:

- Featuring appropriate guarding in the selection of new equipment at purchase.
- Having a third-party training tool for the sector that increases confidence in safe use on farm.
- Increasing awareness of hazards and their control in new and older mobile augers.

Mobile augers are commonly used in agriculture and are seen as the riskiest piece of equipment on the farm by many growers. This concern is well-founded with recent examples of both [entanglement](#) and [fatalities](#).

There is a significant body of knowledge about hazards relating to augers and controlling the risks on farm, integrated into resources such as [Farmsafe Australia's Toolbox Talks](#).

The aim of this case study was to conduct a scan of the whole safety system to identify whether there were also practical opportunities to boost the safe use of mobile augers through off farm interventions.

Method

A Rasmussen-inspired approach, developed as part of the RSHA04 mobile plant project, was used for the safety system scan.

The scope of the scan was mobile augers (including smaller pencil augers) as conveyer and fixed auger types, while more complex, are inherently safer.

The scan started by interviewing Wayner Baker, a subject matter expert and Chartered Professional Mechanical Engineer with decades of experience providing OHS advice to farms. From this, the RSHA Working Group identified key areas that emerged as points for influencing safety around augers.

Further information about the augers available in Australia and regulations around auger guarding was explored in a desk audit by the subject matter expert.

The RSHA04 Mobile Plant Working Group met to discuss the findings and their implications.



Points on mobile auger use in agriculture

Mobile augers are used in agriculture to deliver product or shift grains or pellets within a farm (for example moving the residual from a bin ready for refill).

The volumes and required lift heights vary between farms, and can be large scale for some. Mobile augers range from 8-30 metres in length and from a flow rate capable of shifting a few tonnes to 120 tonnes per hour.

Despite this range mobile augers are relatively uniform in their components and design. They are generally powered by a small petrol engine (mounted on the auger) or by a connection to the Power Take Off of the tractor. There is an exposed screw at the lower end which moves product up the shaft as it turns. The auger sits on two wheels located at the centre of gravity and can be collapsed for transport. Some newer models are self-propelled. Bigger mobile augers have different folding mechanisms.

Fatalities and major injuries are in the main due to the feed-in and flight (which have engineering controls that make things safer) as well as a couple of cases where augers have collapsed (which means the operator was in the danger zone).

The lifetime of a mobile auger is about 30 years. They are often used on farm until they become obsolete in terms of flow capacity or height, or they wear out. As with many types of machinery, risks to safety increase with age due to structural wear.

A new high lift, high capacity auger can cost over \$100,000 while small secondhand units in good condition might be around \$5,000.

Most people learn to use augers in the farm workplace. It is important that induction and supervision is appropriate to ensure people who work on farm understand the risks and those who use the equipment have the necessary skills.

Off farm components of the safety system

The Australian Standard for machinery guarding (AS4024) was designed around industrial machinery and does not provide the functionality needed for farm (grain cannot flow at a sufficient rate). An agricultural [Industry Safety Standard](#), where a two-guard system is used to reduce access, was negotiated in 2009 and became the accepted practice for the sector - and effective in reducing injuries.

However it is now uncertain to what extent the Industry Safety Standard is endorsed by the agricultural sector in 2024 or what the state and territory regulatory authorities enforce around auger guarding.

Auger suppliers and images with flighting guarding

Brand	Country of origin	Online images viewed with guarding
Brandt	Canada	YES
Convey-All	Canada, USA	n/a (conveyors)
Farm King / Buhler / Versatile	Canada, USA	NO
Meridian	Canada	YES
Westfield / AGI / Hutchinson / Wheatheart / Herberger	Canada, USA	YES
Auger Supplies WA	Australia (WA)	SOME
Aust-Mech Australian Conveyor Systems	Australia (Qld)	n/a (conveyors)
Commander Ag Quip	Australia (SA)	SOME*
Cowra Equip	Australia (Vic)	SOME*
Fast Flow Augers	Australia (NSW)	SOME*
Finch	Australia (Qld)	SOME*
Grainline	Australia (NSW)	YES
GrainRite	Australia (Vic)	SOME
Protector Grain Systems	Australia (WA)	YES
Venning	Australia (SA)	SOME*
Vic Silos	Australia (Vic)	NO
Walsh & Ford	Australia (Qld)	YES

* Pencil/smaller augers seemed to lack the secondary guard.

With considerable consolidation of agricultural machinery manufacturing in recent years, Australian distributors typically support 2-3 brands sourced from a handful of international companies (mainly Canada and the USA). The stock is reassembled by resellers at Australian facilities.

The desk top review established that it is possible to purchase new augers in Australia with guarding that meets the Industry Safety Standards, but it is not a requisite (see table). Furthermore, safety or safety features are not key design elements communicated within promotional material.

Design safety is guided by the general obligations that exist to duty holders under state, territory and commonwealth workplace safety laws.

Next steps for consideration

The RSHA Working Group identified opportunities to help control safety risks for augers on farm that could be supported through organisations such as Farmsafe Australia, the state and territory worksafe authorities, equipment manufacturers, and the RDCs.

