

PRIMARY INDUSTRIES HEALTH AND SAFETY PARTNERSHIP



Exploring the barriers and facilitators to adoption of improved work practices for safety in the primary industries

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Development Corporation**

Exploring the barriers and facilitators to adoption of improved work practices for safety in the primary industries

by Richard C Franklin, Kristin E McBain-Rigg, Jemma C King and Tony Lower

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Foreword

High rates of work-related injury and illness within Australia's primary industries demonstrate that the creation of safe work environments remains a significant problem. There are many Work Health and Safety (WHS) programs designed to improve outcomes on farming and fishing enterprises; however, it appears that these programs are underutilised by those in the primary industries sector. The Primary Industries Health and Safety Partnership (PIHSP), as part of the Rural Industries Research and Development Corporation (RIRDC), have been working to improve the health and safety of Australia's farming and fishing communities.

The major barriers to implementing improved safety practices included perceived cost, time and inconvenient to implement changes; the administrative burden of current regulatory requirements for WHS also rated highly as an impediment to change. Primary producers also identified that, with strong leadership and positive attitudes from key people, the creation of a culture of safety in the primary industries is possible.

The research was undertaken by the World Safety Organisation Collaborating Centre for Injury Prevention and Safety Promotion at James Cook University, facilitated by funding from the Primary Industries Health and Safety Partnership.

The Partnership are committed to achieving significant benefits regarding health and safety practice in the primary industries through the implementation of targeted and high-impact research, development and extension projects. This report will be used by the PIHSP to help guide future RD&E activities. The report may also be used by industry and community stakeholders and policy makers to inform future investments in WHS research in primary industries.

This report is an addition to RIRDC's diverse range of over 2000 research publications and it forms part of our Primary Industries Health and Safety Partnership program, which aims to support increasingly healthy, safe and productive working lives in the primary industries through investment in RD&E to drive sustainable improvements to work health and safety outcomes.

Most of RIRDC's publications are available for viewing, free downloading or purchasing online at www.rirdc.gov.au. Purchases can also be made by phoning 1300 634 313.

Craig Burns

Managing Director

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Associate Professor Tony Lower is the director of the Australian Centre for Agricultural Health and Safety (ACAHS), a centre of the University of Sydney. He has been involved in farm safety and health promotion through his work with the Farmsafe Australia network and has undertaken extensive applied research and development work to underpin the centre's promotion and extension work.

Acknowledgments

The authors would like to thank the members of the reference group on this project, who gave generously of their time and their insights into rural industries and the health and wellbeing of workers across primary industries all over Australia. Their expertise was invaluable in the development, conduct and analysis of this project. We also acknowledge and thank all attendees from our focus group and workshop sessions for their participation in the project.

The WSO Collaborating Centre for Injury Prevention and Safety Promotion received a grant from the Primary Industries Health and Safety Partnership to undertake the study.

Abbreviations

| | |
|-------|---|
| ACAHS | Australian Centre for Agricultural Health and Safety |
| CoP | Code of Practice |
| HBM | Health Belief Model |
| HOC | Hierarchy of Controls |
| JCU | James Cook University |
| PCBU | Person Conducting a Business or Undertaking |
| PIHSP | Primary Industries Health and Safety Partnership |
| PPE | Personal Protective Equipment |
| PTO | Power Take Off |
| RDC | Research and Development Corporations |
| RIRDC | Rural Industries Research and Development Corporation |
| ROPs | Roll Over Protection Structure |
| UK | United Kingdom |
| USA | United States of America |
| WHS | Work Health and Safety |
| WSO | World Safety Organisation |

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Executive Summary

What the report is about

Primary industries are among the most dangerous workplace environments in Australia. In the five years between 2007-08 and 2011-12, agriculture, forestry and fishing had a combined workplace fatalities rate of 16.81 deaths per 100,000 workers, which was seven times higher than the national fatality rate (2.29/100,000) [1]. The total economic cost of these injuries and illnesses for the primary industries was reported to be over AU\$2.1 billion in 2008-09 [2].

While numerous interventions, programs and solutions to WHS issues have been developed, it appears that many relevant programs are underutilised by the primary industries. In order to create nuanced safety messages and programs to improve the health and wellness of Australia's farming and fishing communities, it is important to establish why existing WHS solutions have not been implemented. Further, it is critical to identify what may assist producers to make changes for improved health and safety outcomes.

Who is the report targeted at?

This report is targeted at Australia's primary industry producers, workers, industry advocates, community advocates, RD&E organisations and policy makers involved in the development of WHS regulations, standards and practices.

Where are the relevant industries located in Australia?

This study was carried out across all regions of Australia and included focus groups and workshops with industry representatives for the Cotton, Grains, Fisheries, Meat and Livestock, Meat Processing, and Sugar industries, in locations such as Hobart, Cairns, Ingham, Ayr, Moree, Bathurst and Dalby. The results from this research will assist in the development of comprehensive safety messages and solutions to identified industry problems of safety. These will have flow on benefits for producers through the development of WHS solutions that acknowledge the barriers and facilitators of WHS program implementation.

Background

The PIHSP is undertaking strategic investigations that will build upon the past 17 years of WHS research funded by the Partnership. Due to past research, the problems facing the primary industries have been well described and evidence established regarding the nature of many of these problems. In the contemporary R&D plan, the partnership has established a new direction, which seeks to build solutions and make significant contributions to the improvement of WHS outcomes in the primary industries. One of the aims of the PIHSP in the next five years is to address the barriers to adoption of WHS outcomes. This research provides evidence of existing barriers to adoption, considers possible facilitating factors to improve the uptake of WHS solutions and provides guidance on strategic approaches to future research, development and extension work in this area.

While it is a common assumption that WHS implementation is expensive and time consuming, there is limited evidence to support this view. This assumption must be explored, in order to create simple, cost-effective solutions to implement WHS solutions. There is evidence which suggests that, even with our current understanding of health and safety strategies, the number of deaths on farms could be halved if solutions were implemented.

Aims/objectives

This project aims to explore the barriers to adoption of improved work health and safety (WHS) practices and develop a strategy to address these barriers which would lead to a reduction in workplace

injuries and illness. The objectives of this project are targeted at primary industries (with focus on Cotton, Fisheries, Grains, Sugar, Meat and Livestock and Meat Processing) and will:

- Identify the barriers to adoption of improved work practices in primary industries by:
 - Consolidating current knowledge on addressing the barriers to adoption of improved practices (Literature Review)
 - Describing the extent of the problem (Focus Group)
 - Explore perceptions of changes in WHS over time (Focus Group)
- Rank by importance the barriers to adoption (Delphi Survey)
- Identify existing strategies to overcoming the barriers to adoption (Facilitators)
- Explore financial and human resources needed to achieve adoption (Delphi Survey).
- Propose a research, development and extension agenda to :
 - Further define and refine the barriers to adoption of improved work practices
 - Develop strategies to overcome these barriers
- Provide implementation approaches to enhance successful adoption and overcome the identified barriers (Recommendations).

This research will benefit Australian farming and fishing communities. The research actively sought the opinions and experiences of Australian farmers and fishers regarding WHS on their enterprises and in their industry. Making WHS strategies more accessible and accommodating comes from understanding the implementation barriers that farmers and fishers themselves identify.

Methods used

This research employed a mix of methods to achieve its aims. A comprehensive literature search was undertaken to consolidate current knowledge on WHS implementation in both national and international settings. Focus groups and workshops with members of the Cotton, Grains, Fisheries, Meat and Livestock, Meat Processing and Sugar industries established contemporary attitudes toward WHS implementation and the barriers and facilitators to improving health and safety practices. These led to the development of a survey in the form of a modified Delphi (consensus method) process, which established the relative importance of identified barriers as experienced at the level of individual enterprise and industry. This survey also ranked the impact of identified facilitators in enhanced implementation processes, and explored the financial and human resources needed to make changes to safety for individual enterprises and at the industry level.

Results/key findings

- Barriers were identified through the review of the literature and discussion of the problems in focus groups. By consolidating the literature it was discovered that some of the major impediments to implementation included:
 - Prevailing attitudes toward changes to the production process or work environment to improve safety, attitudes of complacency and acceptance of risk;
 - The cost (both financial and time) to implement changes to improve safety;
 - Perceptions of control over the work environment and production processes;

- Ineffectual and /or inappropriate design of safety messages;
- Workforce issues including the nature of workforce supply and the need for continuous cycles of training for new recruits each season;
- Administrative burden of the paperwork required for compliance with legislative requirements;
- Lack of access to reliable, trustworthy sources of information about safety; and,
- Legislative uncertainty that came from perceived cycles of changes in legislative requirements.
- Facilitators included:
 - Social networks and support for positive approaches and attitudes toward safety;
 - Financial incentives;
 - Assistance with WHS issues (including assistance with auditing of practice and improvement of safety systems);
 - Best Practice management systems and whole-of-production change considerations;
 - Awareness of problems and sufficient motivators for action (including the presence of vulnerable others on the enterprise; enforcement of legislation, and safety changes which increase efficiency or productivity); and,
 - Improved access to information about safety, designed in consultation with producers to address their identified needs;
- Changes to WHS over time included discussions of:
 - generational shifts in attitudes and practices to create safer workplaces;
 - perceptions of changes to legislation, the nature of those changes and the lack of control that producers perceived due to not being able to comprehend/keep pace with changes; and,
 - the role of significant influencing people (e.g. peers or extension agents) that could translate WHS legislation into recognisable, practical action for producers to take to improve safety.
- Results from a survey of producers ranking the barriers and facilitators for safety change showed that:
 - The top three barriers at the enterprise level were –
 - administrative burden,
 - attitudes toward WHS, and
 - cost to make changes.
 - The top three barriers at the industry level were –
 - attitudes toward WHS,
 - administrative burden, and
 - cost to make changes
 - The top three facilitators to change at the enterprise level –

- attitudes and leadership on WHS,
 - safety practices which increase production efficiency, and
 - the convenience of making changes (i.e. easy to make changes)
- The top three facilitators for change at the industry level –
- safety practices which increase production efficiency,
 - attitudes and leadership in WHS, and
 - the convenience of making changes.
- The likelihood of these facilitators to make a difference to practice: assistance with paperwork was rated as moderately to highly likely to make a difference; cost incentives were seen to be highly likely to make a difference; and positive attitude and leadership on WHS were seen as moderately to highly likely to make a difference. The shift to positive attitudes and leadership on WHS was rated as requiring a long term implementation period (45.5%).
- The responsibility for implementing these facilitating factors were assigned to :
- administrative assistance should be provided by industry (38.6%) or government (36.4%),
 - cost incentives rested heavily with government (54.6%) and then industry (40.9%),
 - positive attitudes and leadership were seen to be the responsibility of all levels (43.2%), with a predominant focus at the individual enterprise (54.6%).
- It seems that the major barriers that producers face include the cost, time and inconvenience to implement current strategies for safety practice, negative attitudes toward safety and the sheer administrative burden and confusion that current WHS legislations presents in practice. There are indications that attitudes toward WHS are changing, across generations of producers, and that group approaches to solution generation are improving leadership on WHS issues in these industries.
 - Safety messages do not need to be complex, but all elements of this communication must be woven together to create a composite learning and awareness experience for farmers. This approach touches on producers' reserves of resilience, self-reliance, and ability to be innovative in ways that suit their circumstances, hits at their sense of community, family, fear of the unknown and unintended consequences. It also provides practical actions to move toward solutions which should see an increase in safety practices and a reduction in non-intentional injuries and deaths.

Implications for relevant stakeholders

These findings indicate that there are a number of barriers and facilitators that are universal, consistent across industries and across contexts. In the design of safety solutions it will be imperative to include implementation and evaluation planning. This is important due to a current lack of suitable evidence to show whether contemporary approaches have been successful or sustainable in practice. It is necessary to enhance this level of activity and evidence, as it provides opportunities for action and trustworthy information for producers to base their decisions on, when seeking safety improvements.

It is also important that the design of safety solutions be tailored to different levels of financial and time commitment, and different levels of the Hierarchy of Control (HOC). They should be communicated in ways that incorporate various mediums and generations of producer. Industry bodies

and other non-government representative bodies should be seen to actively promote safety innovation and encourage producers to implement changes, as they are able.

Recommendations

The recommendations from this project include:

For Producers

- To implement and model best practice WHS in action at the enterprise level, based on known solutions;
- Continued discussion (lobbying) by producers with industry bodies regarding the barriers they face to improve WHS in their farm business.

For Industry

- In partnership with RDCs identify the highest risk WHS issues facing the industry (e.g. size of problem by cost, numbers injured and severity). Consideration must also include vulnerable subpopulations. These issues should be systematically addressed for an extended period of time, to enable real improvements to be attained and measured (diffusion of innovation).
- To provide leadership and support advocating for improved WHS

For RIRDC

- All RIRDC funded research is required to provide recommendations on the adoption of the findings, with consideration of economic and efficacy issues for implementation;
- Maintenance of the baseline datasets should be considered for ongoing investments by the PIHSP, to help inform industry about areas of challenge and success;
- An Australian specific clearinghouse for data relating to WHS in the Primary Industries should be supported by the PIHSP.

For Government

- A systematic approach to enforcement commencing with self-audits and improvement by producers be adopted by WHS agencies. Trusted non-government agencies should be resourced to undertake this role to maximise self-regulation before enforcement is activated.
- Enforcement must be perceived as both a potential and real threat to be effective, but should be the final component of a systematic approach.
- Government provides targeted support linked to the high risk areas identified by industries.

Introduction

Farmers should be recognized as potentially nonrenewable natural resources. Yet farmers...are currently being lost at a rate that is not acceptable according to current western standards of public health

(Hair, 1991, p.17)[3]

The Australian primary industries employ approximately 3% of the nation's population and include industries such as Cotton, Grains, Sugar, Meat and Livestock, Fisheries production, and Meat Processing[4]. The primary industries are also among the most dangerous workplace environments in the country. In the five years between 2007-08 and 2011-12, agriculture, forestry and fishing had a combined workplace fatalities rate of 16.81 deaths per 100,000 workers, which was seven times higher than the national fatality rate (2.29/100,000) [1]. The total economic cost of these injuries and illnesses was reported to be over \$2.1 billion in 2008-09[4].

In 2013, there were 48 worker fatalities in the agriculture, forestry and fishing industries, representing 25% of all worker fatalities that occurred in that year[5]. Whilst the 2013 worker fatality rates for agriculture, forestry and fishing industry were slightly below previous annual figures, it still represented a fatality rate of 15.11 fatalities per 100,000 workers which was nine times the national fatality rate of 1.64[5-7].

Given this high fatality rate the agricultural industry has been identified as a priority industry for action in the current Australian Work Health and Safety strategy[8]. A consideration of the mechanisms of injury for this industry sector highlight the role of vehicle collision, rollover of non-road vehicles and being hit by a moving object as the top three mechanisms of workplace injury[6]. These rates of injury and fatality are intolerably high, when a strong knowledge base on the risks and hazards found within primary industry production settings already exists along with known WHS strategies to address these problems.

To improve safety environments for Australians at work, the Commonwealth government streamlined legislative practices for WHS through harmonisation of state and territory level WHS legislation. The *Work Health and Safety Act 2011* provides general advice regarding safe work practices on issues that span industry types (such as working at heights, plant and equipment safety, use of personal protective equipment, responsibilities for safety, etc.)[9]. While the Act features some industry-specific sections, it was primarily designed to overcome some of the problems of previous prescriptive regulations, and to minimise variation in WHS law enforcement between the State jurisdictions of Australia. However, recent surveys of producers suggest that many farmers do not recognise which portions of the WHS Act are relevant to them, nor are they certain of which Codes of Practices (CoP) to apply to their circumstances[10]. This indicated an important gap in the knowledge of farmers of how to identify, adapt and apply legislation and codes of practice to their enterprise, and fulfil their obligation at law to protect themselves and others as a 'Person Conducting a Business or Undertaking' (PCBU)[10].

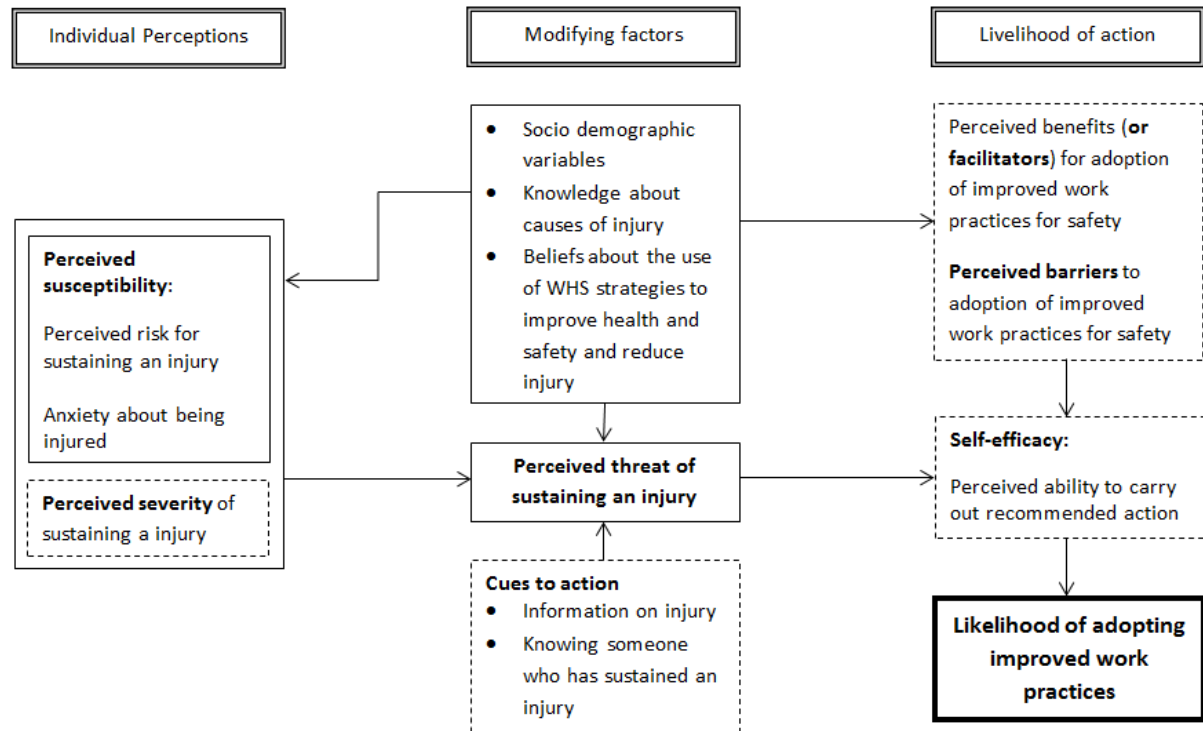
There are many contemporary examples of interventions and other approaches to improve health and safety. These include a range of activities, such as development of risk assessment guidelines, checklists, guide books, maintenance schedules, WHS management software, etc. However, DeRoo and Rautiainen (2000) in their systematic review found few farm injury prevention interventions were formally evaluated; those that were evaluated contained methodological limitations that made it difficult to interpret the degree of effectiveness[11]. They add that more rigorous evaluation of interventions is needed in this area, and that the design of intervention studies and evaluation include a number of key elements (i.e. randomisation of study participants where possible, use of control groups and objective outcome measures)[11]. There are even fewer examples of studies which establish what factors prevent farmers from implementing solutions to identified problems[12]. Recent evidence suggests that, through the implementation of current safety approaches, approximately 42% of deaths from injury on farms could potentially have been prevented (e.g. in the period 2001-14, there were 45

deaths involving farm utes, 53% of these incidents could have been avoided, had seatbelts be worn, or no passengers carried in the tray of the ute)[13].

Health Belief Model

The Health Belief Model (HBM) (Becker, 1974) explains and predicts behaviours of human beings (traditionally employed in considerations about health behaviours), based on the exploration of the beliefs and attitudes held by individuals[14]. For the purposes of this project, we have created a modified version of the health belief model, which is better suited to considerations of the ways that primary producers conceptualise health and safety practices in the workplace. In particular, the original theory features categories such as ‘perceived barriers’ and ‘perceived benefits’, which we have removed from the model, given that this study specifically focuses on both barriers and facilitators/benefits to adoption of safety change. The modified version of the framework is shown in Figure 1. It is worth noting that the perceived barriers were the most powerful of the HBM dimensions[15].

In the Health Belief Model (HBM) framework, the role of individual beliefs and perceptions is the critical starting point; documentation of the beliefs and attitudes of individuals, particularly focussed on their perceptions of severity or seriousness of a proposed problem, and their belief regarding their individual susceptibility to this problem, are key predicting factors toward the ultimate outcome[15]. These attitudes and beliefs are impacted upon by a number of other factors including socio-demographic indicators, social norms of the population to which the individual belongs, prior knowledge about the causes of the issue and the perceived use of implementing strategies to minimise risk or threats related to the problem[15]. The interplay between these factors creates a composite which then contributes to the individual perception of the likelihood that any change to behaviour will make a difference to their susceptibility or reduce the threat of the problem occurring. These considerations, alongside beliefs regarding their ability to implement such changes results in action toward change (which may result in pre-contemplation/contemplation of changes, or readiness to adopt change).



Adapted from:[16]

Figure 1. Injuries in Primary Industries: Application to the Health Belief Model

In order to describe and understand the factors which influence uptake of safety change behaviours or programs, it is important to define what is meant by the terms ‘barrier’ and ‘facilitator’. For the purposes of this research we have defined:

- Barrier as ‘a real, or perceived obstacle which makes something difficult or impossible to achieve’.
- Facilitator is ‘a phenomenon which makes something easier or helps cause an action to be adopted’.

Rogers (2003) defines adoption as “a decision to make full use of an innovation as the best course of action available”[17]. Rogers’ theory of the diffusion of innovation seeks to explain the ways and reasons that new ideas are adopted by social groups, and the rate at which these new ideas are accepted[17]. The theory was born of the rapid advancement of new technologies in the agricultural setting in the USA in the 1920s and 1930s. The role of communication channels and the different types of adopters are a critical element of the theory, which measures changes over time regarding the adoption within social groups[17].

It is important to understand the ways that new ideas and information about new technology or changes are disseminated among the population, how long it takes to reach a critical mass of adoption for sustainable change and the way that adopters approach innovations. Such understandings make it possible to design safety solutions/messages which will reach individuals at any stage of change contemplation (pre-contemplation/contemplation of change/readiness to adopt/ keeping the change), and which address the needs of a population at various levels of priority) (Figure 2)[17].



Source: [17]

Figure 2. Rogers Diffusion of Innovations Theory Model

One method to guide the development of safety solutions is the Hierarchy of Controls (Figure 3). The Hierarchy of Controls (HOC) was historically accompanied by the Priority Table (a risk matrix designed to assist producers to make decisions regarding the likely outcome of the threat versus exposure to the threat). Once a decision has been made about the level of threat versus levels of exposure, a timeframe for action is suggested. Current WHS legislation requires that, if a solution to a risk is known, then that solution should be applied (e.g. helmets reduce head injury). The risk matrix is still used, however as many agricultural practices have capacity to maim or kill, they are automatically considered high risk (e.g. exposure to machinery or moving parts). The Hierarchy of Controls considers possible solutions for the management of identified hazards and risk through six levels of possible interventions, with elimination being the most safe (and requiring the least amount of human management) to the introduction of personal protective equipment (least safe intervention with the highest need for human management)[18]:

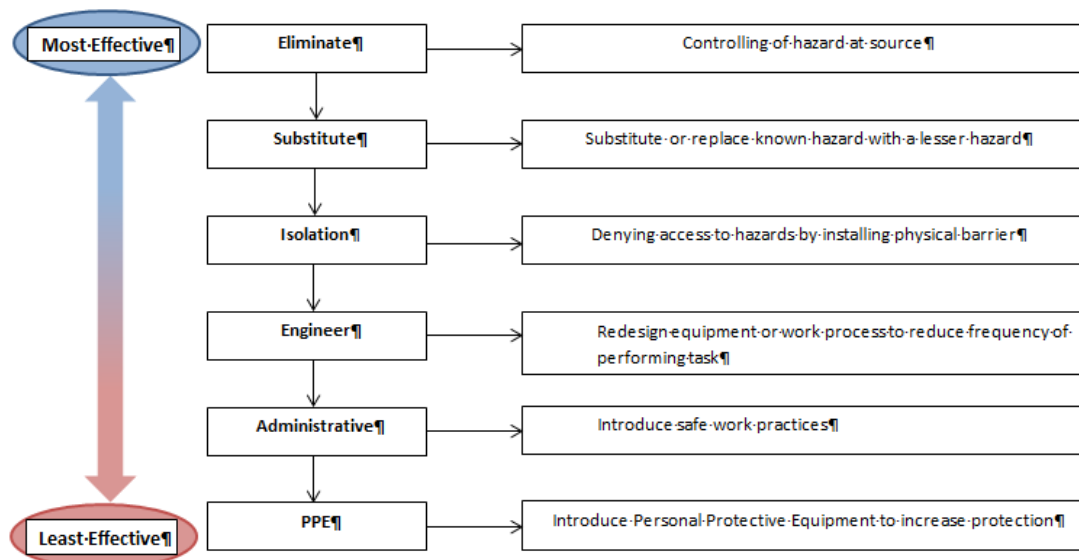


Figure 3. Hierarchy of Control for Injuries

By considering the ways that individuals perceive threats, adopt new ideas, make decisions about the need to make changes, and the degree of management solution chosen, it is possible to provide insight into the ways that barriers and facilitators are identified, dealt with and evaluated for success in WHS. The interplay between the elements of the HBM (Figure 4), illustrates the ways that human beings create their conceptions of risk and moderate their willingness to accept risk, or act to mitigate against harms. By using the hierarchy of control framework, effective solutions to improving farm health and safety can then be used utilised by primary industries to improve WHS.

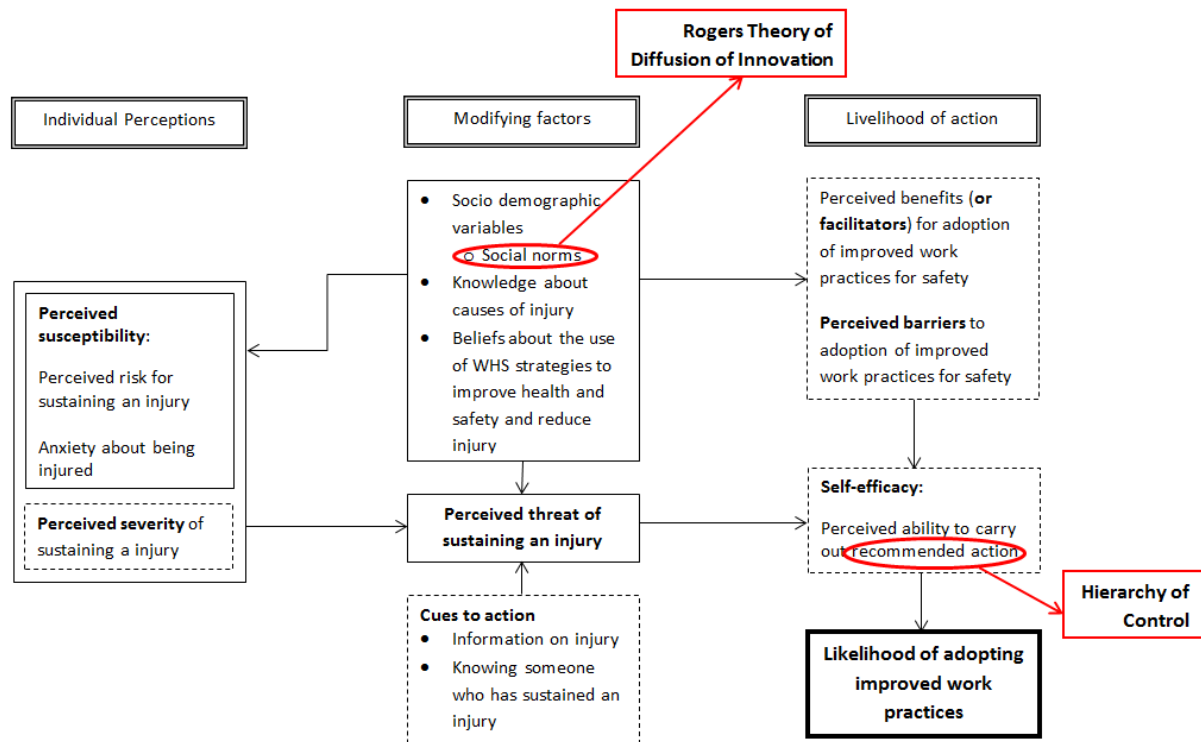


Figure 4. Modified Health Belief Model to illustrate how other models can help explain adoption behaviour

In a report by Fragar, Lower and Temperley (2011), documenting factors associated with behaviour change at the individual (or farm) level, it was noted that there is a large range of solutions for farming safety problems. Further, there was an identified need for such programs and solutions to be tailored to the specific needs of different industries and different enterprises (p. ix)[12].

This project provides critical evidence toward the creation of effective and sustainable solutions to safety problems, by integrating the Health Belief Model, Theory of Diffusion of Innovation, and the Hierarchy of Controls. It demonstrates the complexity of factors which influence adoption of safety practices and ways to improve uptake by the creation of solutions which cater to all levels of readiness to change.

This project considers the degree to which identified problems in the primary industries have been addressed utilising solutions that fall within the HOC model. Discussions with primary producers examine the ways that farmers and fishers make decisions about risks and hazards in their everyday practice, when they seek to change their practice for improved safety, and why they might choose not to implement existing safety measures into their enterprise.

Objectives

The objectives of this project are targeted at primary industries (with focus on Cotton, Fisheries, Grains, Sugar, Meat and Livestock and Meat Processing) and will:

- Identify the barriers to adoption of improved work practices in primary industries by:
 - Consolidating current knowledge on addressing the barriers to adoption of improved practices (Literature review)
 - Describing the extent of the problem (Focus group)
 - Explore perceptions of changes in WHS over time (Focus group)
- Rank by importance the barriers to adoption (Delphi)
- Identify existing strategies to overcoming the barriers to adoption (Facilitators)
- Explore financial and human resources needed to achieve adoption (Delphi).
- Propose a research, development and extension agenda to:
 - Further define and refine the barriers to adoption of improved work practices
 - Develop strategies to overcome these barriers
- Provide implementation approaches to enhance successful adoption and overcome the identified barriers (Recommendations).

Methodology

This project was a partnership between James Cook University (JCU) and the Australian Centre for Agricultural Health and Safety (ACAHS), and received ethical approval from the James Cook University Human Research Ethics Committee (HREC# H5587). This partnership allowed for a more efficient use of resources in relation to the geographic dispersion of the key commodities targeted. There are three methodological components used in this project: a literature review of peer and grey literature, focus groups undertaken with the identified primary industries (Cotton, Fisheries, Grains, Sugar, Meat and Livestock and Meat Processing) and an adapted Delphi process which included a workshop session undertaken at the 10th National Farmsafe Conference in Launceston, Tasmania in October 2014 and a ranking survey.

Literature review

A literature review (including grey literature) was conducted to explore the barriers to adoption of workplace health and safety practices in the primary industries. This information was collated and used to inform the project. It used Scopus, Medline, PsychInfo, Agricola and other relevant databases (such as the NIOSH) to explore barriers and facilitators to the adoption of workplace health and safety practices in primary industries. A key word search for 'health and safety', 'primary industries', (each commodity group), 'barriers', and 'facilitators', MESH terms for occupational health and safety was undertaken and then combined to identify relevant articles. Articles published from 1990 to 2014 were included in the analysis. An initial review of the title was conducted, then the abstract and then full paper to remove papers which did not fit the inclusion criteria. These papers were reviewed for common themes, actions and further research ideas. A review of the grey literature occurred by reviewing the RIRDC website for relevant publications and reviewing the Safe Work Australia website. These reports were also examined and the information was added to the review. Refer to the Appendix 1 for full search terms and strategies used.

Focus groups

Focus groups are an established qualitative research method[19], developed to elicit discussion among a group of peers, to explore particular topics of interest. The ideal focus group has between 5 and 12 participants, as this provides a depth of conversation and interaction that facilitates exploration of themes and ideas, whilst also being a manageable group size, ensuring that all participants can be heard and incorporated into the discussions. The discussion is guided by a facilitator, who makes open-ended enquiry about the topic of interest, allowing discussions to flow freely. While some styles of focus group use only 3 to 5 open-ended questions to guide discussion, health services research focus groups tends toward using more targeted questions, to maximise the opportunity to explore concepts in a potentially one-off situation[20]. The benefit of the focus group method lies in the ways that the group constructs a discourse, or story, about the issue at hand, and can reveal underlying assumptions and beliefs that may not be perceptible through an interview or survey. By using the dynamics of a group conversation (when facilitated competently), it is possible to see evidence of the ways that peer interaction influences the creation of a dominant story (discourse) about a topic.

Focus groups were run to elucidate aspects of the key themes emerging from the literature. These discussions also documented the recognition by those who work in the primary industries of the barriers and facilitators that affect their everyday practice and adoption of improved work place health and safety practices. Using a focus group methodology enables in real time an exploration of the extent of the problem, and a more in-depth consideration of not only the barriers and facilitators but the context of these issues in relation to daily operation of a farm or fishing vessel.

A range of focus groups were conducted to explore barriers to adoption and possible strategies to address these barriers, and included the Cotton, Sugar, Grains, Fishing, Meat and Livestock and Meat Processing industries. These focus groups were run in a variety of locations including Queensland,

New South Wales, Victoria, South Australia and Tasmania. The focus groups took a semi-structured question format, were recorded and subject to a thematic analysis. For a list of questions used for guiding focus group discussions, see Appendix 6.

Recruitment

Focus group participants were recruited via local, state and national industry groups (e.g. websites, electronic newsletters or emails that are routinely generated by these industry groups). These advertisements began in early April and ran until late September 2014. Interested participants were instructed on the advertisement to contact the research team for study details or to indicate an expression of interest. Reminder emails were sent to those that submitted an EOI two weeks prior to the focus group sessions, and a brief text message (or email if the potential participant did not provide a mobile number) reminder was sent the day prior to the event to maximise attendance by participants. There were key participants identified at the industry level that were contacted directly for their participation.

Further to this, was a workshop held at the 10th National Farmsafe Australia conference in Launceston, Tasmania in October 2014. This workshop was advertised as a part of the conference program and participants self-selected to attend. They were offered consent forms and information sheets about the project and were given the opportunity to leave the session at any time.

Settings

The settings for the focus groups were determined based on geographical spread of the primary industries and also a consideration of optimal locations which have a high percentage of farmers/fishers in each area. Following identification of these key areas for production, the research team then approached industry specific organisations or known key figures in these industries to assess if there was an optimum time to hold the session, setting or means to contact potential participants.

Analysis

An inductive thematic analysis was conducted using the computer software, Nvivo 10 to assist in the organisation of materials and the identification of themes[21]. Initial coding of themes was undertaken by two members of the research team as data were entered into the program. These axial themes were reduced further and summarised for presentation at the workshop at the Farmsafe Conference in Launceston. At this workshop participants helped to confirm the validity of the categories and identified any further barriers/facilitators they thought may be missing from the analysis. This led to further coding and analysis, which was confirmed by the research team. The themes were further refined by categorisation into the Health Belief Model, which provided a framework for the discussion of the ways that these complex themes contributed to individual and group perceptions of safety practice.

Delphi

The Delphi methodology provides a process for turning individual opinions and perspectives into group consensus[22]. The method is a group facilitation technique, whereby the opinions and perceptions of a group of 'experts' is sought through various rounds of consultation, or through an 'iterative multistage process' (p. 1010)[22]. In the case of this research, the Delphi method guided the design of the focus group questions, which sought the opinions of primary producers and industry representatives regarding the barriers and facilitators to adoption of health and safety practices (alongside a more general exploration of attitudes to safety). These opinions were consolidated/summarised and presented to the conference workshop participants (also primary producers and industry representatives), who confirmed/refuted the categories suggested by researchers and added their opinions regarding any missing items.

This new round of data provided further refinement of the categories of barriers and facilitators, which were then included in the survey tool used for the final stages of the Delphi process (see Appendix 9). This survey sought the opinions of the same primary producers and industry representatives from the focus groups, regarding the relative importance and impact of the identified barriers, and the relevance and likelihood of making a difference they would assign to the identified facilitators. A copy of the email communications that were sent to raise awareness amongst consenting participants that this process of the research had started is included (Appendix 10).

The objective of using a modified Delphi process was to enable focus group and workshop participants to provide anonymous/aggregated feedback about the barriers and facilitators that emerged from the sessions. It also provides a quick and easy way for these participants to rank the identified barriers and facilitators on a number of variables and to identify any context specific content which may be absent from the thematic overview used to derive the broad level barriers and facilitators.

Limitations

Allowing participants to self-select whether they would attend a focus group/sign on for the ranking survey may be a limitation to this work. It could be argued that these participants are already acutely more interested in safety, due to their willingness to participate. However, the range of views that participants contributed to focus group discussions when compared against similar themes identified in the literature review from a large number of other studies, suggests that any such bias if present was minimal. Participants ranged from WHS representatives, to farmers and other who would often express dissent about contemporary approaches to WHS in the primary industries. The limitation with the data from both the Grains and Meat Processing industries include the small number of representatives that engaged in the focus group process. However, those who were able to contribute did illustrate issues for their industries that not only feature industry specific information, but also fit within the general concerns of primary industries and producers relating to the implementation of successful WHS programs in their enterprise.

Results

The project was designed as an iterative, multistage process of data collection and analysis. In order to best represent the results for this project, this section is divided into subsections, reporting on each phase of the Delphi process. These subsections include the results from:

- The literature review
- The focus group sessions and the conference workshop
- The final Delphi survey.

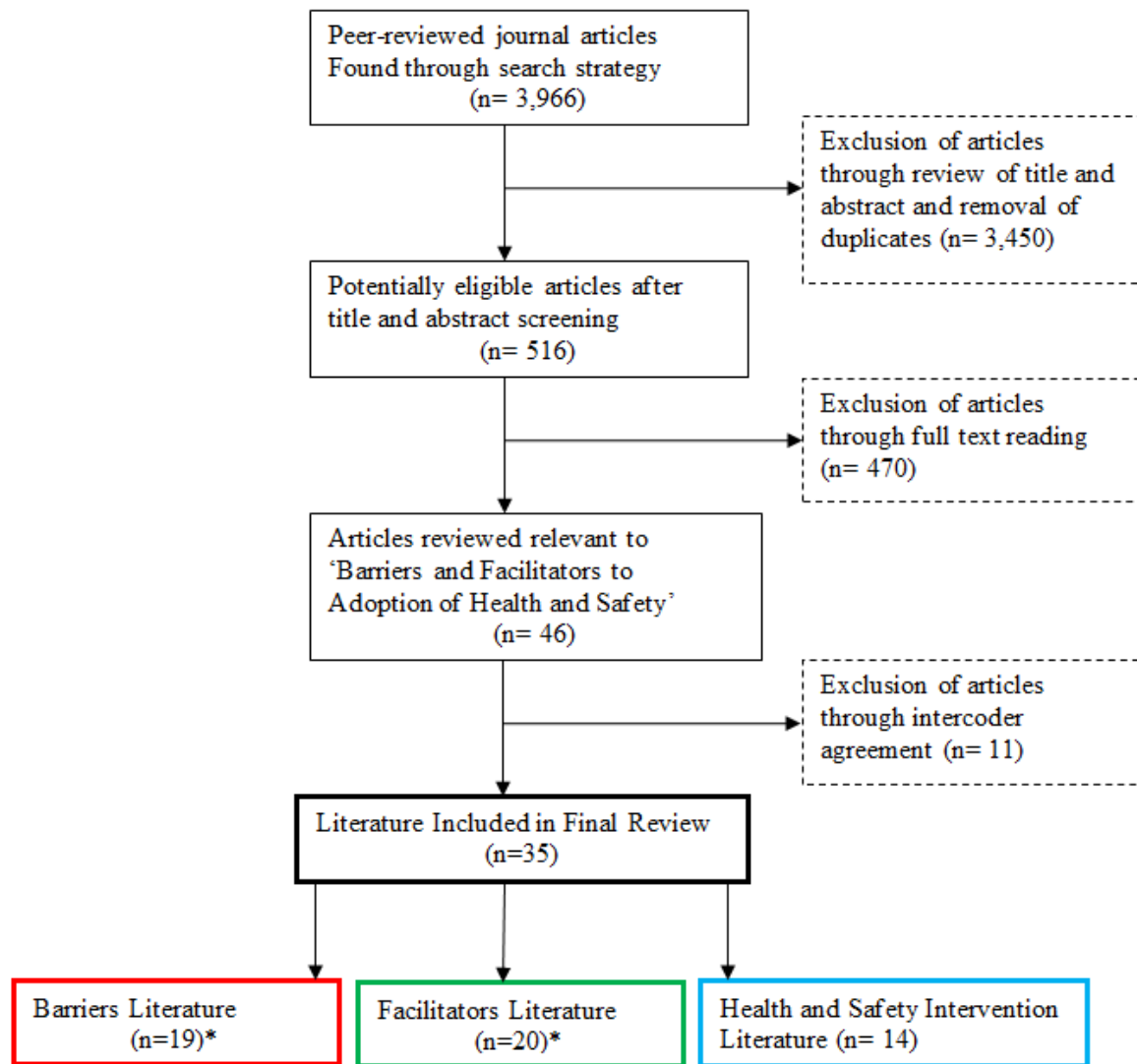
Literature Review

Consideration of current knowledge regarding the barriers and facilitators to adoption of safety practice began with a review of the peer-reviewed and grey literature, from national and international sources.

Figure 5 describes the process used to exclude and reduce data until the most relevant pieces of literature were identified for review. The search strategy produced 35 articles of direct relevance to this research. The articles included studies of differing methodological approaches, but all were included on the basis of their reporting of the barriers and facilitators that were documented in the course of designing, implementing or evaluating programs or initiatives to improve the health and safety of those working in agricultural and fisheries industries (Appendix 2).

The majority of the articles are from the international literature (n=31), and focus on interventions in a range of locations, including the United States of America, Canada and parts of Europe. The Australian literature was significantly smaller in number (n=4)[23-26], indicating a potential lack of peer reviewed evaluation or documentation regarding the difficulties of implementing health and safety practices. It is important to note, therefore, that the ideas and programs investigated in this literature are not necessarily transferable, nor generalizable, as the political, legislative and social climate surrounding agricultural and fisheries enterprises in the USA and Canada are different to the Australian context.

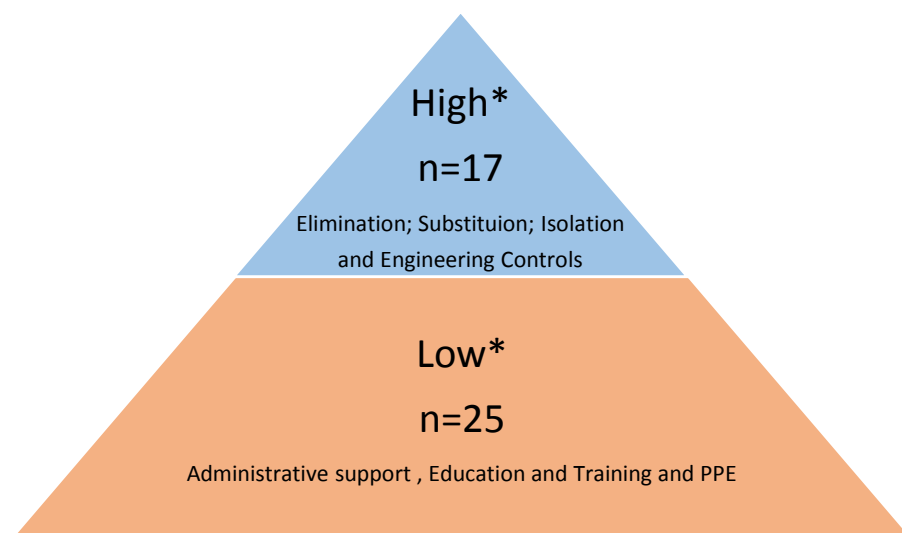
There were 11 articles regarding tractors and ROPS[27-37], which is not surprising, given that tractors have been a leading cause of fatalities on farms in high income countries such as Australia, USA and UK for many years.



* Eighteen of the articles included in the final review feature *both* barriers and facilitators leaving one article that only discusses barriers and two which only discuss facilitators.

Figure 5. Literature Review Search Results Flowchart

There were 14 articles which described the implementation of an intervention or evaluated interventions for safety. However, there was limited variation in the level of controls used to solve identified safety problems. A summary of the type of control and how many papers addressed this level has been undertaken by the research team (Figure 6).



* Seven articles include both high and low controls

Figure 6. Issues Discussed in the Peer Reviewed Literature and Alignment with Levels of Control

There were 17 articles which addressed high level interventions such as elimination, substitution, isolation and engineering controls, however there were a larger number which incorporated lower level controls such as administrative support, education/training and PPE.

A summary of the peer-reviewed articles which described barriers/facilitators to adoption of safety practices, and the articles which were focused on intervention strategies, was also undertaken (Table 1). An in depth thematic consideration of the barriers, facilitators and intervention literature can be found in Appendix 3, Appendix 4 and Appendix 5 respectively.

Table 1. Level of Control by Research Issue in the Peer Reviewed Literature

| Level of Control | Research Issue | | |
|------------------|---------------------|-----------------|----------------------|
| | Facilitator n=19 | Barrier n=20 | Intervention n=14 |
| High | 8 | 7 | 8 |
| Low | 14 | 13 | 10 |
| References | [24, 26, 31-47] | [23-26, 32-47] | [27-30, 48-57] |

* Some articles included both facilitators and barriers (n=18) as well as high and low levels of control (n=7).