Recommendations:

- Industry explores what regulators expect about mobile auger guarding.
- Industry connects with (1) the Tractor and Machinery Association of Australia and (2) Australian equipment suppliers about featuring Industry Safety Standard guarding (and safety more broadly) as a selling point.
- Farmsafe Australia and RDC: (1) encourage growers to consider safety features when selecting new equipment; and (2) target safety messaging around older equipment ('if it is in the workplace, it has to be safe'). For example encouraging retrofitting of guarding where indicated and increasing awareness of hazards associated with structural wear and tear.
- Industry arranges development of a training/induction resource on safe design and use that can be delivered by suppliers, competent trainers on farm, or third party providers. Preferably with 'evidence of instruction' (important to have if things go wrong).



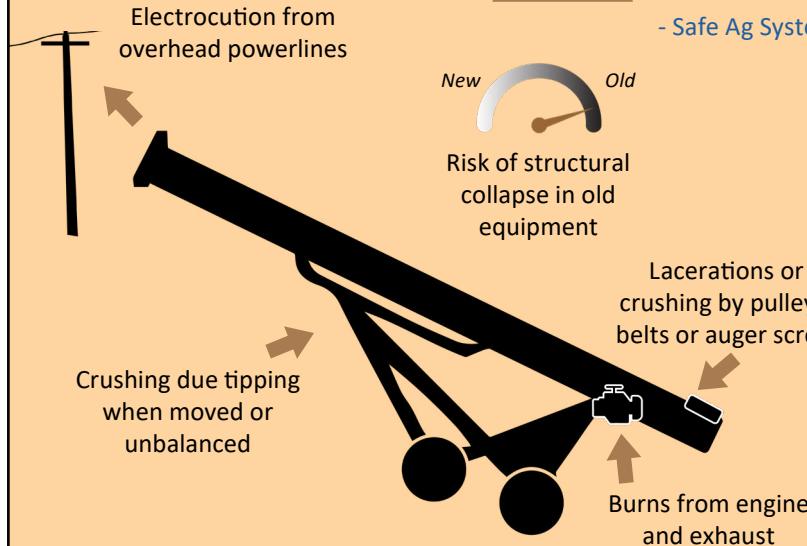
Mobile auger safety on farms

Practices and perceptions of growers



RURAL SAFETY &
HEALTH ALLIANCE

Mobile augers are risky - and an essential part of farming

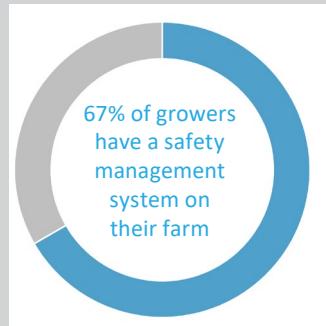
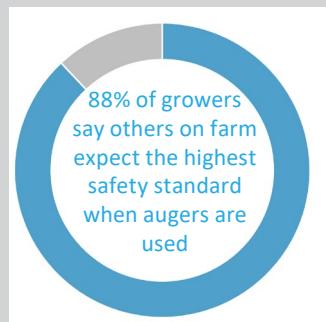


- Injury can be severe.
- Hands, fingers and arms are often affected.
- Typically laceration or avulsion.
- People of all ages get injured, including children.
- Injuries increase in the afternoon and at harvest.

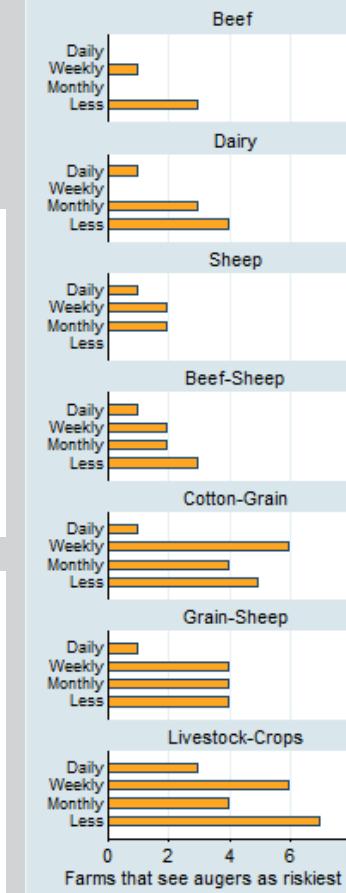
- Ag Health Australia, 2006.

Augers were used on 84% of survey farms

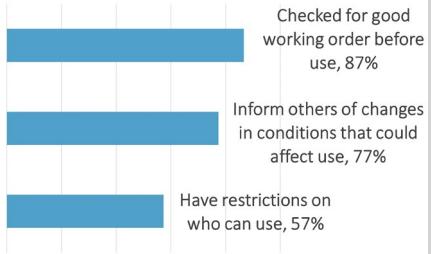
... and seen as the riskiest plant by 1 in 3 growers on these farms



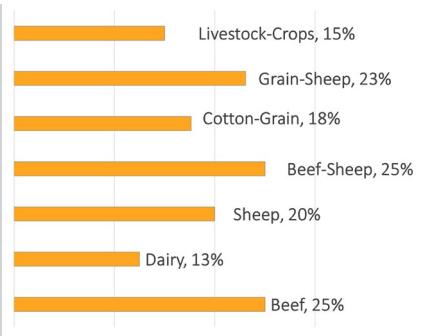
Frequency of use varies with commodity



Work practices on many farms support safe operation



Modifications are not uncommon



A Work Science survey of 229 farms: 69% mixed commodity, typically 1,600 hectares, worked by one family member with 5 workers at peak and using one contractor.