Thematic Analysis: Peer-reviewed literature which addressed barriers/facilitators and interventions for safety

There were ten major themes which emerged from the peer-reviewed literature (the most frequent of these themes were design of safety messages, negative social influences and awareness and reasons for action [Table 2]).

Attitudes to change

Early articles from the collection address influences to change, usually regarding particular interventions or modifications. Kelsey et al. explored farmer attitudes to rollover protective structures (ROPS) as tractors posed the leading risk for unintentional death and injury on farms internationally at that time[33]. According to Kelsey et al (1996), farmers were reticent regarding the fitting of ROPS to their tractors, not necessarily on the basis of cost, but due to a range of other influential factors, including specificity such as the age of the tractor and the age of the owner, effects to the usability of the tractor post-fitting and storage concerns (whether current storage would have to be modified as a consequence of the increased height of the vehicle post-fitting of ROPS)[33]. The study revealed a lack of knowledge regarding the cost to purchase and fit ROPS and a refusal by many farmers to accept ROPS as a safety intervention regardless of the cost, as significant barriers to universal uptake of this intervention.

This was similar to research on grain auger safety in Queensland, Australia, which showed that farmers believed that grain auger injuries could be explained by the operators' state of mind and attitude to safety, or to the age, type, shielding and operational mobility of augers (as older augers were less likely to have safety shields installed, and mobile augers were perceived to be more likely to cause injury)[23]. Later studies by May et al. (2006) indicated that many farmers were at the pre-contemplation stage in terms of their readiness to accept ROPS retrofitting to their tractors in New York State, indicating that attitudes had altered very little in the course of a decade after running extension and awareness campaigns in the United States[34]. This was accompanied by a follow up article regarding the perceptions of risk, barriers and motivators for retrofitting in the same community, which indicated that safety strategies needed to be more convenient and that the cost to retrofit and the age of the tractor all combined to inform the decisions made by farmers about retrofitting[35]. There was a perception among farmers that while ROPS were an important safety initiative, they did not see the personal relevance to their situation. The denial of personal susceptibility to rollover was addressed in the development of a social marketing campaign[30].

Table 2. Summary of Thematic Analysis of Peer-Reviewed Literature

| Theme | Summary of Theme | Literature with theme |
|---|---|------------------------------------|
| Attitudes to change | Attitudes held by producers regarding the perceived severity/seriousness of identified problems and ensuing attitudes toward the need for changes to workplace safety practice. | [23, 30, 33-35] |
| Cost as a barrier to uptake | Perceived costs (financial, time and degree of inconvenience) to make changes to workplace safety practices. These costs were considered by producers relative to the perceived benefits of the changes made, with a particular focus on productivity and profitability. | [27, 31, 32, 37, 44, 45] |
| Attitudes of complacency and acceptance of risk | Complacency and acceptance of risk in the workplace based on perceived seriousness of the problem and perceived susceptibility. | [38, 40, 43-45] |
| Negative social influences | The impact of social norms and perceived negative influences of beliefs held by other individuals or the population group as a whole. | [36, 38, 40-44, 46, 52] |
| Perceptions of control over circumstances | Producers' perceived level of control over their circumstances and self-efficacy to make changes to workplace safety practices. | [39] |
| Design of safety messages | Efficacy of different types of safety message design and diffusion. | [28-30, 37, 48, 49, 51, 52, 55-57] |
| The role of social networks and personal connections | The influence of social norms developed within the social group, which influence individual ways of thinking about susceptibility. | [53, 54, 56] |
| Best practice management systems and whole of production change | The implementation and evaluation of Best Practice management systems and the integration of safety systems throughout enterprises. | [25] |
| Awareness and reasons for action | Stated awareness of problems and the interaction between awareness, perceived susceptibility and motivating factors which would influence change. | [26, 32, 47, 48, 50, 51, 57] |
| Safety culture and credibility of safety messages | The development of a culture of safety – i.e. the development of a comprehensive and pervasive way of understanding safety as a fundamental component of production processes, which is influenced by the credibility of safety messages and who delivers those messages. | [24, 28, 41, 44, 45] |

Cost as a barrier to uptake

Despite cost not emerging as a significant barrier in the Kelsey et al article, there are a number of articles which suggest that temporal and financial limitations do pose significant barriers to the implementation of improved health and safety practices on farms[31, 32, 44, 45]. Often, the lack of

time or money to implement solutions to health and safety problems was suggested as a major issue that restricted farmer's abilities to change their practices or environment. Consequently a number of studies explored financial incentives such as tax breaks, insurance reductions or compensation as a way to circumvent this problem. In all cases, farmers indicated support for such financial incentives, but also indicated a degree of reservedness, depending upon the source of such compensation. In a study by Thu et al. (1998), many farmers indicated that financial incentives in the form of insurance reductions would be beneficial, but also expressed a degree of scepticism about the motivations of insurance companies in providing such reductions[45].

Lack of time, financial limitations and fear of the unknown were also key themes in farmer perceptions of their personal health, as indicated by Thu et al. (1998)[45]. In the Certified Safe Farm program developed and tested by Thu et al. (1998), the coupling of financial/insurance incentives, personal health screening and the stepped development of action on safety priorities were all considered crucial parts of the development of comprehensive safety systems on farms[45]. Hallman (2005) examined the level of financial incentive needed to motivate the maximum number of farmers to retrofit their tractors, as well as assessing any hidden barriers to implementation[27]. Hallman found that farmers who could voluntarily retrofit ROPS were willing to wear some of the cost burden of doing so – the acceptance rate of retrofitting was highest per dollar paid, and an incentive of between 75 and 90% funding toward the costs of fitting had the highest rate of acceptance among farmers[27]. The study also discovered a number of issues with the sourcing and fitting processes which created a sense of 'hassle' for farmers – the number of quotations sought for the cost of retrofit kits and the variation between kits, the variation in prices and shipping costs (especially as it became notably more expensive from official advised estimates), access to facilities or expertise to perform the retrofit and putting the tractor out of action for a prolonged period, outweighed the benefit of fitting for many of the participants[27].

One proposed solution to the ROPS fitting issues was studied by Sorensen et al (2011), regarding the feasibility of a trade-in scheme for tractors which could not be fitted with a ROPS (approximately 20% of tractors without ROPS)[37]. Sorensen et al (2011, p.30) found that farmers (and tractor dealers) required 'persuasive financial incentives to participate in a trade-in program', while industry stakeholders stated that the economic burden of funding such a scheme, and the removal of a large number of tractors from workplaces may exacerbate financial limitations, not to mention what to do with the older tractors post-trade[37].

The presence of economic worries and stress on the farm was related to the safety decisions made by farmers in studies by Hagel et al. (2013) in Canada[31]. The study found that there were elevated levels of risk associated with building maintenance and use of safety shields on combines and augers, where there were elevated levels of financial worry[31]. This did not apply to ROPS on tractors, ladder safety cages on grain bins, or barriers around water hazards. Hagel et al. (2013) stated that farmers must be supported to invest in physical safety on the farm and that they needed evidence that any safety intervention was a sound health management and economic investment decision[31].

Attitudes of complacency and acceptance of risk

Many studies raised attitudes of complacency and acceptance of risk in agricultural settings as a significant barrier to change. In an early study by Brush et al. (1997), New Zealand farmers expressed their decisions or desire to participate in agrichemical safety training. It found that factors significantly negatively associated with their decisions included overconfidence, perceived depth of experience and ambivalence toward their personal health[38]. In contrast, positively influencing factors included whether or not staff would be handling chemicals, safe and efficient use of chemicals (in terms of storage and access) and impact on their ability to export their goods to certain markets (some markets require growers to keep records of chemicals used on their produce), which would also affect their choices[38]. The study identified a major barrier to uptake of agrichemical training was farmers' current perceptions of their practices as being 'safe and efficient', even if practices did not comply with recognised safety standards. Inhibitions to the recognition of a problem included "the effects of

uncertainty about both the consequences of their practices, and the benefits of agrichemical training” [38].

In Thu et al. (1998), farmers indicated that they did not believe they would get hurt and thus resist any perceived unnecessary alteration to the environment. There was also a fear that by conducting independent safety audits, unknown safety hazards may be uncovered. These would then need to be addressed, indicating a possible fear of failure to recognise and change hazards[45]. Fear of the unknown impacts of unrecognised hazards which they may be exposed to over time was also a feature of work by Seiz and Downey (2001)[44]. In this study, there was a degree of sophistication in the responses of farmers regarding their understanding of the nature of occupational risks and the causes of accidents, that indicated a preference for complexity in explanations of causes, rather than simplistic or linear descriptions of the causes[44]. Whilst this may indicate a willingness to explore the mitigating factors for incidents, it may also indicate an unwillingness to see opportunities for changes to be made – the more complex the situation becomes, the less they will be perceived as amenable to easy changes that make significant impact to the circumstances of the original incident.

In a study conducted in 1994-1995, Reis and Elkind (1997) discovered a professed difference in safety behaviours between farmers who had prior exposure to minor injuries on their farm, than those who had experienced major injuries on the farm[43]. The study also suggested that it was occupational stressors, rather than lack of safety knowledge, which impacted on farmer attitudes to safety precautions (Reis and Elkind 1997, p.194). Reis and Elkind (1997) explored the relationship between occupational stress, habitual work tasks, attitudes toward safety and perceptions of behavioural control, and found that as stress increased, attitudes toward safety and behaviour control perceptions decreased[43]. Green (1999) identified that the need for farmers to feel in control, competent and present-oriented also diminished their ability to perceive risks on the farm, while many also reflected on the comparative improvement of generations of farmers in their safety conduct[40].

Negative social influences

Negative social influences (such as the example set by previous generations of farmers)[36], discomfort and awkwardness of personal protective equipment, combined with tendencies to minimise perceptions of one’s own risk led to variance in the level of engagement and interaction with farm health and safety initiatives. Alternatively, Green (1999) also found that farmers would be influenced in their safe work practices by the presence of children and wives, changes in their health, abilities and attitudes associated with age, and with increasing experience of the consequences of not taking precautions[40]. Elements of experience were present in a large number of the studies[38, 40, 43] and the reliance that farmers place on their experiential knowledge of farming issues to provide authenticity and nuance to the issue, which those unexperienced in agrarian pursuits could not access or provide.

Farmer perceptions of control over health or safety issues were identified by a number of studies as related to the uptake of health and safety practices. Wadlud et al. (1998) found that farmer beliefs about the preventability of an issue, and their indicative level of concern about the issue “were strong correlates” (p.20) on the implementation of prevention activities on that issue (in this case, occupational health problems such as respiratory disease, noise induced hearing loss and skin cancer)[46]. In the work of Green (1999) and Seiz and Downey (2001) it was established that macro level factors are significant barriers to adoption of health and safety initiatives, with complex government policies on occupational health and safety, condescending attitudes of governing bodies and safety information lacking credibility having a stated impact on perceptions of health and safety practices[40, 44].

In one hearing loss prevention intervention (Gates and Jones 2007), it was found that farmers neglected to wear their hearing protection, due to inconvenience, discomfort and because it created new hazards (limiting communication with others), which was echoed in research by McCullagh and Robertson (2009)[42, 52]. The Gates and Jones (2007) program indicated short term success with a recorded increase in the uptake of hearing protection within the first 1-2 months following the

intervention, while the McCullagh and Robertson study reported that farmers made hearing protective PPE readily available and highly accessible and visible, while attempting to influence others' use of the devices, to overcome the common barriers to use[42, 52]. But as noted by Kaustell et al. (2011), indications of lasting or long term effectiveness of such interventions are limited within the literature[41].

Perceptions of control over circumstances

Perceptions of control were also examined with regard to farmer responsibility for safe cattle production in studies by Ellis-Iversen et al. (2009)[39]. The study found that younger farmers or those with larger herds tended to place responsibility for financial assistance to implement zoonotic controls with industry, over governments[39]. Although the farmers in this study indicated that they believed zoonotic controls to be very important to the process of producing cattle, half of these farmers indicated no intent to implement controls; those who indicated they would implement controls, had not to date, due to lack of knowledge or economic pressures[39]. They also indicated that cultural pressures such as unrealistic expectations from society and governments, fear of losing consumer confidence in their products and a general ignorance of farming by the broader community all contributed to a reluctance or loss of self-belief in the ability to implement controls. The advice of veterinarians was a significant motivation for those with no intent to control. For those farmers with intent to control, financial incentives and consumer demands were significant factors for change[39].

Design of safety messages

The efficacy of different types of safety messages was tested by Morgan et al. (2002)[29]. Narrative-based and fear messages in combination were evaluated more favourably by farmers than messages that simply inform or utilise statistics to create scenarios for change. However, it is noted that any campaign that utilises fear appeal must contain four elements: The creation of perception of a threat, demonstration of the severity of the problem/its consequences, demonstrate how to avoid this threat, and a course of action for the receiver of the message[29]. Without any one element, the message will fail to be effective or persuasive.

There are other studies which outline the effective use of campaigns that utilise multiple approaches to communicate safety messages, including print mass media, public events, university extension, word of mouth [49], which found that increased information flow to operation managers could be a way to supplement traditional injury control efforts (which the authors believe could be applied across high-risk industries)[49].

Other studies reported different combinations, including noise assessments, educational sessions mailed reminders with brochures, placement of hearing protection on farms for a hearing loss prevention intervention[52]; development of a supportive social network with a focus on discussions about risk management[56]; social marketing interventions and incentives for tractor retrofitting[30]; a four year campaign disseminating information about three safety options for the dairy industry to managerial level[48]; expansion of a community health program with elements of farm safety reviews (as part of the Certified Safe Farm initiative)[55]; and the utilisation of fathers to teach young people about the use of ROPS seatbelts on tractors[28]. Examination of a three-year intervention to increase the adoption of safe practices for nursery crops (through dissemination of information about safety alternatives), showed that while awareness was increased across some of the practices, there was no indication of change in rates of adoption of these practices[48].

The role of social networks and personal connections

The development of a social network of farmers focused on risk manageability (through regular gatherings to analyse incidents and accidents, while a further set of farmers also received information about risk and accident consequences), indicated that the support of others led to increased safety activity and a concomitant reduction in stress and risk acceptance among the total sample. However, risk perception and the perceived ability to manage risks did not change[56]. Community based

intervention programs were successful in improvements for eye safety among citrus harvesters in the USA[53, 54]. The use of peer models, educated to provide advice and assistance to workers to treat or prevent eye injuries was a significant step toward the improvement of eyewear and improved rates of uptake of eyewear[53, 54]. By utilising an adaptation of the community health worker model and developing the skills and knowledge of those working in the field, peer models not only educated, but also assisted their fellow workers. This created a supportive environment which fostered increased use of glasses while harvesting, overcoming common misconceptions about eyewear being an impediment to the harvesting process[53, 54].

Best practice management systems and whole-of-production change

The use of a hazards-based examination of the changes within the Australian Cotton industry revealed that the development of best practice management programs and WHS resources, in conjunction with legislative or regulatory requirements, were significant drivers of change in the industry[25]. Financial incentives to retrofit ROPS on tractors, rebates for repair or replacement of PTO guards and discounts on workers' compensation insurance also contributed to improved safety on Cotton enterprises[25]. Switching transportation options from quad bikes to side-by-side utility vehicles, changes to farm roadways to better accommodate wider equipment, driver safety induction and PPE use (helmets and seatbelts), improved irrigation systems and picking systems and equipment were some of the improvements made to the work environment that created safer conditions for workers, and better productivity for the enterprise[25]. The recognition of the interdependence between technologies and improvements across entire production systems was an important aspect for improving Cotton farming safety[25].

Awareness and reasons for action

In more recent years, the shift has been to examination of prominent barriers to the use of safety equipment such as ROPS[32] and PTO driveline shields[47], the evaluation of information dissemination strategies[57], and the emerging small or boutique farming enterprise and its differing needs for safety advice and communication styles[26]. While the contemporary impediments to the uptake of ROPS in two states of the USA (Vermont and Pennsylvania) do not differ significantly to earlier concerns (the leading barriers being cost, perceived need and limited use of the tractor in the case of older farmers), there was an increasing concern about liability and the safety of workers when using tractors near hills or ditches[32].

Increased risk of liability to others was highly motivating for farmers to install ROPS on their tractors in these two states[32]. In the case of PTO shaft guards, farmers reported being highly aware of the dangers posed by unguarded machinery, but that cost and time were primary barriers to installing the guards, along with previous negative experiences of the shields due to their design[47]. Farmers were more likely to either accept the risks or create alternative work strategies than they were to replace or fit the shields[47]. The dissemination of safety improvement information over a longer period appeared to have a significant impact on the uptake of safety solutions for Wisconsin farmers (as compared to the New York State farmers)[48]. The study also found that, while extension agents were likely to make an impact in the early dissemination phases of the new technologies or interventions, as more farmers became familiar with the interventions, the reported impact of extension activity dwindled[48].

The development of small farming enterprises, which are often non-commercial and lifestyle based developments, emerging on the 'peri-urban fringe of rural communities' are an important new agricultural set, which have not been engaging with traditional health and safety programs for farming sectors[26]. While this group of farmers face similar hazards to those of larger enterprises, they are likely to need assistance to understand legal obligations for health and safety, and the ways to reduce risk on their enterprises[26].

All of these articles emphasise the need for complex intervention styles, using multiple communication channels and types of information and education/intervention, for success. The complexity need not be

in the messages themselves, but rather in the way that all elements are woven together to create a composite learning and awareness experience for farmers. This approach touches on their own reserves of resilience, self-reliance, ability to be innovative in ways that suit their circumstances, hits at their sense of community, family, fear of the unknown and unintended consequences. It also provides practical actions to move toward solutions which should see an increase in safety practices and a reduction in non-intentional injuries and deaths. The question is, with these many successful programs of information, awareness and education, providing known solutions to known problems, why is there still a lag in uptake of many safety solutions in the Australian agricultural and fisheries industries?

Safety Culture and the credibility of safety messages

Durey and Lower (2004) provides an insight into this issue: that there is a need for safety interventions and solutions to be integrated to create a culture of safety in agricultural and fisheries enterprises[24]. Farmers in this study identified a safety culture but as a ‘reflection of their autonomy and socially constructed identity’ as farmers[24]. Farmers construct themselves as being highly practical and require evidence of the ways that changes to their practice will improve safety, production, or income, as well as getting the impression of changes being realistic modifications to practice or not[45].

The integration of the individual characteristics of the farmer, alongside limited resources and the slow incremental evolution of the farm environment (where older hazardous areas of the farm exist alongside newer, safer improvements), was identified as an important aspect of studies by Kaustell et al (2011)[41]. Understanding the farm family as a site for potential safety change facilitation, acting on the shared sense of interdependence and mutual ownership of the land (Familial-ecological perspective) was identified by Seiz and Downey (2001) and more recently by Jinnah et al (2014) as an effective communication and development strategy for safety promotion[28, 44]. Credibility is highly valued among agrarian populations and credibility is borne of personal experiences of agricultural life[58]. Without such perceived credibility, any safety messages will fail to overcome the barrier of farmer autonomy. Thus, messages developed by knowledgeable others, such as agricultural inspectors, academics and policymakers needs to be authenticated by farmers, for ready acceptance of the messages. This can be challenging, but could be facilitated by community and industry level consultations and collaborations.

Grey literature review

A review of grey literature regarding barriers and facilitators to the adoption of WHS practices was also undertaken. For the most part, RDC websites and other related industry and government websites, such as Safe Work Australia, focus on the provision of information and resources for the implementation of safety practices and systems, but do not address the factors that impede or motivate the uptake of safety programs and practices. However, there were some noteworthy reports, many of which are a part of the RIRDC collection [12, 59-65].

Implementation and evaluation of WHS training program

The Managing Farm Safety program was a national farm safety training initiative, which was implemented and evaluated in the late 1990s[59]. A survey conducted with over 200 of the participating farmers indicated satisfaction with the training and accompanying resources. There were indications of barriers which impeded implementation of safety on the farm, which included farmer attitudes, cost, lack of training and educational opportunities, age and design of farm machinery, workforce issues, deficiencies in performance of government departments, inconsistent support from industry bodies, and competing priorities on the enterprise (p.viii)[59]. The report recommended targeting less depressed areas of the primary industries initially to begin the adoption and spread of information (suggesting that the less depressed sectors would be potentially more receptive to safety messages)[59]. There were also suggestions that any safety messages developed should be accompanied by possible solutions at reduced costs, the provision of a ‘rural relief’ financial support to encourage training and insurance incentives.

The report also suggests that the marketing of farm safety should be conducted in such a way that it linked in with other competing, higher ranked priorities of farmers, safety messages for agricultural support industries and the improvement of PPE (both usability and accessibility)[59].

Farmer and Fisher health and safety

There were four noteworthy reports which provided insight into the health and safety of those working in agriculture and fisheries industries. A 2006 report from the Australian Safety and Compensation Council [65] indicated that farmers and fishers' attitudes were a significant barrier to safety change, including indications that safety was a relatively low priority for those interviewed. The value of autonomy and personal experience in the agricultural and fisheries industries was also a barrier to change, as WHS was "seen to undermine these values and are likely to be met with resistance" (p. 2) [65]. A mix of marketing strategies, which increased the threat level of injury and increasing the perception of benefits from making changes were stated as two important elements in communicating safety messages. Localised, small scale initiatives were also reported to be a favourable approach to safety initiative development[65].

In response to the limited literature on health and safety in the Australian Fisheries industry, a report documenting contemporary WHS insurance claims in the Fisheries industries, and known WHS interventions which were in existence between 1998 and 2008 were examined[64]. The report found that OHS awareness varied throughout different states of Australia, and that fatal injuries (aquaculture) and non-fatal injuries in marine fishing were increasing. Among the recommendations from the report were indications of training and communication strategies for increased awareness of safety in the Fisheries industries[64].

A national survey of farmers provided baseline data regarding health, safety and mental health awareness [63]. The survey found that only 24% of farmers had implemented a farm health and safety plan. While the majority of farmers had implemented known safety solutions such as ROPS and PTO guards, 60% of farmers did not wear seat belts when driving on the farm. The report concluded that there was significant scope to enhance the health and safety of Australian farmers[63].

The ways that farming and fishing communities sought help for their physical and mental health was documented in a multisite community audit style study[62]. The report indicated that these communities faced significant challenges relating to timely access to health and mental health services in their communities, and that collaborative approaches to improving this were needed across levels of government, industry and community[62].

Farmer perspectives on financial incentives for safety change

In 2003, farmers were invited to a round table discussion to explore the kinds of financial incentives that would encourage them to adopt improved workplace practices with regard to safety[60]. Discussions were focused on four types of financial incentive: insurance discounts, market access and price premiums for products from accredited farms, discounts on other farm inputs, and collaborative programs which reduced the costs associated with accreditation (p.vi). The report found that the costs of accreditation were high and not adequately compensated for by reductions in insurance premiums. Few insurance agencies indicated support for such accreditation and policy price reductions. The study also concluded that only those farmers who were already contemplating changes would be encouraged by market based incentives[60].

Review of the what has worked and the strength of evidence

Assessment of existing farming safety programs up to 2009 indicated that there was a wide range of 'successful' programs available, which provided targeted support in the areas of awareness raising, information and training provision, personalised services, incentive based programs, regulation based programs and improved design of work systems[61]. There were varying levels of reporting to indicate in what ways these programs were successful. But some of the factors which led to farming practice

changes included media campaigns, course participation and follow-up, rebates in conjunction with increased regulatory action, audit processes that included deadlines, specific plant audits on farms, and government partnership with manufacturers for design changes[61].

Previous research identified research and evaluation on farming and fishing health, safety, and mental health programs of relevance to Australian primary producers between 2008 and 2010[12]. The report showed that there was varying levels of strength in the evidence for success in farming and fishing health and safety programs, and noted that information on initiatives for the Fisheries industry was very limited. The report developed ten principles to guide the effective adoption of safety change on Australian farms, and asserted that these principles could also be applied to designing solutions for the Fisheries industries[12].

1. Use the range of known effective drivers that prompt action – Intent
2. Anticipate and deal in a practical way with any real and perceived barriers to action – Barriers
3. Ensure farmers have the necessary information, skills, and capacity to take the recommendations action – Skills and Self-efficacy
4. Define the positive outcomes farmers can expect from adopting safety systems and approaches – Outcome expectancies (attitudes and beliefs)
5. Build programs on the characteristics that farmers recognise as positive – for example farmer individualism and autonomy (Social norms and self-standards)
6. Recognise and deal with strongly held feelings held by some farmers about safety – Emotional reactions
7. Industry associations and organisations have key roles to play to ensure adoption of safety on Australian farms
8. Governments have roles to play in partnership with industry to ensure adoption of safety on Australian farms
9. Local community action groups and community organisations have roles to play to promote adoption of safety on Australian farms
10. Empowerment and participatory research continues to be the most relevant manner of development of innovations, strategies, programs and approaches to improve farm safety in Australia[12].

The grey literature reviewed reports similar barriers and facilitators for the adoption of improved workplace practices as is found in the peer-reviewed literature. This high degree of consistency indicated that these categories are consistent with universal themes across industries and geographical locations. However, it was unknown whether these categories were still valid in contemporary primary industry communities. These categories and concepts were tested in the second phase of the research, in focus group discussions with primary producers and industry representatives.

Summary

A review of the peer reviewed and grey literature regarding the barriers and facilitators to adoption of health and safety innovation in the primary industries provides a consolidated understanding of the identified issues that face farmers, industry and government when it comes to translating WHS legislation into action on the ground. It appears that personal attitudes to safety, social influences and factors such as time and cost of implementing changes are major impediments to most safety campaigns. The development of safety messages that achieve their intended reach and impact is also a challenge, and the best ways to communicate and follow up with best practice management systems

feature as facilitators to change. However, the scant literature which evaluates programs of change indicates a need to explore these issues with Australian farmers and fishers, in order to establish the current attitudes and practices of those working in the primary industries. However, this should occur in the context of implementing and evaluating solutions.

Focus Groups

There were a total of nine focus groups conducted, with 88 participants at which point this form of data collection ceased due to saturation of themes. There was no new data emerging from the focus groups and all industries had been represented in at least one focus group session. The details of the focus group sessions, excluding the workshop which served as a final step in the process, highlights a large proportion of the participants were male and a high response rate amongst the broadacre and fisheries industries (Table 3).

It is important to note that, for the purposes of the analysis, representatives from the Cotton and Grains industries were grouped together under the category of 'broadacre farming'. This was due to the fact that there were a small number of Grains industry representatives present at the focus group sessions, and these representatives were present at a focus group that combined the two industries. These industries are also characterised as having similarities in terms of risks to safety, equipment and processes and seasonality.

Table 3. Focus Group Participant and Session Characteristics – Excludes Workshop Participants

| Demographic Characteristics | Focus Group Participants |
|--|---------------------------------|
| Gender | |
| <i>Male</i> | 52 |
| <i>Female</i> | 14 |
| Industry | |
| <i>Cotton/Grains</i> | n= 17 |
| <i>Fisheries</i> | n= 18 |
| <i>Sugar</i> | n= 10 |
| <i>Meat and Livestock</i> | n= 11 |
| <i>Meat Processing</i> | n= 3 |
| Average Duration | 100 minutes |
| Minimum Duration | 45 minutes |
| Maximum Duration | 132 minutes |
| Average Number of Participants Per Session | 6 |
| Minimum Number of Participants | 3 |
| Maximum Number of Participants | 12 |

A number of themes emerged during the focus group sessions, an amalgamation of the discussion of the barriers (Table 4 and Table 5) and facilitators (Table 6 and Table 7) across sessions has been undertaken with themes being organised according to components of the Health Belief Model[14, 66]. A summary of issues and hazards that emerged during discussion which are specific to the different participating primary industries is also provided (Appendix 7).

Thematic Analysis of focus group data utilising the health belief model

The Health Belief Model as outlined in the introduction to this report, was modified for the purposes of this project and formed the basis of the organisation of all phases of the research. This model is an ideal framework to utilise in the establishment of themes from focus group discussions in the modified

Delphi process, as it provides insight into the ways that the opinions of the participants can be understood as perceptions of their uptake of safety practices in the workplace. The results of the thematic analysis of the focus group discussions is therefore split into consideration of identified barriers and facilitators as they pertain to the Health Belief Model.

Barriers to adoption of safety changes – focus group data

There were five major themes relating to the barriers to adoption of safety strategies in the workplace, and a total of 26 subthemes. The major and minor themes, a description of the major themes and their content, are situated within each of the HBM factors and can be seen in Table 4 and Table 5.

Table 4. Thematic Summary of Perceived Severity, Susceptibility and Self-efficacy related to identified barriers (Focus Groups)

| Health Belief model factor | Thematic Summary Barriers | Theme Description | Theme Components |
|---------------------------------|--|---|--|
| Perceived severity /seriousness | Attitudes about WHS and safety practices | Negative attitudes toward safety in practice, including powerbroker attitudes, suspicion of advice coming from agencies or government with a vested interest, and the presentation of safety issues to the general public | Suspicion of government departments offering assistance Management attitudes toward WHS Hypocrisy in depictions of safety (commercial versus recreation/ personal safety) Complacency attitudes |
| Perceived susceptibility | Workforce issues | The nature of workforce supply and the need to train workers in safety practices | Seasonal workforce Scarcity of skilled labour Costly to train (continuous cycles of training) Managing contractors and discerning WHS responsibilities |
| Self-efficacy | Individual-level barriers | Barriers at the level of individual producers or employees. Includes physical and skills related issues, attitudes toward the propensity of individuals to control their own personal safety | Work ethic Education or skills based barriers Level of responsibility for own safety Inevitability (some people are just 'accident prone') |
| | Personal Protective Equipment | Attitudes toward the use of Personal Protective Equipment in practice. | Use and comfort of PPE Use of PPE substitutes |

Table 5. Thematic summary of Threats and identified barriers

| Health Belief model factor | Thematic Summary Barriers | Theme Description | Theme Components |
|----------------------------|---|---|---|
| Threats | Cost to implement changes | Costs to implement changes to safety in practice, including financial, temporal costs and hassle to make changes (ease of implementation) | Financial cost to implement changes Excessive time taken to implement changes Hassle of implementation |
| | Administrative burden | Considerations of the amount and type of administrative tasks related to WHS, and related audit processes | Administrative burden Fear of inspection and failure |
| | Access to safety information or resources | The ability to access trusted information about safety, including safety advice, programs, extension, education and information about legislative changes | Lack of access to information Confusion about safety information Trustworthiness of sources of information |
| | Legislative uncertainty | Expressions of confusion or consternation about legislative approaches to safety and enforcement of laws | Restricts innovative thinking about safety solutions Not knowing where to start with making changes Lack of understanding about the legislation or obligations at law Various interpretations of the law |

Perceived Severity/Seriousness

Perceived severity and seriousness of safety issues were highlighted in all focus groups, with industry specific issues outlined in Appendix 7. However, in general discussions throughout the groups it was identified that negative attitudes toward safety practice were perceived to be a significant barrier to creating safer workplaces.

The complacency of fellow producers was often raised, with indications that, while participants generally believed they exhibited adequate or better levels of safety, they all knew someone in the industry who didn't, and who took risk for granted, believing that 'bad things wouldn't happen to them'. While this concept touches on perceptions of susceptibility, producers discussed the

consequences of not mitigating for WHS risks, stating that they could 'lose everything' including their enterprise, or homes, due to the nature of investment:

The insurer said, we can insure you but if you kill somebody we'll come down and go through you with a fine toothed comb and if we find that you're negligent, you won't be getting any money. So it even makes you ask, well maybe I shouldn't even be doing this because there is a risk there and we're a small entity - could lose the house. (Fisheries)

...I would say with what they've got, most do try to do the - and they don't see it as a dollar sign; someone's going to take my farm off me if they get hurt here. (Sugar)

There were also expressions of negative attitudes toward WHS, especially relating to a suspicion of government assistance with auditing or providing advice on safety. A story of a free advice and information farm safety inspection that went 'bad' for one of the broadacre producers is an example of the kind of actions that generate such suspicion:

We spent the whole day with him, taking him round...so it was us directing the conversation and him providing information. Then we got a report back, which was just like an audit and it had - he'd sectioned the different things we talked about and it was like an improvement notice. He gave us three days to fix the high risk things, four weeks to fix the medium things, and we had to sign it. So my advice to anyone that isn't absolutely up to speed and - don't go there. Now, that was probably two years ago. I don't know whether it's changed, but I was disgusted. I was really disappointed... But he never followed it up, so we took his advice on board and quietly filed it away. I didn't sign anything and they never followed it up... (Broadacre)

Negative attitudes toward WHS originating from management levels and the impact this had on workers was a perceived barrier to effective and sustainable safety change:

I've heard blokes at Chem[ical safety] courses who are talking about systems they use, to use chemicals. They're atrocious, absolutely atrocious, and the management wasn't prepared to look at anything better at that time. (Sugar)

Discussions of the way that primary producers were depicted in the media and in the community regarding their safety record were also common. There was a sense of hypocrisy detected by the producers in these representations: it was perceived that when something went wrong on the enterprise, it was given more attention than recreational or everyday incidents that were not work-related. There was a related perception that the government spent too much time focusing on workplace safety, targeting producers unfairly and allowing citizens to injure or kill themselves without regard:

Interviewee 1: I get a little bit sick of the hypocrisy in society where if someone gets killed in the fishing industry we're already so over-regulated it's not funny, and yet we're quite happy to kill 1200 people on the road every year and nobody gives a rats bum, do they? Let's face it.

You read it in the papers and think, oh yeah - poor bugger's died there. Turn the page over and on we go. Yet, someone dies in the fishing industry and we've got to have an enquiry, and we've got to do this, that and everything else. It just seems a bit lopsided to me.

Interviewee 2: Yeah, you can't stand on a box on a building site, two feet off the ground, but you're allowed to jump up in the air on a football field, come down and break a leg, or severe an artery. You can jump in a boxing ring and punch the life out of somebody and cause them to have brain injuries. When are they going to apply OH&S to dangerous sports? (Fisheries)

Perceived Susceptibility

The susceptibility of producers and their families to injury or death in the workplace was a feature of many of the discussions, especially for sole operators or those with small enterprises employing small numbers of people. The acute nature of the threat of injury or death from unsafe practices was often linked to the fragile state of ownership of an enterprise, and the desire to protect loved ones and colleagues from harm:

I like the fact that people are going home. Preferably they're going home the same way they came. All intact. That's the one I drum into guys [unclear] do you want to be telling mum, dad, son that through something we did or didn't do, they're not coming home. Or they're not coming home with all their limbs. (Broadacre)

All focus groups featured discussions of workforce issues. There was a perception by many groups that skilled labour was in short supply, especially for those industries who shared geographical locations with mining interests.

Well about 15/20[years] ago they weren't being pulled to the mines for two or three times the money they are on now and a lot of our properties are in those particular coal, gas or whatever particularly in Queensland. There goes that 35 or 40 year old guy with a lot of experience and with machines he is now working in the mines and you have accepted the lower sort of level because he isn't quite experienced enough to go there yet so you're getting him, he is your most experienced guy. (Meat and Livestock)

The seasonal nature of harvest and other production phases meant that seasonal labour forces could be highly variable in terms of prior knowledge of the enterprise or industry, and of the safety requirements for each production type. Ongoing cycles of training to keep new recruits informed of the safety requirements was perceived as being continuous, costly and difficult to manage.

There were also concerns raised over the degree to which individual enterprises were responsible for the safety and the induction of contractors, in order to be compliant with WHS legislation:

We've had the same contractor out at the property I manage, since I've been there. I go through - I've got an induction form. We've had sections in it - well when I say, induction form, it's 12 pages long - and there's sections in it for him to make comments about the shed and things like that. It's up to him to induct his employees into the shed. It's a part of the - their induction is that he does the individual inductions for his employees. (Meat and Livestock)

Self-Efficacy

Individual-level barriers

Producers identified that the work ethic and attitudes of workers was critical to creating safe workplace environments and made mention of the fact that there were some people that simply did not fit in the primary industries, on the basis of skills set, attitudes and work ethic. There was also discussion of the ways that individuals needed to take responsibility for their own safety:

Well, of course you're going to take care of your crew to the best of your ability, but where does that stop, and his own sense of responsibility come into the picture? (Fisheries)

Some of these discussions featured comments about the ways that current levels of legislation may hamper the ability of individuals to make wise decisions with regard to their own personal safety on the job:

I just think by all this conveyance of OH&S you're actually taking something away from the working individual. You're robbing him of the capacity to take care of his own safety at the

end of the day. We're producing a generation of bloody robots that have lost their common sense, and it's getting worse. (Fisheries)

The sense of inevitability of injury for some individuals, who simply could not be protected, or were considered to be 'accident-prone' was also discussed:

...sometimes you will employ people who are walking accidents. No matter how much training you give them, and no matter how much instruction you give them, they can't seem to grasp simple safety measures. (Fisheries)

Personal Protective Equipment

The use and comfort of Personal Protective equipment was not a strong theme to emerge from discussions. There were some comments made regarding the way that workers needed to be encouraged to use their PPE and reminded at regular intervals about its use:

It's reminding blokes to put their safety gear on. They've got to document it and thinking more about documenting than making sure he actually wears it. It's like, put it on and if he says no, well, you've just got to document it. It's not so much about wearing it. (Cotton)

There was also discussion of the kind of PPE that was being used in some industries. While many acknowledged the use of standard PPE, some would use available substitute items, such as long sleeved shirts, wide brimmed hats, boots, etc. These choices were often made due to the discomfort of regulated PPE pieces, or due to convenience.

Threats

The threats to the implementation of safety changes included the costs to implement changes (this could be from the perspective of financial stress, lack of time or the hassles to implement changes). Discussion of the administrative burden faced by producers in terms of the paperwork and ongoing safety audits, co-ordination and meetings, training and other activities were all seen to pose a threat to compliance. Many producers were fearful of the result of inspections, due primarily to a fear that they might have missed a hazard or risk in their own safety management process. This could then see them liable for change notifications (with tight deadlines and significant costs), fines or other punitive measure. One such example of the varying interpretations of the law is demonstrated by a member of the fisheries industry:

...a workplace standards inspector has gone onto...an oyster farm, and he's done the audit of the whole place; their processing facilities and the processors there. Then, he's gone and had a look at the boat and he said, "Your lifejacket there - it hasn't got a light and a whistle on it".

The guy's said, "I don't need a light and a whistle - no, the regulations under the national standards for commercial vessels, because I'm solely in smooth or sheltered waters and it's daytime operation only, I'm not required to have that". He [the inspector] said, "Well, I'm saying you are".

When you get that sort of confusion between regulators or uncertainty too...This is just another example of what's going wrong. (Fisheries)

Facilitators

There were four major themes relating to the facilitators to adoption of safety strategies in the workplace, one of which included two subthemes. The major and minor themes, a description of the major themes and their content, and its positioning within each of the HBM factors can be seen in Table 6 and Table 7.

Table 6. Thematic Summary of Facilitators Identified in Focus Groups

| Health Belief Model factor | Thematic Summary Facilitators | Theme Description | Theme Components |
|--------------------------------|-------------------------------|--|---|
| Perceived severity/seriousness | Financial incentives | Different types of financial incentives discussed, including government and industry funded schemes, rebates, tax incentives and other options | |
| | Assistance with WHS issues | Kinds of assistance that would facilitate changes, including responsibility for provision and types of assistance | Government assistance |
| | | | Industry bodies assistance: Commodity and state based |
| Susceptibility | Enforcement of legislation | The effective and efficient enforcement of WHS related legislation as a motivator for change | |
| Threats | Presence of vulnerable others | The presence of vulnerable populations on the enterprise (children, visitors, older persons) as a motivator for safety change. | |

Perceived Severity/Seriousness

All industry focus groups contained indications that the most useful ways to facilitate safety change would be through the provision of financial incentives, such as rebate schemes on safety equipment or management systems.

But certainly, Richard, all the farmers - the 138 in that premium discount program - said that they had a small - there was a large industry and a small industry incentive scheme. They all said that they participated because there were financial gains and incentives by a reduction in the premiums. Even though some of them were very small, it was still an incentive for farmers to participate and be rewarded for participation in the health and safety programs.
(Broadacre)

The provision of impartial assistance from government (however most would prefer not government agencies) and industry bodies to comply with the paperwork and auditing components of legislative requirements were also a suggested strategy for increased adoption of safety practices.

As far as assistance, the reason I'm harping on that is that AMIC[Australian Meat Industry Council] itself has got funding from regulators [from when we've] put in an application to assist our members, whether that's educational information, preparation of having seminars, publications - even conducting regional workshops.

The fact is that we find that getting the information to them will assist them, but for sure it will come back to them to implement it at their workplace. So assistance in the sense of not giving them a book, because the last thing people want is extra paperwork - we've heard that many a time from members. It's more a case of for a practical point of view, how that assistance can be provided. (Meat Processing)

Perceived Susceptibility

The effective and efficient enforcement of legislation was seen as a facilitating factor for changes to safety practice on the enterprise. This was expressed through discussion of the way that those who are doing well should be encouraged to continue and review their practices regularly and that those who did not comply, should have the stated enforcement actions applied to them. This enforcement would send a clear message to producers that safety should be more highly prioritised in their workplaces:

So I think from an individual establishment perspective, whether this directly comes from a regulator and/or the government, is that there should be some, okay, it's a carrot approach to give benefit to those that are performing well. For those that aren't, as I said, you've got a mixture of those. You've got those that don't really have much of an interest in OH&S and let's see if an injury happens and, if it is, we'll deal with it, to those that are doing their best but, of course, injuries do occur for reasons beyond your control sometimes. For those that are - I don't think so much of the stick, I think - for the latter ones, I mean - I think more of a fact of assistance. (Meat Processing)

Threats

The presence of children, the elderly or visitors on the enterprise was suggested to be a highly motivating factor to ensure that safety management and practices were continually reviewed and performed to a high standard:

[A relative] came [to the farm] with his little ones and he put them on the quad with him. Three of them. I just said to [him], no, can't do that, sorry. He said, but I'm responsible. I said, no, you're on our farm. If something happens, it's our responsibility. So things like that, I think I've got more careful too. (Broadacre)

Table 7. Thematic Analysis of Self-efficacy and Facilitators Identified in Focus Groups

| Health Belief Model factor | Thematic Summary Facilitators | Theme Description | Theme Components |
|----------------------------|-------------------------------|--|---|
| Self-efficacy | Positive attitudes to WHS | Positive attitudes toward safety, including leadership in safety practices, communication and support, recognition of safe practice, and other positive drivers for safety attitudes | Leadership at the farm level on safety attitudes in the workplace |
| | | | Recognition of those doing well and things being done well |
| | | | Team approach to identification of hazards and solutions |
| | | | Generational shifts in attitude |

Self-efficacy

Positive attitudes toward WHS were identified as a major theme and included discussions of the ways that leadership in WHS could create safer workplaces in the primary industries. Leadership on these attitudes and actions at the enterprise level was perceived to be a major contributor to strategic management of safety issues, as was a team-based approach to the management of safety and the

recognition of hazards and risks in enterprises that had more than one person working on the enterprise:

Interviewee: I found the same with workers too. When we first started handing out our induction forms they thought, we should throw these in the bin, waste of bloody time. But after about two or three years a couple of the boys were saying, can you give us a copy of that so we can change it - and we did that for them - and they were using it at their own places there.

Producers emphasised the need to recognise and encourage those who are employing good workplace safety practices and the need to disseminate successful ideas and strategies throughout the industry:

...the industry itself needs to probably step up and start sharing solutions to things, because I've been to a few different companies and we're not doing things a hell of a lot different to what everyone else is doing in the industry, but everyone seems to think that they're doing something more secret than someone else. (Meat Processing)

There was also discussion of generational shifts in attitudes toward safety, with an overall emphasis on more proactive approaches to safety management and training.

Interviewee: Yeah, but the other big constraint I reckon is attitude. For me, with a father who has grown up in a different generation and trying to come back - and then say well we need to do things, need to document things - and he's just, why the hell are you doing that? It's different now because I've [unclear]...

Facilitator: How did you overcome that or change that in the...

Interviewee: I just tried to do it and then I couldn't get through - it's a bit like political negotiations [laughs], I got some things and was able to start doing some things and then just pushed my way in a bit. Then looking back - and some things I wanted to do and dad didn't are probably right, they were a bit - OH&S would've been the best thing to do - but they were over-the-top for what we could afford at the time but yeah...

Changes over time narratives

There were three major themes that emerged from focus groups discussions that touched on the changes that participants had seen regarding WHS over their time as primary producers. These were generational shifts in approach, legislative changes and the role of influential people for making changes.

Generational shifts in attitude toward safety were a recurring theme through most of the focus groups. Many producers indicated that farmers from older generations were reluctant to change their practices and that this led to complacency or negative attitudes toward WHS legislative requirements (both past and contemporary). There were indications that there was always an underlying tendency for farmers toward safe practice, especially when it came to raising children on farms. There were also indications that years of experience and the ability to be innovative in finding solutions to problems as they emerged was a highly valued part of being a primary producer. However, new regulatory requirements could place a dampener on this ingenuity. Many producers also indicated that the current and next generation of farmers-in-training, were changing their attitudes toward safety and were more aware of what was required to make a safe workplace culture on the enterprise.

The changing nature of WHS legislation (going from specific to generalised) was discussed across all focus groups, with special focus on the confusion that such changes make in creating a safe work environment in the primary industries. Many producers stated that the legislation created difficulties in knowing when to start and when to stop making changes so that maximum benefit could be derived (both for human safety and for profitability). There were indications that assistance from experienced

industry based people could be of benefit in the translation of changes into practice, in a trustworthy way.

The importance of significant others who encourage and demonstrate how safety can be enacted on the enterprise, whether it was other producers, social networks or extension agents was indicated by participants as being highly valued. This was despite the fact that the opportunity to network with others for safety innovation was limited and that extension agents are either in limited supply or no longer exist for particular industries. These people were regarded as trusted informants and trainers, who had experience in the industry and could provide practical advice in a manner that was conducive to making effective and efficient changes for improved safety.

Workshop

The workshop was held at the 10th National Farmsafe Conference in Launceston, Tasmania in October 2014 and included primary producers, industry representatives and academics. The workshop was designed to confirm the range of barriers and facilitators identified through the literature and focus groups adequately summarised the contemporary issues facing the primary industries. This also led to the identification of further barriers and facilitators that participants thought were missing from the initial set of categories. A summary of the results from this workshop can be found in Appendix 8.

The focus group data provides insight into the extent of the problems that primary producers face when deciding on their susceptibility to risk and the implementation of actions to mitigate those risks to personal safety. It seems that the major barriers that producers face include the cost, time and hassle to implement current strategies for safety practice, negative attitudes toward safety and the sheer administrative burden and confusion that current WHS legislations presents in practice. There are indications that attitudes toward WHS are changing, across generations of producers, and that group approaches to solution generation are improving leadership on WHS issues in these industries.

The data from focus groups and the workshop highlighted the perceived changes in attitudes toward WHS practice, especially generational shifts in attitudes and understandings of the importance of creating safe work environments. Changes in the legislative requirements and the nature of WHS legislation (going from specific to generalised) and the accompanying confusion this creates was discussed often in the focus groups sessions and emerged as a barrier to the implementation of safety measures. However, many of these discussions also made note of the significant contribution of extension agents and local producers that could cut through the legislative language and demonstrate the benefits of safety programs and provide everyday guidance and assistance with making changes on the enterprise. These influences, along with other facilitating factors, such as financial and practice based assistance for compliance with WHS legislation, consultation with primary producers in the creation of safety programs, and the efficient and effective enforcement of legislation were perceived to be significant motivators for making changes, and creating a culture of safety in the Primary Industries.

Delphi Process

The final stage of the adapted consensus method used for this research was to undertake a survey of producers and key stakeholders in each of the industries included in the study. The survey was designed as a final confirmation of the major barrier and facilitator categories created from the literature review, focus group and workshop data combined. A unique feature of the survey was the ranking of these identified categories for importance to the individual enterprise, to the industry and the ability for participants to reflect on the likelihood of these facilitators to make a difference to practice. This also included consideration of the timeframe and responsibility for implementation of such solutions.

Survey participant demographics

There were 50 respondents to the survey. The demographics of the participants according to gender, age and industry affiliation are shown in Table 8. The respondents were predominantly male, and the average age of respondents was 45.8 years.

Table 8. Demographics of survey participants

| Characteristics | Categories | Percentage (%) of total respondents |
|----------------------|-----------------|-------------------------------------|
| Gender | Female | 20.8 |
| | Male | 79.2 |
| Age | 18-24 years | 0 |
| | 25-34 years | 10.2 |
| | 35-44 years | 16.3 |
| | 45-54 years | 32.7 |
| | 55-64 years | 36.7 |
| | 65+ years | 4.1 |
| Industry affiliation | Beef | 12 |
| | Sheep | 14 |
| | Grains | 6 |
| | Cotton | 10 |
| | Sugar | 20 |
| | Fisheries | 12 |
| | Meat processing | 0 |
| | Other | 26* |

Note: * the 'Other category allowed participants to indicate their own industry categories, and included responses such as dairy, government and education.

54% of respondents worked on a farm or fishing enterprise, and the majority of these were medium sized enterprises (40.7% - enterprises with less than 10 employees) (Figure 7).

4. What is the size of the enterprise, based on the number of employees?

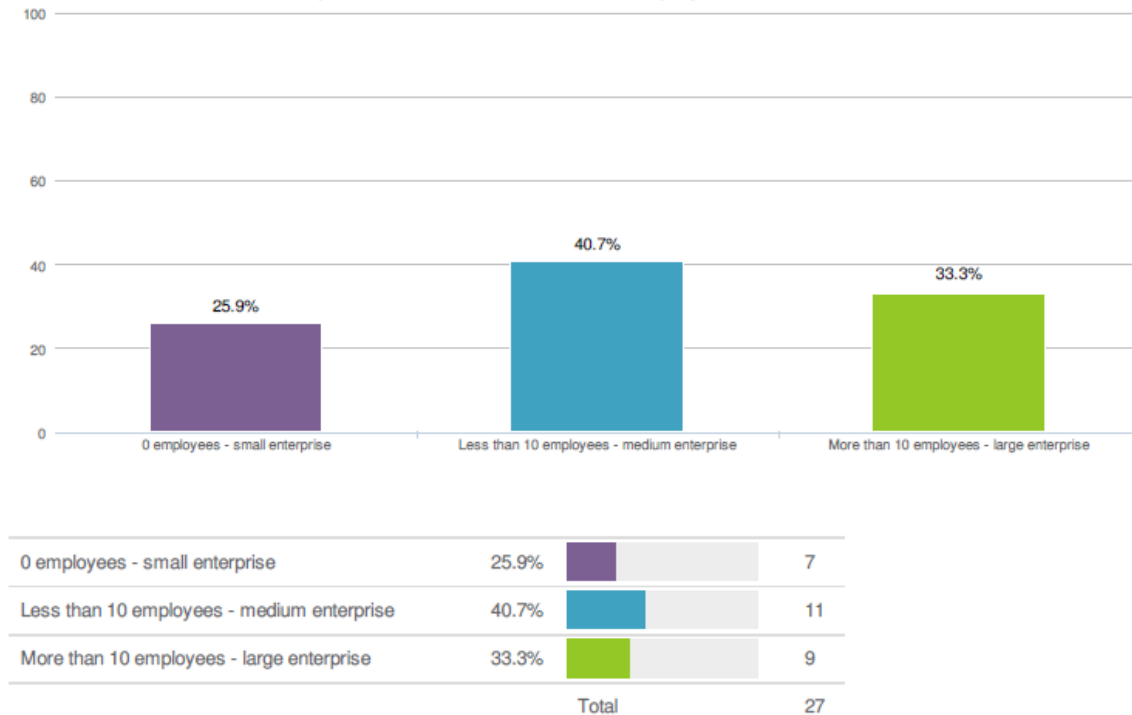


Figure 7. Size of enterprise

Barriers

The final list of barriers to the improvement of safety practice included:

- Administrative burden
- Attitudes toward OHS
- Changes restrict innovation
- Comfort of PPE
- Cost to make changes
- Hassle to make changes
- Lack of access to information about safety
- Legislative uncertainty
- Training costs
- Turnover of staff

Ranking of these barriers in the survey showed that the top three barriers to implementing safety changes at the level of the enterprise were: administrative burden, attitudes toward WHS and the cost to make changes. Figure 8 shows the average scores for each of the barriers categories. Table 9 shows the groups of categories based on high, medium or low scores.

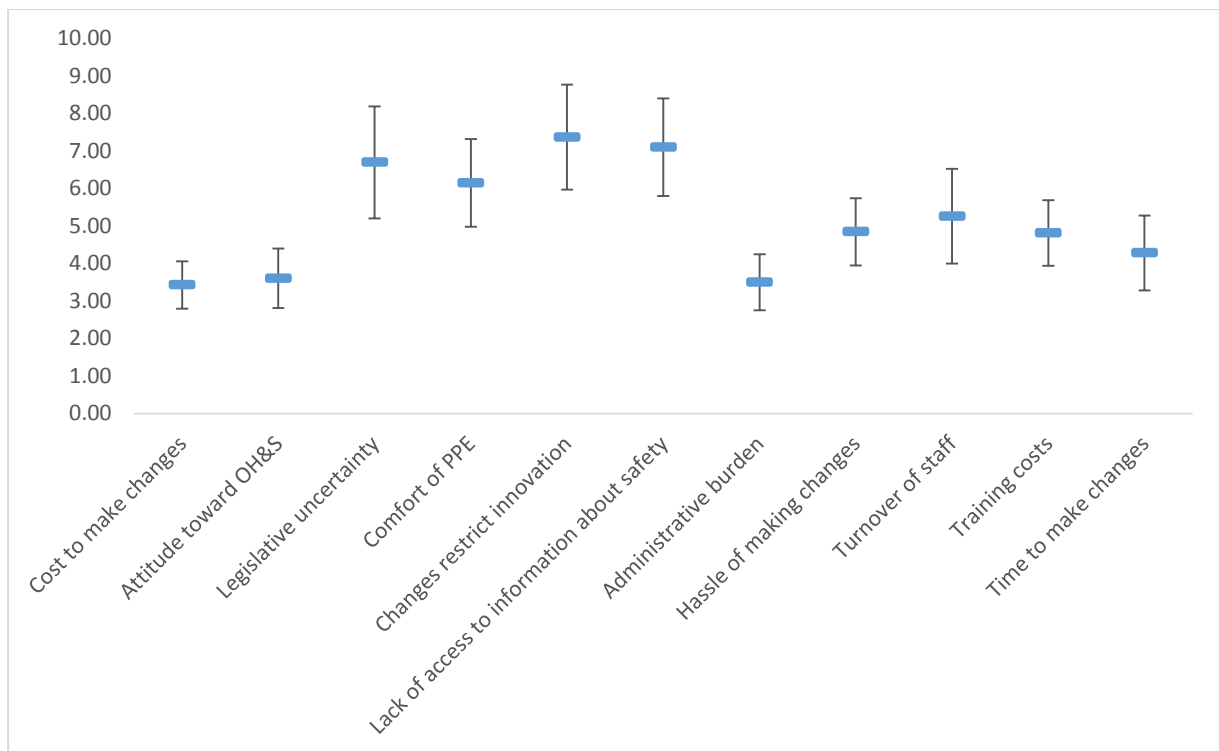


Figure 8. Mean ranking by issue for all industries at an enterprise level

Table 9. Barriers to implementation according to ranking at the enterprise level

| Ranking | Category |
|------------------------|--|
| Most Important | Administrative burden |
| | Attitude toward OH&S [sic] |
| | Cost to make changes |
| Important | Time to make changes |
| | Hassle of making changes |
| | Training costs |
| | Turnover of staff |
| Least Important | Comfort of PPE |
| | Legislative uncertainty |
| | Lack of access to information about safety |
| | Changes restrict innovation |

The top three barriers at the industry level were – attitudes toward WHS, administrative burden and cost to make changes. The average ranking of each barrier at the level of industry is shown in Figure 9. Table 10 shows the groups of categories based on high, medium or low scores.

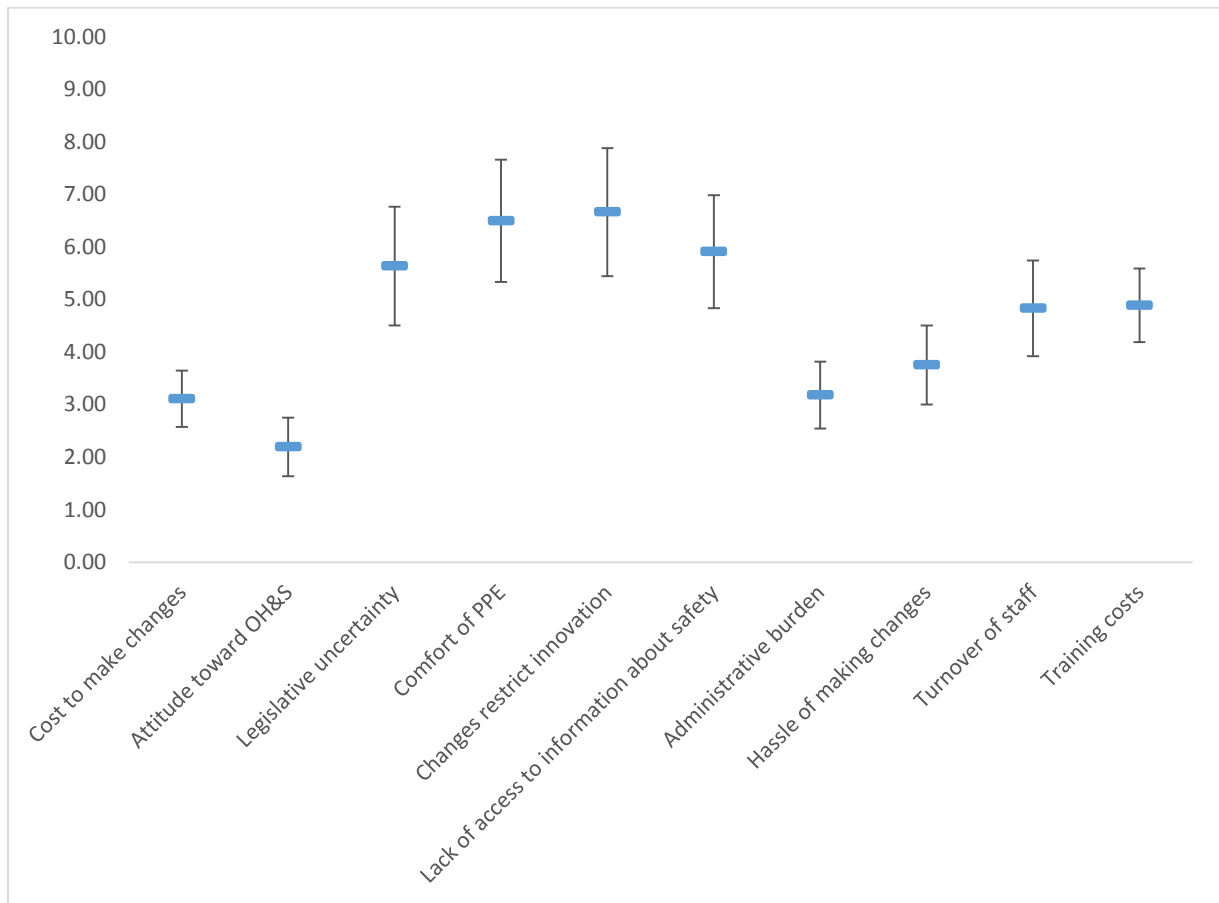


Figure 9. Mean ranking by issue for all industries at an industry level

Table 10. Barriers to implementation according to ranking at the industry level

| Ranking | Category |
|-----------------|--|
| Most Important | Attitude toward OH&S |
| | Administrative burden |
| | Cost to make changes |
| Important | Hassle of making changes |
| | Turnover of staff |
| | Training costs |
| Least Important | Legislative uncertainty |
| | Lack of access to information about safety |
| | Comfort of PPE |
| | Changes restrict innovation |

Respondents were asked to consider whether these barriers could be addressed or changed. This should indicate whether participants believed that the listed barriers were insurmountable or amenable to change and improvement. Participants indicated that it was possible to address or change attitudes to WHS (97.9%), lack of access to information about safety (84.8%), comfort of PPE (80%). However, it was perceived that turnover of staff (55.3%), time to make changes (38.6%) and training costs (32.6%) were not amenable to change.

Facilitators

The final list of facilitators to the implementation of safety practice included:

- Assistance with paperwork or administrative guidance
- Attitudes and leadership on OH&S
- Convenience in making changes (i.e. easy to make changes)
- Cost incentives
- Enforcement of legislation
- Improved PPE
- Reward/recognition for innovative safety practices
- Safety practices which increase efficiency
- The presence of vulnerable people (i.e. children, visitors, older people, etc.)
- Training and access to information about safety

The top three facilitators to change at the enterprise level were: attitudes and leadership on WHS, safety practices which increase efficiency, and the convenience of making changes (i.e. easy to make changes). The average scores for each of the categories are shown in Figure 10. The ranking of each category, group by high, medium and low scores, is shown in Table 11.

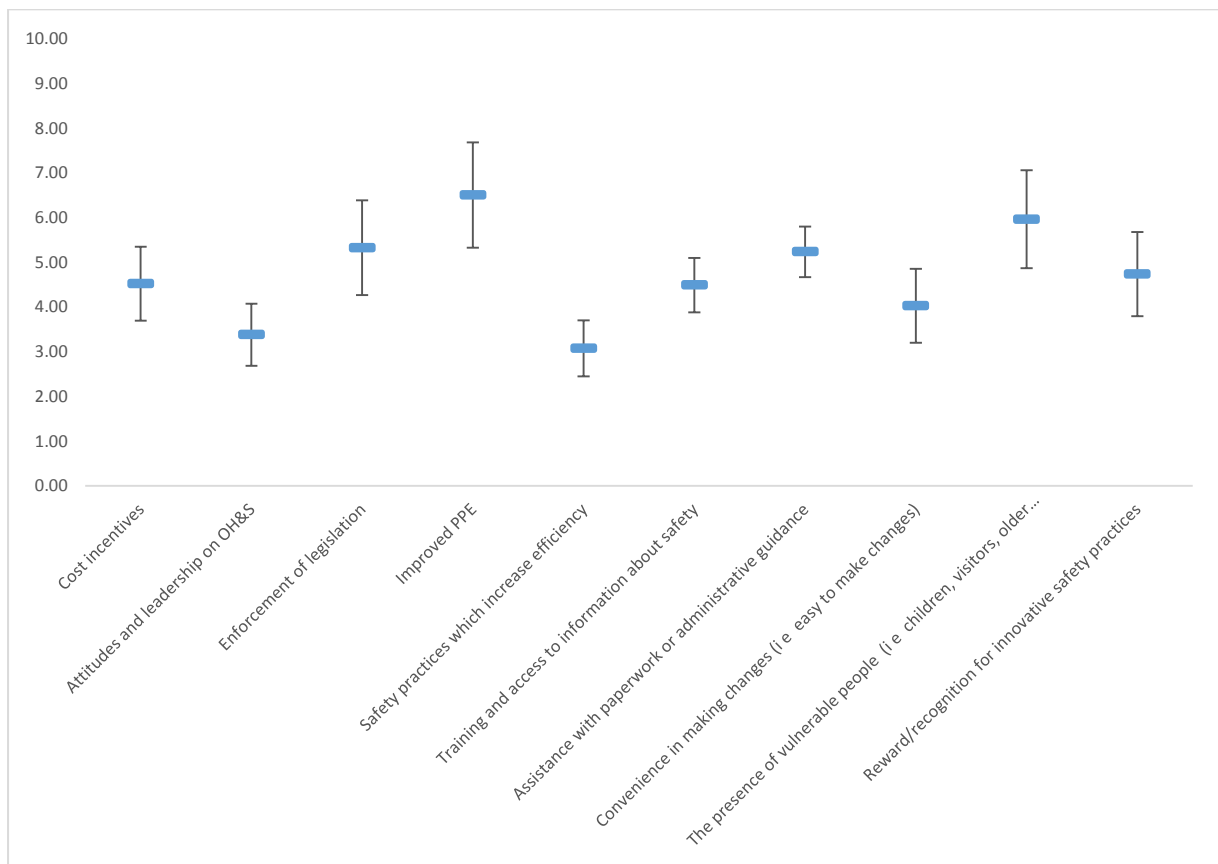


Figure 10. Mean ranking of facilitators at the enterprise level

Table 11. Facilitators to implementation according to ranking at the enterprise level

| Ranking | Category |
|------------------------|---|
| Most Important | Attitudes and leadership on OH&S |
| | Safety practices which increase efficiency |
| | Convenience in making changes (i.e. easy to make changes) |
| Important | Training and access to information about safety |
| | Assistance with paperwork or administrative guidance |
| | Cost incentives |
| Least Important | Reward/recognition for innovative safety practices |
| | Enforcement of legislation |
| | The presence of vulnerable people |
| | Improved PPE |

The top three facilitators for change at the industry level were: safety practices which increase production efficiency, attitudes and leadership in WHS and the convenience of making changes. The average scores for each of the categories are shown in Figure 11. The ranking of each category, group by high, medium and low scores, is shown in Table 12.

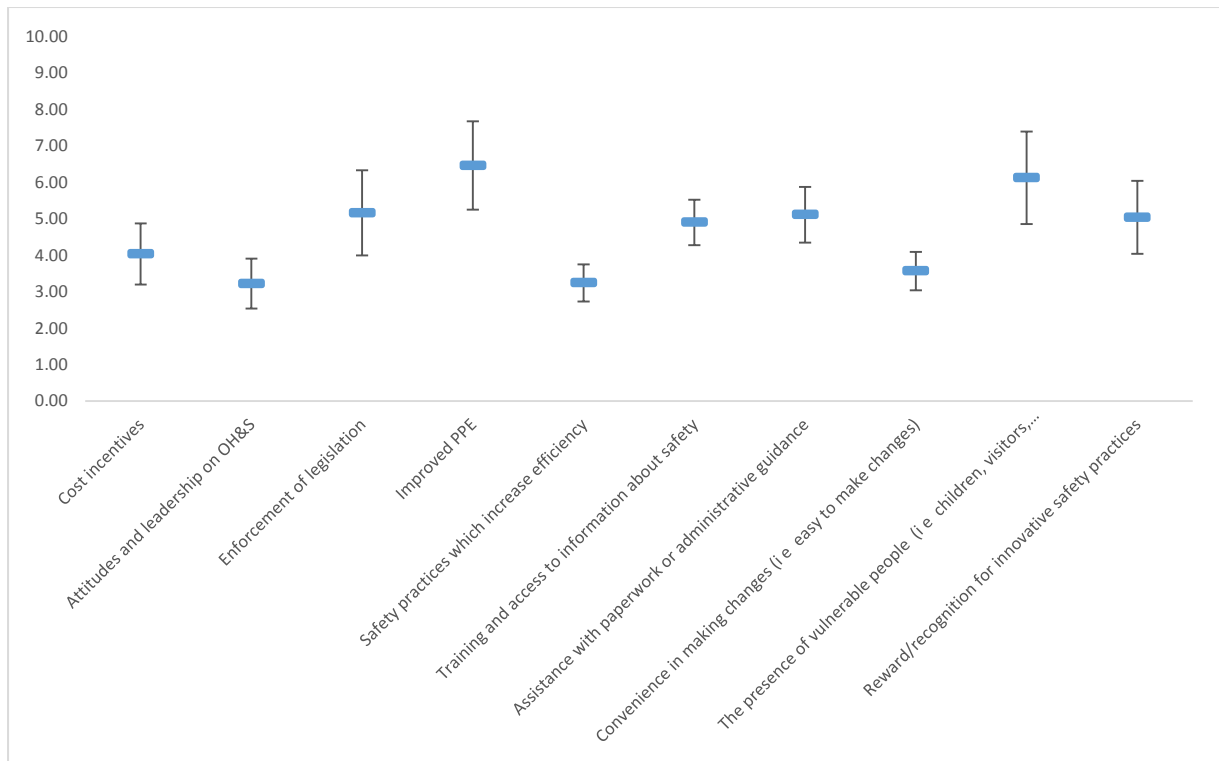


Figure 11. Mean ranking of facilitators at the industry level

Table 12. Facilitators to implementation according to ranking at the industry level

| Ranking | Category |
|-----------------|---|
| Most Important | Safety practices which increase efficiency |
| | Attitudes and leadership in OH&S |
| | Convenience in making changes (i.e. easy to make changes) |
| Important | Training and access to information about safety |
| | Cost incentives |
| | Assistance with paperwork or administrative guidance |
| Least Important | Enforcement of legislation |
| | Reward/recognition for innovative safety practices |
| | The presence of vulnerable people |
| | Improved PPE |

Participants were asked to consider the facilitator categories in three ways: The likelihood of these facilitators to make a difference to safety practice, the timeframe for implementing the facilitator, and the level of responsibility for implementation of the facilitator.

Likelihood of making a difference

Participants believed that the following facilitators were highly likely to make a difference to safety practice: cost incentives (56.5%), positive attitude and leadership on WHS (65.2%), enforcement of legislation (45.7%), training and access to information about safety (53.2%). Assistance with paperwork (54.4%), reward for innovative safety practices (56.5%), and improved PPE (51.1%) were rated moderately likely to make a difference to safety practices.

Timeframe for implementation of facilitators

The majority of participants believed that assistance with paperwork (43.2%), cost incentives (43.2%), and improved PPE (30.2%) were solutions that could be implemented in a short time frame. Facilitators such as training and access to information about safety (40%), reward for innovative safety practices (47.7%) were perceived to be medium term solutions, while the shift to positive attitudes and leadership on WHS required long term implementation (45.5%).

Responsibility for implementation

The responsibility for implementing facilitating factors was assigned in the following ways:

- Administrative assistance should be provided by industry (38.6%) or government (36.4%);
- Cost incentives rested heavily with government (54.6%) and industry (40.9%);
- Enforcement of legislation rested predominantly with government (61.4%) but also showed indications of being a responsibility at all levels (individual enterprise, industry and government) at 31.8% or responses;
- Positive attitudes and leadership were seen to be the responsibility of all levels (43.2%), with a predominant focus at the individual enterprise (54.6%);
- Reward for innovative safety practices was predominantly rated as an industry responsibility (39.5%), but there were also indications that this responsibility was shared across all levels ((37.2%);
- Training and access to information about safety was strongly seen as a shared responsibility (all levels – 62.8%);
- Improved PPE was mixed – this was predominantly assigned as the responsibility of the industry (41%) and the individual enterprise (30.8%), or rated as a shared responsibility across all levels (35.9%). Government was rated as having the least responsibility for improved PPE (7.7%).

Summary

The Delphi survey has provided confirmation that the categories of barrier and facilitator as established through each phase of the research process is somewhat ubiquitous and while commodity sectors experience these barriers of facilitators in different ways, they are present in all of the included industry groups. It is important to understand the importance assigned to particular barrier categories, so that future R&D activity may address these barriers in a strategic manner. This will enable appropriate facilitators to be implemented and tested in ways that make intuitive sense to producers in their everyday practice experiences.

It is also imperative to understand the expectations that producers and key stakeholders have regarding the timeframe needed to make changes and the level of perceived responsibility for the implementation of those changes. In this way, disappointment and disillusionment with the change process may be minimised and expectations may be more appropriately managed so that changes are viewed more positively across industries and enterprises.

Implications

The major barriers to the adoption of health and safety practices in the primary industries could be summarised as:

- Cost to implement changes for improved safety practices;
- Time to implement improved safety practices;
- Hassle to sourcing and implementing safety practices;
- Negative attitudes toward WHS
- Administrative burden of paperwork and processes for compliance;
- Uncertainty regarding WHS legislation and the ability to become or remain compliant;
- Lack of access to information about safety practices;
- Workforce supply, turnover of staff and ongoing costs to train staff in WHS practices
- Feeling restricted by the current legislation when attempting to implement solutions to identified problems.
- Discomfort/availability of Personal Protective Equipment for everyday use.

The major facilitators to the adoption of health and safety practices in the primary industries could be summarised as:

- Cost incentives to mitigate against financial stress associated with implementing changes
- Safety changes which increase efficiencies in production and which are easy to implement;
- Positive attitudes and leadership for WHS on the enterprise;
- Assistance from non-government and industry bodies with paperwork and processes to enhance compliance;
- Efficient and effective enforcement of the WHS legislation, to provide motivation to the uncompliant, and to encourage continual improvement for those who are compliant;
- Improved access to training and information about safety practices;
- Reward and recognition for innovative safety practices on the enterprise;
- The presence of vulnerable others (such as children, visitors and the elderly) on the enterprise, motivating change to protect loved ones and colleagues from harm.
- Improved Personal Protective Equipment that is comfortable and easy to use everyday

The consolidation of international and national literature indicates that these barriers and facilitators are universal, consistent across industries and across contexts. This project provides further confirmation of this in the focus groups discussions and the conference workshop, and explored the importance of these categories and their likelihood of making a difference to safety practice in the Delphi survey.

Australian primary producers are aware of and concerned by the risks associated with their businesses, regardless of industry affiliation. They are worried for their peers that appear to disregard safety and are openly critical of those who make little to no effort to comply with safety standards in their practices. They are motivated to protect those people who work on their enterprises and vulnerable others who may be present in production areas.

They seek answers to their identified practice hazards, from credible sources with demonstrated industry knowledge and experience. They express varying degrees of confidence to implement known solutions to their WHS problems and their ability to translate WHS legislation requirements into practice. Attitudes and approaches to WHS implementation are perceived to be changing as new generations of producers take over the enterprise and training in safety becomes a normalised part of participation in the workforce. However, they also acknowledge that the nature of production processes creates staff turnover and the need for costly cycles of training and professional development each season. Continual reinforcement of the use of PPE for employees and leadership in WHS practices, along with team-based approaches to identification and management of hazards were identified as positive ways to improve everyday practice.

However, it is important to note that each industry faced its own problems, related to the type of production processes, equipment and geography unique to their industry. It is critical that, in the creation of safety solutions, that the needs of each industry be taken into account. Within industries, differences in geographical location may require attention for the development of solutions which are effective and sustainable. Such attention to the specific needs of intra-industry groups is needed to influence producers to take up change solutions.

In the design of safety solutions it will be imperative to include implementation and evaluation planning. This is important due to a current lack of suitable evidence to show whether contemporary approaches have been successful or sustainable in practice. It is necessary to enhance this level of activity and evidence, as it provides opportunities for action and trustworthy information for producers to base their decisions on, when seeking safety improvements.

It is also important that the design of safety solutions be tailored to different levels of financial and time commitment and across all levels of the HOC. They should be communicated in ways that incorporate various mediums and generations of producer. Industry bodies and other non-government representative bodies should be seen to actively promote safety innovation and encourage producers to implement changes, as they are able.

Strategic Approaches

It is proposed that rather than a fractured approach to research and development there was a more critical approach. The priority table may be useful when attempting to be strategic in addressing serious issues and creating a research and extension agenda which acts to work towards being a body of evidence addressing the issue. Ideally any research would attempt to address issues that primary industry workers are frequently or regularly exposed and which has the potential to cause fatal or serious injuries (Table 13).

Table 13. Priority Table for Primary Industry Workers

| What is the likely outcome? | How often am I, or other people, exposed to the hazard? | | | |
|-----------------------------|---|--------|---------|--------|
| | Daily | Weekly | Monthly | Rarely |
| Kill or disable | High | High | High | High |
| Several days off work | High | High | Medium | Medium |
| First aid treatment | High | Medium | Low | Low |

| | |
|--------|--|
| High | The danger is too great to ignore. Take action as soon as possible and where possible take controls that are higher order in the hierarchy of control. |
| Medium | Risks may be serious. Plan to take action. Control measures may focus on engineering and control, although if possible always try to select higher order controls. |
| Low | Minor to negligible danger. Always look for ways to improve safety. These events may only require lower levels of actions. |

Research, Development and Extension Agenda

A proposed systematic approach to exploring how an issue may be addressed in farm health and safety has been developed (Figure 12. Logic model for future research and development to improve health and safety in primary industries). This systematic approach will ensure enough depth and breadth of information about an issue which will inform the development of prevention and reduction of deaths. There are points throughout the flowchart where a key decision point or end point is reached at which point it is recommended to consider some of the helpful explanatory models used in text (Table 14).

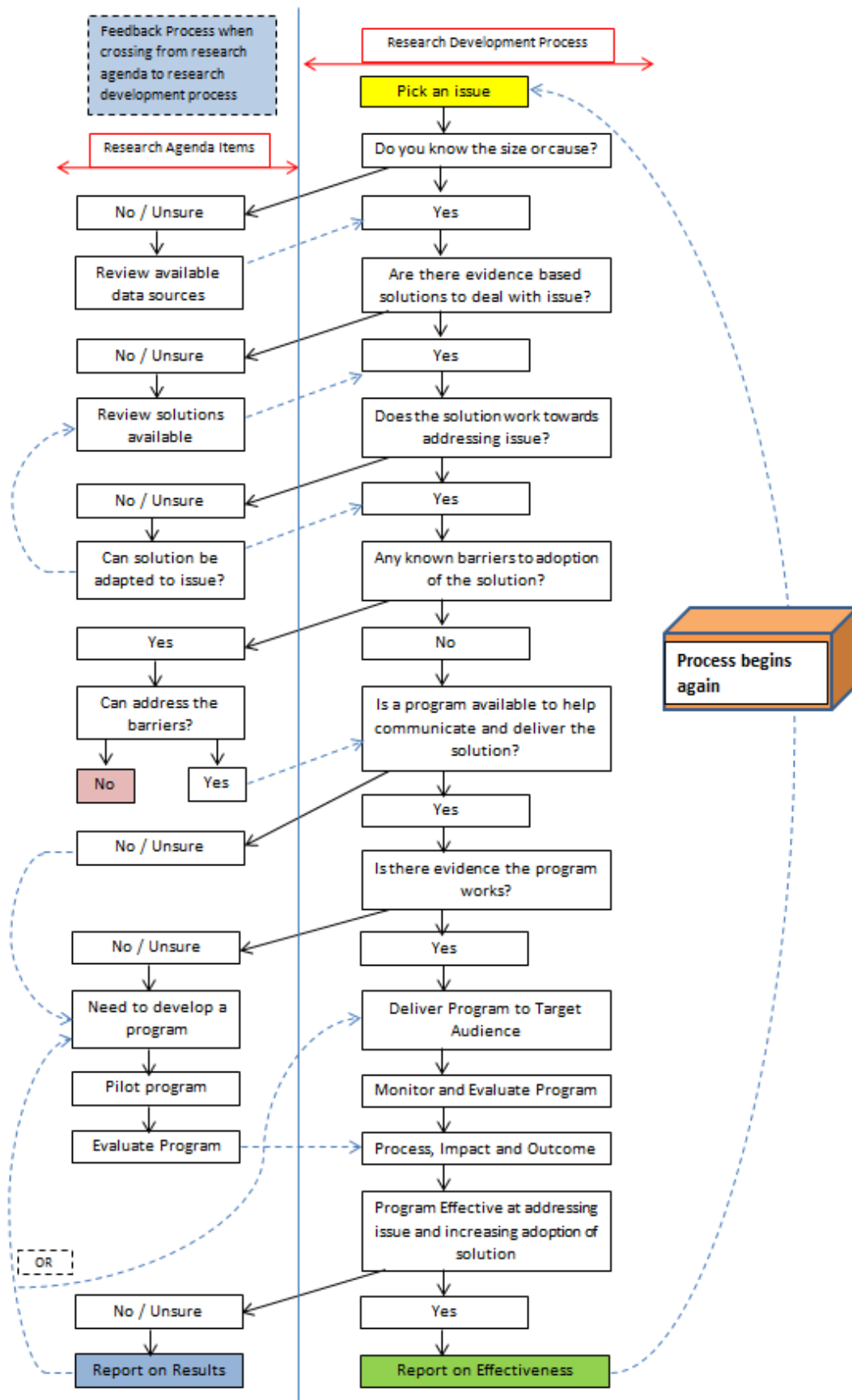


Figure 12. Logic model for future research and development to improve health and safety in primary industries

Table 14. Explanatory Feedback Points in Research Development Flowchart

| Step in Flowchart | Tool to Assist this step | Reference in Text |
|------------------------------|--|-------------------|
| Pick an issue | Priority table: This table will help you explore risk and outcome. | Table 13 |
| Can't address the barriers | Health Belief Model: If these cannot be easily addressed consider increasing communication on the other factors which influence behaviour such as: <ul style="list-style-type: none"> - the facilitators - the cause of the injury - the solution/strategy and how it works to address the issue | Figure 1 |
| Solutions to deal with issue | Hierarchy of Control: Ideally solutions to address an issue should work from the highest level of the hierarchy down. In nearly all instances a mix of approaches will be required. Communicate the importance of assessing the solutions that are available. | Figure 3 |
| Report on Effectiveness | Rogers Diffusion of Innovation: Communication about results will help increase engagement potentially across locations and if applicable industries. | Figure 2 |
| Report on (negative) results | Rogers Diffusion of Innovation: This improves the scientific process as if this isn't communicated then other resources which may unwittingly undertake the same methods may be lost | Figure 2 |

Recommendations

This report has provided insight into contemporary barriers and facilitators to the adoption of improved work practices for safety in the primary industries. Based on the results of this study, 10 recommendations have been developed. These recommendations are aimed at four audiences: producers, industry bodies, RIRDC and Government.

Producers

Australia's primary producers recognise the risks inherent in their production processes and are concerned to implement the best practices and safety solutions possible to mitigate these risks. It is critically important that producers feel supported to implement and continually innovate their safety practices. In order to achieve safety change at the level of enterprise, producers need to:

- Implement and model best practice WHS in action at the enterprise level.
- Articulate to industry bodies regarding what the barriers to adoption are for improved WHS.

Industry

Industry bodies and other non-government agencies involved in supporting safety in the primary industries are a vital mediating influence in changes to everyday practice, and ongoing refinement to regulation and safety standards within the primary industries. In order to achieve safety change at the level of industry, representative bodies need to:

- Identify a small number (two to three) of WHS issues with selection criteria based on high risk consequence (i.e. deaths, severe injuries) for each industry (in conjunction with industry RDCs). Additional focus should concern specific vulnerable sub populations including children and older farmers. These issues should be explored in detail for an extended period of time (3 to 5 years to allow for diffusion of innovation).
- Provide leadership and support advocating for improved WHS.

RIRDC

The Rural Industries Research and Development Corporation plays an important role communicating contemporary and future problems facing the primary industries to other sectors including those within government. Their role in advocating for improved health and safety for rural producers and their families and communities is critical in ensuring that the needs of these groups are recognised and integrated into other policy areas. In order to achieve health and safety change for the primary industries, RIRDC needs to:

- Develop a requirement in future project reporting for a proposed recommendation about adoption with consideration of economic and production efficacy issues.
- Consider maintenance of the baseline datasets for ongoing investments by the PIHSP as suggested in the Primary Industries Health and Safety Partnership research, *A synthesis and review of Primary Industries Health and Safety Partnership Publications* report. Identifying barriers and facilitators to adoption should also be added to the material collected.
- Develop an Australian specific clearinghouse for data relating to WHS in the Primary Industries should be supported by the PIHSP. Inclusive of clear guidance on adoption.

Government

Enforcement of current WHS legislation is an important part of the adoption process but should include the opportunity for self-audit and improvement as a starting point (outside of government personnel). In order to support and encourage safety change in the primary industries, the government needs to:

- Provide resources to external agencies to assist producers with self-audit and improvement as a starting point before enforcement is activated.
- Enhance efforts for the enforcement of WHS legislation. Enforcement should be seen as part of the uptake of WHS as the last step in ensuring compliance of WHS, this is a significant and vital role and needs to be not just perceived but a real threat.
- Provide rebates and other financial incentives which are linked into the high risk areas identified by industries.

Glossary

| | |
|-----------------------|--|
| Adoption | Defined by Rogers (2003) as a decision to make full use of an innovation as the best course of action available |
| Barrier | A real, or perceived obstacle/s which makes something difficult or impossible to achieve”. |
| Delphi | The Delphi methodology provides a process for turning individual opinions and perspectives into group consensus |
| Facilitator | A phenomenon/s which makes something easier or helps cause an action to be adopted’. |
| Focus group | Focus groups are an established qualitative research method, developed to elicit discussion among a group of peers, to explore particular topics of interest. |
| Health Belief Model | The Health Belief Model (HBM) (Becker, 1974) explains and predicts behaviours of human beings (traditionally employed in considerations about health behaviours), based on the exploration of the beliefs and attitudes held by individuals |
| Hierarchy of Controls | The Hierarchy of Controls considers possible solutions for the management of identified hazards and risk through six levels of possible interventions, with elimination being the most safe (and requiring the least amount of human management) to the introduction of personal protective equipment (least safe intervention with the highest need for human management) |
| Nvivo 10 | Nvivo10 is a computer software program developed by QSR International Pty. Ltd., and is used for the analysis of qualitative data. |
| PPE | Personal Protective Equipment refers to a category of equipment which is used to protect the body of the wearer from injury, from various types of hazards. PPE includes items such as eye glasses/goggles, ear plugs, helmets, protective clothing and footwear. |
| Priority Table | A matrix designed to assist producers to make decisions regarding the likely outcome of the threat versus exposure to the threat |
| PTO | Power Take Off is a method of taking power from a power source, to divert energy to another application. For example, PTO shafts draw energy from the engine of a tractor or truck, for application elsewhere in the vehicle. |
| Self-efficacy | Personal judgement or estimate of one’s own ability to reach a specific goal. |
| Thematic analysis | A qualitative analysis type that seeks to systematically search through data to identify recurrent patterns of ideas or concepts. |

Theory of diffusion of innovations

Rogers' theory of the diffusion of innovation seeks to explain the ways and reasons that new ideas are adopted by social groups, and the rate at which these new ideas are accepted

Workshop

Intensive group discussion to explore ideas and provide iterative feedback between peers in the workshop location.

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Appendices

Appendix 1. Search strategy for literature review

Databases: Agricola, Web of Science, CAB Direct, NIOSHTIC-2, NASD, Medline, Scopus, ASABE, Science Direct, Safe Work Australia

Restrictions: Publications published in 1990 or later, written in English and peer reviewed. Some of the searches were narrowed by document type including articles, discussion pieces or review.

Search Strategy: Search terms

If the database enabled the use of truncation it was used

If the advanced search option allowed different search results to be combined this was also utilized whereby search one would be 'barrier*' and search two would be 'farm*' and the results were combined to see which articles included both terms.

Table 15. Search strategy used for the database that yielded the most relevant results

| Database | Search Strategy |
|----------------------------|---|
| Agricola | Skey "Occupational Health and safety" OR "OH&S" AND barriers OR motivators Primary Industr* AND adoption AND WHS AND (barriers OR motivators OR facilitators) Barriers AND implement* AND health AND safety AND primary industry* OR agriculture |
| Web of Science | (barrier* OR motivate* or facility*) AND (Educat* program* OR behave* change) AND [(farm* OR primary indust*) OR agri*] |
| CAB Direct | [Agriculture* OR farm* AND health AND Safety] refined by the topic 'occupational hazards' and 'safety at work'. |
| NIOSHTIC-2 | barriers facilitators adoption of safety and health programs |
| NASD | Searched based on Topic after no specific results obtained from using the search facility. Topics reviewed: Injury Causes and Prevention; General Safety and Health Topics; Personal Safety and Health Topics; Aquaculture; Rural Safety and Health |
| Medline | agri* AND (safe* OR safety promotion) AND injur* AND prevention AND adult |
| Scopus | (Primary industr OR agriculture) AND ("barriers to adoption OR barriers OR motivate? OR facilitator?) AND barriers to implementation (Primary industr OR agriculture) AND (occupational health and safety OR health and safety standards) AND (perception OR attitudes OR qualitative) |
| ASABE | health NEAR safety AND agriculture AND barrier OR adoption |
| Science Direct | (barrier OR motivator OR facilitator) AND adoption AND implementation AND (agriculture OR farming) AND (injury prevention OR safety promotion) (agriculture AND health) AND (occupation AND safety) AND (adoption AND implementation) |
| Safe Work Australia | Reviewed Hazard Surveillance Research Section |

Appendix 2. Literature review summary table

| Author | Country; Industry; Number | Methodology | Specific Issue Explored | Relevance * | Level of Control |
|--|---|---|---|------------------|--|
| Athanasiov et al., (2006)[23] | Australia; Grain, cattle feed lots, dairy, pig and poultry; N=30 | Focus groups (n=2) | Strategies to minimize grain auger injuries and explore injuries | F | High – Engineering Low order, admin control |
| Brush et al., (1997) [38] | New Zealand; Vegetable and Pipfruit; N=227 | Survey and Logit model | Factors which effect the decision or desire to participate in agrichemical training | B/F | Low order-training |
| Chapman et al., (2010) [48] | USA (Treatment), New Zealand (Comparison); Nursery managers; Rolling, independent probability samples: N=1200 (each year at baseline, years 1, 2 & 3 treatment grp), n=250 (each year at baseline, years 1 & 2 control grp) | Rolling independent probability samples mailed questionnaire to assess information, awareness and adoption of the eight nursery practices. | Eight nursery practices to reduce worker exposure to traumatic or musculoskeletal injury (electronic pruners, long-handled diamond hoes, one person hitches, field stools, tree guard zippers, contained stabilization systems, no-climb truck tarping system and pot-filling machines) | I | High – engineering (no-climb truck tarping, electronic pruners etc.) |
| Chapman, et al., (2003) [49] Chapman, et al (2009) [50] Chapman et al., (2011) [51] Chapman et al., (2013) [57] | USA; Dairy farmers; N=597 (baseline), N=352-587 per year over the next 7 years, N=300 to 472 control group in intervention years 2-7 | Rolling independent samples mailed evaluation questionnaire to assess information, awareness and adoption. Information disseminated across many mediums about the three production practices. | Three production practices to reduce traumatic and musculoskeletal injury – barn light, silage bags and calf feed mixing sites. | I I I I | High – engineering/ design Low – information |
| Durey and Lower (2004) [24] | Australia; Grain-sheep; N=18 | Semi-structured interviews | Investigate farm injuries, how to prevent and safety culture | B/F | Low - admin |

| Author | Country; Industry; Number | Methodology | Specific Issue Explored | Relevance * | Level of Control |
|---|---|--|--|----------------|--|
| Ellis-Iversen et al., (2010) [39] | England and Wales; Cattle n=43 | Interview | Control of zoonotic pathogens | B/F | Low - admin |
| Fragar and Temperley (2011) [25] | Australia; Cotton; N=14 | Literature Reviews Review of Workers Compensation data Interviews | Adoption of technology and impacts on safety | F | High to medium– genetic modification of crops, engineering practice (elimination of cotton modules, etc.) |
| Gates and Jones (2007) [52] | USA; No industry information, N=25 (n=23 farms) | Baseline survey and post intervention survey. Intervention received brief educational seminar and video, review of noise on farm and provision with hearing protection at high noise sites | Explore beliefs about noise, frequency of hearing protection use and test effectiveness of an intervention to improve use of hearing protection | I | Low – admin, PPE |
| Green (1999) [40] | Canada; Grains, Mixed (Grains and Livestock) and Cattle; N= 11 middle aged married couples | Interviews | Assess beliefs and practices regarding health and safety amongst married couples | B/F | Low - admin |
| Hagel et al., (2013) [31] | Canada; No industry specified; N=2390 | Survey. | Economic worry and impact on physical safety hazards (ROPS on tractors, well maintained buildings, guards on combines, guards on augers, ladder safety cages on grain bins and barriers around water sources. | B | High – engineering controls |
| Hallman (2005) [27] | USA; No specific industry; N=365 offers made of which n=30 agreed to retrofit | Offer for cost of ROPS retrofit with financial incentive when installed. | Financial incentive required to stimulate Tractor ROPS retrofitting | I | High - engineering |

| Author | Country; Industry; Number | Methodology | Specific Issue Explored | Relevance * | Level of Control |
|--|--|--|---|----------------|---------------------------------------|
| Jenkins et al., (2012) [32] | USA; Small crop farmers, hay and vegetable farms; N=327 | Telephone Survey | Tractors ROPS barriers and motivators to retrofitting, source of information about farm management, machinery and health and safety | B/F | High - engineering |
| Jinnah et al., (2014) [28] | USA; Row crops; N=114 | Three intervention groups – parent-led, staff-led and control. Pre-test and posttest survey. | Tractor seatbelt safety behavior of youth | I | High – engineering Low - education |
| Kaustell et al., (2011) [41] | Finland; Animal production farms; Cultural probe: n=9; Fire safety interview: n=12 | Cultural probes and semi-structured interviews | Explore how hazards develop on farms and why they continue to exist | B/F | Low - admin |
| Kelsey, Jenkins and May (1996) [33] | USA; Mixed, Dairy, livestock and non-cash grain crops; N=171 | Telephone Survey | Tractor ROPS – presence, perceptions of how much ROPS cost and how much willing to pay. | B/F[57] | High engineering |
| May et al., (2006) [34] | USA; Dairy, livestock, fruit, vegetable, organic and cash crop; N=562 | Telephone Survey | Tractor ROPS | B/F | High - engineering |
| McCullagh and Robertson (2009) [42] | USA; Crops, livestock and dairy; N=20 | Interviews | Hearing Protection device use | B/F | Low PPE |
| Monaghan et al., (2011) [53] Monaghan et al., (2012) [54] | USA; Citrus Harvesters; N=278 | Community Health Workers modelling, encouraging use and education about protective eyewear. | Eye injuries – Protective eyewear | I I | Low - PPE |
| Morgan et al., (2002) [29] | USA; No specific industry identified; N=433 | Evaluation of graphic message stuff using survey | Best type of message to use in promoting attitude and behavior change | I | Low - admin |

| Author | Country; Industry; Number | Methodology | Specific Issue Explored | Relevance * | Level of Control |
|------------------------------|--|--|---|------------------------|-----------------------------|
| Reis and Elkind (1997) [43] | USA; No industry identified; n=199 | Questionnaire | Presumes occupational stress is major determinant of not taking safety action | B/F | Low - admin |
| Schiller et al., (2010) [55] | USA; Dairy and Row crops; 10 farm families (n=19) | Focus Groups and Interviews | Pilot – review of acceptability and perceived utility of a farm health and safety program | I | Low - admin |
| Seiz and Downey (2001) [44] | USA; Vegetables, grains and livestock; N= 8 families | Interviews | Risks, obstacles, motivators and supports that influence occupational health and safety | B/F | Low - admin |
| Sorensen et al., (2006) [35] | USA; Livestock, dairy, cash crop, fruit, vegetable and organic; n=465 | Survey | Retrofitting tractors with ROPS | B/F | High - engineering |
| Sorensen et al., (2008) [30] | USA; Small crop and livestock farms; Four regions (in 2 states);Final: N=391 (baseline + follow up surveys), N=350 (3 years post intervention) | 4 groups – ‘rebates and hotline’, ‘messages and hotline’, ‘rebates, messages and hotline’ and ‘control’. Baseline and Evaluation surveys and survey 3 years post intervention. | Aiming to increase installing of ROPS on tractors. | I | High - engineering |
| Sorensen et al., (2008) [36] | USA; Crop and Livestock; N=23 | Interviews | Attitudes and risk perceptions regarding farm and tractor safety | B/F | Low - admin |
| Sorensen et al., (2011) [37] | USA; No industry identified; N=37 (tractor owners (13), tractor dealers (3), conference attendees (21)) | Focus Groups (including presentation at conference and discussion of findings) | Optimal parameters for tractor trade-in program | B/F | High - Substitution |

| Author | Country; Industry; Number | Methodology | Specific Issue Explored | Relevance * | Level of Control |
|-------------------------------------|--|--|--|----------------|------------------------------------|
| Stave et al., (2007) [56] | Sweden; Forestry, dairy, crop, beef, pig, vegetables and other; N=84 | Process leader led safety sessions – three groups open process, structure approach and structured and information approach. | Whether having a social supportive network for farmers influences attitudes and behavior particularly around risk perception and manageability. | I | Low – admin, education |
| Temperley et al., (2013) [26] | Australia; Small farm (no specific industry); N=102 | Workshops and self-report benchmark survey | Explore small farms: hazards and risks, control measures and sources for health and safety information | B/F | Low - admin |
| Thu et al, (1998) [45] | USA; Multiple; N=56 | Focus Groups | Review of farms interest in safety modifications and health checks with insurance compensation (CSF) | B/F | Low - admin |
| Wadud et al., (1998) [46] | USA; No industry identified; N=110 | Survey | Beliefs and practices relating to prevention of respiratory disease, noise induced hearing loss, and skin cancer | B/F | Low - admin |
| Weil et al., (2014) [47] | USA; Dairy and livestock; N=38 | Interviews (n=22) | Motivators and barriers to installing driveline shield on unprotected rotating machinery shafts | B/F | High- engineering Low -admin |

*Relevance of Literature to Themes: B: Barriers; F: Facilitators; I: Interventions

Appendix 3. Themes from the literature on barriers to adoption of WHS strategies

| Barrier | Components | Cited in |
|---|---|--|
| Characteristics of the Farms [and their risks] | Unique Perceptions that land terrain influences need for tractor ROPS (flat) Size of farm (number of ROPS tractors) Old machinery and building Low perceived need for breathing protection when working in open areas | [45] [32, 35] [34] [41] [46] |
| Negativity regarding motives of insurance companies | Expressions of concern regarding the motives of insurance companies when involved in interventions | [45] |
| Issues relating to authority | Questionable experience of ‘authorities’ Condensing attitudes of government agencies which erode confidence in information provided by them Information not actively being sought from leading work health authorities or government agriculture departments Lack credibility Farmers perceive they are the experts Don’t want to wear tractor seatbelt | [24, 45] [44] [26] [24] [24] [32] |
| Unrealistic expectations | Unrealistic expectations Impractical policies/regulations Low priority for planning and design (equipment and systems need to take this into account) Regulation not matching realities of farming Belief that good farmers beat the odds Limited knowledge of cost of retrofitting – suggesting this hasn’t been explored personally | [45] [24, 44] [41] [24] [36] [33] |
| Financial limitations | Costly to correct known safety hazards To obtain regular physical health checks Influence ability to employ others and resulting fatigue Difficult to finance new machinery purchases and not receiving much money for trade in (barrier to participating in tractor trade in program) Pressure to reduce costs, save time and accept risks – particularly on small farms | [24, 32, 35, 37, 41, 45, 47] [45] [40] [40] [36] |

| Barrier | Components | Cited in |
|---------------------------------------|---|---|
| Time limitations | <p>To correct known safety hazards</p> <p>To obtain regular physical health checks</p> <p>Being safe is time consuming</p> <p>Difficult to attend training and flexibility of trainers</p> <p>Taking short cuts and fatigue</p> <p>Daily struggle to balance demands and challenges</p> <p>No time or energy for safety and battle between time and workload</p> | <p>[24, 32, 41, 45, 47]</p> <p>[45]</p> <p>[24, 40]</p> <p>[26]</p> <p>[24]</p> <p>[47]</p> <p>[36]</p> |
| Low personal susceptibility to injury | <p>Low personal susceptibility to injury</p> <p>Who the comparison is influences perceived risk</p> <p>Infallibility and invincibility</p> <p>Perception that experience, care, attention reduces risk</p> <p>Deflection/attribution to small group of 'others'</p> <p>Younger farmers less willing to retrofit tractor (age between 20 -29) as believe won't tractor rollover won't happen to them (youthful inexperience)</p> | <p>[24, 44]</p> <p>[40, 45]</p> <p>[40]</p> <p>[32, 35, 38]</p> <p>[24]</p> <p>[33]</p> |

| Barrier | Components | Cited in |
|---|---|---|
| Inconvenient to make changes - Hassle | <p>Inconvenient to make changes</p> <p>Tractor with ROPS won't fit in barn and difficult to install</p> <p>Changes to machinery can't be made to structural issues</p> <p>New machinery may not be compatible with existing implements</p> <p>Inconvenient to go to training session (and issues scheduling)</p> <p>Safety measures difficult or complex to implement</p> <p>PTOs are seen as a barrier to workflow as impede maintenance and equipment use, have poor durability, costly to replace, difficult and time consuming to replace</p> <p>Not willing to interrupt a farm task to retrieve hearing protection from a remote location</p> <p>If safety precautions compete with work, require time or are difficult unlikely to be implemented</p> <p>If retrofitting tractor influences storage or use of tractor in building typically unwilling to retrofit</p> <p>Belief that installation of a ROPS makes it infeasible for the tractor to do its work</p> <p>Can't install the tractor ROPS themselves and would be a hassle to truck to the dealer</p> | <p>[42, 45, 46]</p> <p>[35]</p> <p>[35]</p> <p>[37]</p> <p>[26]</p> <p>[24]</p> <p>[47]</p> <p>[42]</p> <p>[36]</p> <p>[32, 33]</p> <p>[32, 33]</p> <p>[32]</p> |
| Issues with health related program components | <p>Afraid of discovering health problems</p> <p>Limited confidential support mechanisms</p> | <p>[45]</p> <p>[44]</p> |
| Complacency/Accustomed to farm hazards | <p>Accustomed to farm hazards</p> <p>Don't see need for safety change/safety is a low priority</p> <p>Inability to recognize alternatives, identify choice and feel personally empowered to choose freely</p> <p>Concern about overturns on a tractor not enough to overcome barriers to ROPS installation</p> <p>Poor record keeping</p> <p>No farm safety business plan</p> <p>PTOs seen as a luxury</p> <p>Those highly/routinely exposed are optimistic about risk exposure outcomes</p> <p>Age of tractor with farmers less willing to retrofit older tractors</p> | <p>[23, 45]</p> <p>[35, 41]</p> <p>[44]</p> <p>[37]</p> <p>[26]</p> <p>[26]</p> <p>[47]</p> <p>[36]</p> <p>[33]</p> |

| Barrier | Components | Cited in |
|--|--|--|
| Difficult to evaluate effectiveness of safety improvements | Return of investment unknown Age of tractor influences need for installing tractor ROPS Nothing wrong with existing machinery Limited motivation or incentive to adopt safety practices Low willingness to retrofit tractor even if free –suggesting cost is not a major barriers | [45] [35] [37] [24] [33] |
| Human error can't be eliminated | Human error can't be eliminated Having restrictions on who can use a piece of machinery/equipment is viewed as a way to minimise risk and need for improvements – including not allowing vulnerable other to use Difficult to hire experienced and reliable help | [45] [32, 35] [47] |
| Difficult to control environment | Not all accidents are preventable Unpredictable threats/outcomes | [26, 45] [36] |
| Farming is hazardous occupation | 'Calculated' risk taking to reduce risk to an acceptable level Risks are necessary for the occupation Perception that you need experience to identify the hazards correctly Perception that everyone is aware of the hazards and responsible for themselves Farm children are leaving to pursue employment in other industries (although not necessarily known if this is due to the hazardous nature of the occupation) Exposure is constant and leads to acceptance | [40, 45] [26, 40] [24] [24] [47] [36] |
| Consensus among inspector staff | Consensus achieved between inspectors | [45] |
| Social Influence | Exposure to negative role models and poor job training (generational learning) Early risk introduction and learned risk behaviours | [40] [36] |
| Issues with PPE | Discomfort and Awkwardness and need to plan and organise to make available when and where required Hearing protection device use and associations with age of the farmer Don't think to use or don't see the importance of protection | [40, 42, 46] [42] [46] |

| Barrier | Components | Cited in |
|---|---|--|
| Perception that safety negatively influences productivity | Perception that safety negatively influences productivity Fruit farmers identifying ROPs makes work difficult as gets in way Consider the utility of purchasing the new tractor not the safety feature Productivity is primary concern for farm practice related decisions Hearing protection will lead to a failure to hear equipment sounds that may signal malfunction and difficulties in communicating with co-workers – ‘learned myths’ | [40] [35] [37] [24] [42, 46] |
| Being your own boss | Accountability and no one else to enforce safety Perceived no obligations to people who aren’t employee – i.e. contractors Safety impinging on autonomy Safety management made without consultation with others impacted (employees, family, spouse) | [40] [26] [24] [24] |
| Gender and risk taking | Masculinity associated with taking risks Different perception of risk between the genders | [24, 40] [40] |
| Safety is a choice | Occupational culture Attributes of a successful farmer Agrarian values Installation of ROPS is not necessary The issue is of little concern Safety is postponed until resource limitations are removed or less intense Belief health and safety requirements don’t apply to them Installing tractor ROPS is not a high priority | [40] [40] [40] [35] [38] [41] [26] [32] |
| Familiarity lead to underestimation of risk | Familiarity Habit Perceived knowledgeability/attitudes Risk taking as normative Age – older farmers had less tractors with ROPS Visibility of hazard Complacency (risk habituation) Faith in experience and control Low perceived need to retrofit their tractor Have enough experience | [40] [41, 43] [38, 41] [44] [34] [41] [47] [36] [33] [32] |

| Barrier | Components | Cited in |
|---|---|--|
| Limited discussion of the consequences of unsafe work practices | Present oriented focus | [40] |
| Stress | Influence on decision making, safety attitudes and perceived control Stress and Fatigue Economic worry | [43, 47] [31, 44] [31] |
| Lack of organization among farmers | An un-unified front reduces potential for collective voice to prompt changes | [39] |
| Lack of specific information | Accessibility of information Difficulties accessing internet information Never thought about making a change Information that lacks objectivity, credibility or scientific rigor Distrust of safety information used by professionals with no farming experience Unsure of how to comply or what the rules are Unaware of the different types of hearing protection available – generally relates to local accessibility Limited knowledge of foldable ROPS (assumes farmers not interested in retrofitting because they think they won't be able to continue to store their tractor in the same location) | [39] [26] [35] [44] [24] [42] [33] |
| Infrequent exposure/engagement | Infrequent use of a tractor reduces the need/importance for installing ROPS Tractor use doesn't justify to the expenditure to retrofit Tractor being restored and don't want to alter it | [32, 34, 35] [33] [32] |
| Lack other resources to make changes | Tools and supplies Limited storage space Hearing protection not accessible Rollover bars are not available for older tractors | [41] [41] [42] [33] |
| Solutions to address safety issues are low level | Use information that is available and don't look to optimize Low consideration of basic risk management approaches including inductions | [41] [24] |

| Barrier | Components | Cited in |
|----------------------------|--|----------------------|
| Limited interest in safety | Limited interest in safety Suggested there is a cumulative effect with more barriers identified less likely to indicate use of work safety practices Ignorant of the possibility to retrofit their tractor | [41] [46] [33] |
| Knowing – Doing gap | Awareness of safety issues doesn't necessitate cause for action | [24] |

Appendix 4. Themes from the literature on facilitators to adoption of WHS strategies.

| Facilitator | Example | Cited in |
|--|---|--|
| Programs which offer a benefit to participants | Health Screening Financial incentive – including reduction in insurance premiums but need to offset any changes Avoidance of a financial penalty Improved animal welfare and health for workers/family Incentive from dealer – better trade in value if equipment has a safety component Reduced workers compensation premium Training programs that lead to certification Comfort most common reason for retrofitting a cab | [45] [35, 37, 39, 44, 45] [39] [39] [35] [44] [44] [44] [33] |
| Voluntary programs [Not mandatory] | Voluntary programs are viewed positively | [45] |
| Farmers input into modifications or allow ability of innovations | Including prioritization of modifications over time and flexibility Fabrication or altering existing ROPS to fit tractors that ROPS are not available for Preference is to make the old tractor safe | [45] [37] [37] |
| Authority and Credibility of Inspectors | Inspectors who are both credible and have relevant authority are important conduits | [45] |
| Honour programs which respect accountability of farmers | Farms appreciate honour programs as highlights that they are perceived as trustworthiness and allows this to belief to be demonstrated | [45] |
| Continued involvement after research program | Regular reminders and safety tips | [45] |
| Recognition of control | Self-efficacy Issue is preventable and of concern Enforcement of on-farm rules | [40] [46] [25] |

| Facilitator | Example | Cited in |
|--|--|---|
| Presence of Vulnerable Others and People to Feel Responsible For | <p>Children</p> <p>Workers</p> <p>Women/spouse</p> <p>Presence of visitors – represents a physical risk and risk for biosecurity to cattle</p> <p>Family</p> <p>There is a caveat to this though – as may opt to say “I am the only one who can use this equipment”.</p> <p>Farmers confidence in positive outcomes to risk did not extend to others working on the farms – as other lack experience or ability to remain calm and focused in dangerous situations</p> <p>Vulnerable people operate the tractor/s (children and workers)</p> | <p>[35, 37, 40, 44, 47]</p> <p>[37, 38, 40, 47]</p> <p>[40, 47]</p> <p>[39]</p> <p>[44]</p> <p>[47]</p> <p>[36]</p> <p>[32]</p> |
| Setting a positive role model for children | <p>Positive role models for children</p> <p>Parents purveyors of knowledge, role modelling and reinforce need for a safe environment</p> <p>This extends to others including employees and family members by trying to influence their trial of hearing protection devices by using verbal persuasion, provision of HPDs and modelling of use</p> | <p>[40, 42]</p> <p>[44]</p> <p>[42]</p> |
| Women positive social influence | <p>In particular mothers</p> <p>Significant other’s opinions</p> <p>‘zone of influence’ where their input contributed to enhances safety practice when men in sight of the women</p> | <p>[40]</p> <p>[43]</p> <p>[24]</p> |
| Exposure to Consequences of Not Taking Precautions | <p>Exposed to consequences of risky behaviour</p> <p>Awareness of litigation</p> <p>Hearing damage as a result of not using hearing protection devices earlier in farming career</p> | <p>[40]</p> <p>[24]</p> <p>[42]</p> |
| Age Related Changes influencing safety including compensation and change in practice | <p>Health, Ability, and Attitudes</p> <p>Acquisition of sensitivities</p> <p>Enhanced awareness of own mortality</p> <p>Younger farmers willingness to implement a control mechanism</p> | <p>[37, 40]</p> <p>[40]</p> <p>[40]</p> <p>[39]</p> |

| Facilitator | Example | Cited in |
|---|---|---|
| Personal or vicarious experience of injury/near miss event/fatality | <p>Personal or vicarious experience</p> <p>In the instance of vicarious other their proximity and similarity is suggested as a factor</p> <p>Personal experiences that result in an impairment which requires a change in practice to continue farming</p> <p>Receiving notification of incident</p> <p>A ‘close call’</p> <p>Media stories prompting action/review- noting the effect is short term and erodes over time</p> <p>Resulting change from these experiences or knowledge of experiences is to work processes specific to the task and not universal</p> <p>Experienced a rollover and concerned about being hurt next time</p> <p>Personal acquaintance killed or injury by a tractor rollover</p> | <p>[24, 26, 41]</p> <p>[35, 40]</p> <p>[40, 42]</p> <p>[35]</p> <p>[37, 41, 47]</p> <p>[26, 47]</p> <p>[24]</p> <p>[32]</p> <p>[32]</p> |
| Availability and credibility of information | <p>Availability and credibility of information</p> <p>Information from a trusted source</p> <p>Acknowledged authorities</p> <p>Information available in a central location</p> <p>Information format – short, covers major points, pictures for context</p> <p>Informal sources of health and safety information including neighbour and other farmers</p> | <p>[40]</p> <p>[39]</p> <p>[41]</p> <p>[26]</p> <p>[26]</p> |
| Positive social norms | <p>Perceptions of what other farmers are doing</p> <p>Peer farmers as a positive influence on safety action</p> <p>Peer visits to avoid ‘blindness’ (but have limited influence/authority)</p> <p>Need frequent positive reinforcers for safety behaviours as fear of an event is small and uncertain and not enough to maintain behaviour</p> <p>Community concern</p> | <p>[40]</p> <p>[41]</p> <p>[41]</p> <p>[36]</p> <p>[25]</p> |

| Facilitator | Example | Cited in |
|--|---|---|
| Availability of safer more efficient machinery | <p>Machinery that improves productivity and safety</p> <p>Dangerous (machinery) implements</p> <p>Augers specific– standards that take grain flow into consideration; better shielding; provision of realistic ratings about grain transfer rates, availability and cost for acquiring shields for older machines, safety switches types and locations for manual switches, hopper design, improved bin design including slope and sensors, grain gates on trucks, enclosing end of auger, improved stability of mobile augers, use of trailing chains</p> <p>Changing to a different piece of machinery that still offers the same versatility</p> <p>Improved machinery design and technology to be operator friendly, comfortable, reduces fatigue, less vibration, less noise, better ergonomics and improved productivity</p> <p>Improvements occur at the manufacturing levels (i.e. not individual improvements)</p> | <p>[23, 24, 40]</p> <p>[37]</p> <p>[23]</p> <p>[25]</p> <p>[25]</p> <p>[25]</p> |
| Improvements in PPE | <p>Comfort</p> <p>Making the PPE available in location on the farm where needed, highly visible, carrying hearing protection with you</p> <p>Making explicit the benefits of hearing protection device use</p> <p>Desire for awning for protection for the sun</p> | <p>[40]</p> <p>[42]</p> <p>[42]</p> <p>[32]</p> |
| Increases sense of control and ease of incorporation | <p>Increased sense of control and ease of incorporation</p> <p>If PTOs were easier to install replacement shields</p> <p>Placement of hearing protection devices in locations were needed will assist in use</p> <p>If retrofitting a tractor doesn't influence its storability or ability to be used in a building</p> | <p>[43]</p> <p>[47]</p> <p>[42]</p> <p>[33]</p> |
| Market signals | <p>International rules and stronger laws about imports and branding requires action</p> <p>Market demand or enforcement of safety production processes</p> | <p>[39]</p> <p>[41]</p> |

| Facilitator | Example | Cited in |
|--|---|--|
| Farm Characteristics | Hilly terrain highlights the need for tractor ROPS Culture of safety Improved farm communication including enhanced cell phone coverage Presence of ditches on property | [32, 35, 37] [47] [25] [32] |
| Recognition that the task may be dangerous | Recognition that the task may be dangerous Belief that some regulations are necessary Promotion of the reality of hazards and benefits of safety If safety precautions are seen as necessary more likely to be undertaken, plus if easy, habitual, make sense and have utility Safety reason for adding a tractor rollbar | [32, 35] [24] [47] [36] [33] |
| Awareness of lower level safety actions | Use of appropriate storage and need for signage Size of pesticide containers | [38] [25] |
| Farms multiple use situations | Co-existence of farms as a workplace and home | [44] |
| Farmer Characteristics | Alert and open to safety Stage of life – succession plans influence safety investments | [41] [41] |
| Education | Noting is influenced by traditions, attitudes, and respect Improved prioritizing of safety with improved farmer education through industry Improve people’s knowledge, skills and awareness of danger Formal competency-based training and accreditation of auger users Using graphic examples Training including staff inductions | [41] [24] [23, 42] [23] [23] [25] |
| Mental training | Crisis situations – knowing what to do in advance | [41] |
| Hobbies and Volunteer work | Influence aptitude for change and enhancement of safety | [41] |

| Facilitator | Example | Cited in |
|---|---|--|
| Characteristics of Safety Actions | Timing in production cycle for off-peak times Convenient to undertake/Easy to apply/install/modify Effective and Attractive – particularly if safety is a by-product for improved efficiency Low cost Management providing clear operating procedures and exercising responsibility for training and safety Ways to improve the operators state of mind Rotating employees Government action | [41] [41] [41] [41] [23] [23] [23] [25] |
| Passive Strategies | No action required on behalf of farmer Improved cotton varieties/genetics available influencing pesticide use and type, irrigation, cultivation and harvesting | [41] [25] |
| Improved farm performance – not safety specific | Improvements in financial position of the farm – with improvements that are easy to manage and cost effective Interdependency between technologies | [24] [25] |
| Financial incentive or outlay | Financial incentive Low level of financial outlay for hearing protection devices and they can be brought in bulk Safety actions which have low short term financial cost are motivational Discount on workers' compensation insurance premiums Rebates for retrofitting equipment Knowing the maximum price range willing to pay (assuming the manufacturer price is elastic or there is an option of offer rebates to enable this price range to be achieved) | [23] [42] [36] [25] [25] [33] |
| Legislation | Legislation Need to meet regulatory requirements influenced adoption of safety practices Concerned about the liability | [23] [25] [32] |

Appendix 5. Intervention Literature Overview

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|---|---|---|---|---|---|---|
| Schiller, Donham, Anderson, Dingledein and Strebel (2010)[55] | Shawano County (Wisconsin). Industry: Dairy farms (n=9) Row crops (n=1) <i>Intervention:</i> 10 farm families-principal operator (n=10) and one adult family member from nine of the farm participated (n=9). Male : n= 13 Age range 21-65) | Pilot expanded health program (to include elements of the Certified Safe Farm program) and examine experiences of participants. | Recruitment via extension agent contacting people likely to participate. 3 months post received follow up call from RN to see how progressing towards goals. Evaluation: Focus Groups (n=2 with 4 & 6 participants representing 6 farms): 4 on-farm interviews with others who couldn't attend focus groups. | Health screening data: questionnaire and clinical screening by RN on farm. Test results influenced preventative health actions and referrals. On-Farm safety review: reviewers (health care providers and the county agent) used the Certified Safe Farm on-farm safety review instrument. Individualized feedback given following the farm safety review including areas of their farm that did not meet safety standards. Summary sheet provided with recommendations and goals. Educational information mailed to participants on three occasions (contents included education on respiratory, hearing and sun protection, pesticide application, and back safety). | Barriers: fear, familiarity, concern about liability. Facilitators: trust, desire, to be a leader, on-farm health screen (incentive for participation), immediacy of results, reviewers knowledge of agriculture (credibility), on farm review prompted tidy up prior to review, market the program, positive feedback, keeping children and hired help safe and the authority of reviewer. Changes reported following review: increased PPE use, removal of clutter, gating manure pits, first aid kits and chaining tires. Would recommend the program to others. farmers. | Paid to participate – suggesting initially financial incentive may be required. Lack of time barrier to recruiting participants and on-farm reviewers. |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|--|---|---|--|---|---|--|
| Sorensen, Jenkins, Emmelin, Stenlund, Weinehall, Earle-Richardson and May (2011)[67] | USA (New York and Pennsylvania) Issue: tractor ROPS and effective of retrofitting incentives and efficacy of the rebate program Campaign elements : financial incentives, a ROPS hotline and series of tested promotional messages. Industry: Crop and livestock Average age = 60 Average number of tractors per farm = 3 Participants recruited from search for small crop and livestock farms in the National Agricultural Statistics service database. | Explore the effect of tractor retrofitting incentives including a rebate program. | 4 regions with different rebates/interventions: region 1 = financial rebate only (n=214). Region 2 = received rebate and social marketing messages and promotion (n=227). Region 3 = received message and promotion (n=282). Region 4 = control group (n=323). Baseline data obtained 5 months before intervention (n=391). Evaluation 6 months after intervention. 3 year post intervention follow up study (n=350). Intervention duration 6 months. 3 years post baseline and follow-up re-contacted by telephone to ask whether they had retrofitted a tractor. | Fit ROPS to tractor. Regions 1 and 2 offered 70% rebate of entire cost of retrofit (max \$600). Rebate publicized via adverts and posters. Toll free hotline assisted in locating ROPS kits and comparing prices was available in all regions except 4. Region 2 and 3 exposed to adverts, banners, and posters. Farm equipment dealers received promotional items to encourage their promotion of the program. | Increase in discussion with dealer if saw adverts. Of the 350 who completed the 3 year retrofitting assessment survey 5.1% reported retrofitting a tractor. Significant difference (p<0.05) in stage of change (TTM) between region 2 and 3 and 2 and 4. The most predictive variables impacting behavioural intention were subjective norms and perceived behavioural control measures and amongst retrofitters there were significantly higher values for subjective norms and attitudes. | Barrier: perception 'it won't happen to me'. Quasi-experimental as legislation stipulated that the rebate be offered throughout NY state. 303 of the baseline surveys were unusable due to interviewer errors. No significant difference between people who responded post intervention and those who didn't. |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|--|--|--|---|--|---|--|
| Chapman, et al., (2003)[49] Chapman, et al., (2009)[50] Chapman, et al., (2011)[51] Chapman, et al., (2013)[57] | USA (Northern Wisconsin) Industry: Dairy farmers n= 597 (baseline) n=352-587 per year over the next 7 years <i>Selection criteria:</i> Managers who make day to day decisions. Rolling, independent probability samples. Not randomly assigned to treatment. <i>Intervention:</i> 8 Northeastern Wisconsin counties. <i>Comparison:</i> Maryland dairy producers [Yrs 2-5 as exhausted list dairy producers] New York state dairy producers [Yrs 6 & 7] N= 300-472 per year. | Intervention to increase voluntary adoption of three production practices which increase safety and profitability in Dairy industry. | Criteria used to select production practices – primarily to reduce traumatic and musculoskeletal injury. Three production practices –barn lights, silage bags and calf feed mixing sites. Baseline questionnaire - Evaluation questionnaire (Years 1 – 7 for intervention group and Years 2-7 for comparison) mailed to assess if managers reporting getting more information and changes in awareness and adoption. Return rate of questionnaires 68-79% intervention groups and 38% to 58% for the comparison groups. | To disseminate information about production practices used: print mass media, public events, resource people (university dairy and livestock extension agents, equipment dealers, farm vets, electrical suppliers and farm consultants), farmer-to-farmer exchange, and internet-based outreach (website developed in 3 rd year of intervention and announced via postcard mailing). Farmer to farmer exchange – encouraging interesting people to contact and/or visit six farmers already using the practices. | Years 2-4: No significant differences between awareness and adoption rates for any practices. Year 4: increased awareness of all practices, increased adoption of barn lights and silage bags (associated with gross sales). Year 7: higher level of awareness of barn lights and higher rate of adoption for barn lights and silage bags by intervention farmers than comparison farmers. Baseline and Year 7: Significant differences regarding source of information about the practices. | Small incentives used for return of questionnaires. Use of unconfirmed self-reports regarding adoption. Awareness of silage bags was already widespread at baseline (95%). Benefit: long intervention period which is useful given the proposed time lag between awareness and adoption. Voluntary adoption as dairy operations exempt from enforcement of government occupational safety regulations. |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|----------------------------|---|---|--|---|---|--|
| Chapman et al., (2010)[48] | <p>USA and New Zealand</p> <p>Industry: field-grown nursery crops.</p> <p><i>Treatment:</i> US Nursery managers in Wisconsin, Minnesota, Iowa, Michigan, Ohio, Indiana and Illinois.</p> <p><i>Comparison:</i> New Zealand Nursery managers.</p> <p>Rolling independent probability samples.</p> <p><i>Treatment:</i> n=1200 per year in off season (January – March) [Baseline and after intervention years 1, 2 and 3].</p> <p><i>Comparison:</i> n=250 per year in off season (June-August)[Baseline and intervention year 1 & 2].</p> | <p>Intervention to increase awareness and adoption of nursery production practices which increase safety and profitability.</p> | <p>Intervention focused on promoting eight practices which help reduce worker exposure to risk factors for traumatic or musculoskeletal injury. Production practices: electronic pruners, long-handled diamond hoes, one person hitches, field stools, tree guard zippers, contained stabilization systems, no-climb truck tarping system and pot-filling machines.</p> <p>Questionnaire asked about awareness and adoption and sources of information. Follow up reminder postcards sent if response not received 1-2 weeks and 4 to 6 weeks following dissemination.</p> | <p>Intervention components: grower to grower exchange via contacting or visiting pilot nurseries; print mass media; public events; resource people sent one-page tip sheets biannually to university extension agents, nursery organizations and other advisors; radio and television and internet website.</p> | <p><i>Treatment group:</i> after intervention reported greater awareness than at baseline for four interventions – electronic pruners, field stools, tree guard zippers, and tarp draping systems. But no change in adoption of these practices. Treatment and comparison groups showed different levels of awareness for the different practices.</p> <p>Barriers/reason for not adopting given: ‘nursery too small’, ‘no use for my crops’, ‘too expensive’, ‘lack of information’, and ‘never seen it used’.</p> | <p>Small incentive for return of completed questionnaire (first class postage stamps). Not randomized control trial. Comparison group not a true control as they may have accessed internet-based resources and subscribe to US nursery magazines and newsletters.</p> |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|---------------------------|--|---|---|---|--|--|
| Jinnah et al., (2014)[28] | <p>USA (Rural South Georgia) Industry: row crops <i>Inclusion criteria:</i> English speaking farm families with children aged between 10 and 19, farm owned and operated by parent or extended family, child worked on farm at least one day a week during the times when crops were in production.</p> <p>Baseline and post-test data collected from father, mother and target (most active) youth. Primary farmers typically father.</p> <p>Farm Size: Average 945 acres (range: 20—5,700)</p> | Exploring whether child tractor specific safety behavior can be improved by involving the family in teaching. | <p>Longitudinal, repeated-measures, randomized-control design. Interventions: Parent-led: n = 34 Staff-led: n= 45 Control group: n = 35</p> <p>Questionnaire – focused on ROPS tractor use without seatbelt, attitudes toward injury susceptibility and intentions to wear seatbelt. Pre-test questions reported on behavior in the past year. Post-test questions reported on behavior since completing the tractor lesson or for control behavior since last completed data forms. Post test questions focused on seatbelt use, if had created seatbelt-related rules and parental communication about tractor seatbelt. Primary farmer referred to as ‘fathers’.</p> | <p>Intervention: AgTeen farm safety intervention – specifically lesson on tractor safety.</p> <p>Various information provided during lesson: child development, guidelines for children’s use of tractors, videos (mildly fear-inducing video on tractor safety and video on teenage brain development shown to fathers), interactive demonstration model and farm accident stories. <i>Parent-led intervention</i> – father received training and taught the tractor safety lesson. Posttest occurred 3 weeks later. <i>Staff-led intervention:</i> staff member (peer farmer from local community) taught lesson to whole family. Family completed data and father viewed relevant videos. <i>Control group:</i> did not receive tractor safety lesson but completed pre and post test data. Given relevant materials and shown video following study completion.</p> | Significant differences between intervention groups and control: changes in parent use of seatbelt (parent-led less likely to operate without seatbelt than staff-led and control); belief that youth could be injured when operating a tractor (parent-led and staff-led groups were more likely to believe than control); require youth to wear seatbelts (Parent-led group more likely than the staff-led); youth reported parents had talked about seatbelt use (Parent-led group more likely than control but no difference between staff-led); youth reported wearing of seatbelts (parent-led group more likely than control). Youth reported learned through direct instruction or from watching fathers work. | <p>Participants paid \$490 if completed project activities and data sheets.</p> <p>Motivator – father awareness of modelling influenced their safety behavior.</p> <p>Barrier: Intergenerational transmission of farm risk behaviours.</p> <p>Staff- led sessions had better retention rates than parent-led or control.</p> |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|--------------------------|--|--|---|--|---|--|
| Stave et al., (2007)[56] | Sweden Industry: Mixture but highest representation amongst forestry. n=88 [evaluation n=84]. <i>Participant recruitment:</i> nine farmers active in the Swedish Farmers' Association recruited and they each recruited approximately 10 other group members. Diversity when recruiting participants emphasized from existing local networks. Recruiting farmer was convener of meetings. Group range between 7 to 11. Participants at each meeting range 5 to 11. | To explore whether the creation of socially supportive and participatory networks can influence safety related attitudes and behavior in particular risk perception and manageability. | Quasi-experimental design. Intervention period 12 months. During first 6 months the groups met once a month for 1.5 to 2 hours. Sessions held at participant's farm or community center. Seventh meeting took place 6 months later. Baseline questionnaire administered at first group meeting and repeated at final meeting. Variables measured: risk perception, risk manageability, work stress, risk acceptance, safety activity, and safety measures. Questionnaire piloted with fishermen but adjusted to relate to agriculture. Process and feasibility (time, place, duration and procedures) evaluation undertaken. | Group Process leaders: two safety engineers and doctoral student who received training and support following each meeting. Nine groups, each process leader looking after three groups each with a different intervention approach. Intervention groups: Open process (O): task of process leader to facilitate and support participants but not to give expert advice unless explicitly asked for. Structure approach (S): group members each given a diary providing a structure for documenting incidents/accidents and used for discussion and reflection at meetings. Process leader was to help participants analyse events and stimulate reflection and possible preventive measures. Structured and information approach (SI): used diaries and given information by leader in more educational way. Information used to raise awareness of risk and consequences. | Entire sample: significant difference from baseline to follow-up with increased safety activity and decreased work stress and risk acceptance. Intervention group significant differences: Baseline - SI group had a significantly higher safety activity than those in the S intervention; no differences in change score between the intervention groups on any of the index variables; change for self-reported safety measures was found between O intervention and the two structured interventions (S & SI) driven by a large change in the S group (46%) and a decrease in the O group (10%). Safety measures undertaken: mending, detaching and installing interiors/building and equipment and machines; improving electrical safety and power transmissions shields. | Absence of a control group. Participation and recruitment based on geographical vicinity and social networks. Considered representativeness between intervention groups and for whole sample in relation to Swedish farmers. Limited utility of diary as whilst widely used only once or twice. Perceived value of meetings expressed by majority (76%) indicating they would like for them to continue post intervention. |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|--------------------|--|--|---|---|--|---|
| Hallman (2005)[27] | <p>USA (New York) Industry: non specified. 365 ROPS retrofit incentive packages offered for ROPS retrofit. 73 responses of which 30 agreed to participate. 41 said no and provided contact details (67% re-contacted to find out why didn't want to participate).</p> <p><i>Inclusion criteria:</i> farmer had gross sales over \$10,000; tractor being retrofitted had to be actively used on the farm and did not currently have a ROPS installed.</p> | Determine level of financial incentive required to motivate action to retrofit a tractor with ROPs and what inhibits action despite the potential for a financial incentive. | <p>Information included in incentive package: Cover letter with incentive percentage rebate being offered and response card. Response card required: whether tractor had ROPS, willingness to participate, brand and model number. Response deadline of two weeks following which contact made with yes participants.</p> <p>A random follow up call to 50 non-responders to determine why they did not reply occurred of which 65% could be reached [not undertaken by research team].</p> <p>Follow-up call to responders who said 'no' undertaken.</p> | <p>Nine groups of incentives= based on percentage of total cost (given variability in factors and therefore costs) which include parts, installation charge and freight.</p> <p>Incentives offered: 0%: n=150 – offered free engineering consultation and assistance in sourcing ROPS retrofit kit. 12%: n=75; 25%: n=50; 37%: n=25; 50%: n=20; 63%: n=15; 75%: n=10; 90%: n=10; 100%: n=10. Retrofit Kit requirements/considerations: must contain a seat belt, installation could be self or dealer, had to provide photograph of tractor before the retrofit, submit receipts from the installation, after installation a safety specialist visited the farm to inspect the retrofit and another photo taken as proof of installation.</p> | <p>Main reasons for not participating (amongst those who had returned the response card) was hassle, ROPS kit were not available for their tractor make or model. Least commonly identified reason was expense. Reasons for non- responders not interested in participating (29%), already had cab (17%), no tractors (8%), already equipped with ROPS (4%), ROPS too expensive (1%). Rate of acceptance highest for the 100% incentive with 80% acceptance but acceptance rate highest per dollar offered in the 75% to 90% incentive with 10% and 70% acceptance respectively. Issues for participants: Delays if required dealer installation, delays if kit not in stock and the hassle associated with the process of sourcing the most cost-effective kit.</p> | <p>There was some difference in the actual price of kits compared to the estimates proposed in a guide which researchers commonly refer to for ROPS retrofit estimates.</p> <p>Retrofitting decisions don't appear to be influenced by only one issue such as cost or risk.</p> |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|---------------------------|---|---|--|---|---|--|
| Morgan et al., (2002)[29] | USA (Kentucky) N=433 farmers or farming community members from 8 counties 64% males Age range = 18-74 <i>Recruitment:</i> farm bureau meetings. | Evaluating the effectiveness and persuasiveness of different types of messages. | Total of 5 messages: information only, narrative, statistics, fear appeal and master message (narrative and fear appeal combined). Layout for all messages the same: brief text plus visual image (graph, chart, line drawing or farm event). Instrument asked about opinions of ROPS and attitudes toward message. Each participant only shown one message (randomly assigned to each participant) before completing the survey. These messages had previously been evaluated by 32 farmers who indicated the narrative-based messages were more favourable than the statistics messages. | Overall Research Question: are fear appeals more successful than narrative-based messages? 4 Hypotheses: 1) narrative messages will be more successful than statistics-based, 2) narrative will be more successful than informative messages, 3) graphic message suffers containing fear appeals will be more successful than informative messages and 4) messages combining both fear and narrative will be more successful than messages based on fear appeals or narrative appeals alone. | Hypothesis 1 - not supported (no significant difference between narrative and statistics messages). Hypothesis 2 - supported narrative better received than informative messages. Hypothesis 3 - supported - fear appeal better received than informative. Hypothesis 4 - not supported no significant difference between master message and either fear or narrative. Research Q = no significant difference in evaluation of narrative or fear appeals. No significance difference in responses to messages if owned a ROPS-equipped tractor or not. | Conducted post project campaign. Findings for a single state. Many of the messages were created by people active in the intervention community (not systematic). |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|----------------------------|---|--|--|---|---|--|
| Gates and Jones (2007)[52] | USA (Kentucky – South Central) n=23 Farms (25 farmers): 7 <i>intervention farms</i> (8 farmers) and 15 <i>comparison farms</i> (17 farmers). 20 male and 5 female. Age range 23-68. Intervention group significantly younger with mean age of 32 (mean age of comparison group 54 years old). | Test the effectiveness of an intervention to increase farm workers' use of hearing protection when exposed to noise on the farm. | Both groups completed a baseline survey. Approximately five months after baseline survey second survey sent to both groups. One month later third survey sent and small (not disclosed) incentive sent to both groups after completing the survey. <i>Comparison group</i> : after completing baseline told would receive two additional surveys in mail. <i>Survey Questions</i> : demographic, farming related, perceptions regarding noise exposure, hearing protection use (when around noise on farm, recreational exposure and when doing jobs at other workplaces), hearing problem related to farming, knowledge of anyone with hearing loss due to farming activities, likert scale questions and reason did or didn't use hearing protection (open ended). | <i>Intervention group</i> : After completion of baseline survey conducted a brief educational seminar including a video. Investigator and industrial hygienist visited intervention farms (n=6) and conducted noise assessments wherever the farmer was working that day. Results provided 3 weeks after visit, along with information and demonstration of proper use of ear plugs. Ear plugs in plastic containers were placed in easily accessible and visible locations identified from the noise assessment to be associated with high noise. Brochures sent (approx. one month post installation of ear plug containers) and reminding farmers to utilize hearing protection and to contact if needed additional earplugs. Barriers –cost and storage. | High levels of exposure on farm and during recreational activities. 36% currently have or have had hearing problem related to farming. At baseline majority of participants never (60%) or seldom used hearing protection (28%). Interpersonal support was only significant correlation between frequency of hearing protection use. <i>Hearing protection use</i> : first survey significant difference between intervention and comparison. <i>Barriers to use</i> : inconvenient, not available, too much time to use, never thought it was necessary, can't hearing someone talking, not exposed for long periods of time, didn't think I needed to use, not a habit and lazy. <i>Facilitators for use</i> : know someone with hearing loss, when there is too much noise and used for loud events exposed to infrequently. | Quasi experimental. Questions in survey adapted from another study. Only one survey item used to measure frequency of hearing protection. Doesn't include any information about how often the intervention participants asked for hearing protection top ups and how many were given to each farm to contextualize use patterns. |

| Authors | Participants | Study Aim/Issue | Methodology | Intervention Type | Significant Findings | Limitations/Issues |
|--|--|---|--|---|---|--|
| Monaghan et al., (2011)[53] Monaghan et al., (2012)[54] | USA (Florida) Industry: Citrus Population: Citrus harvesters Two companies. 13 crews participated. n=278. <i>CHW intervention:</i> 9 crews (Company A [n=6] & B [n=3]). <i>Control:</i> 4 crews (Company B) Recruitment of people for CHW based on nomination by peers and each crew in the intervention group had 1 to 3 individuals complete the training (to reduce effect of turnover).[2012 article provides an overview of qualitative data and results from the pilot.] | Assessed the utility of a community health workers (CHWs) approach for increasing the acceptance and use of safety glasses among citrus harvesters. | Participants (control and intervention) supplied with safety glasses at the beginning of harvesting season. Replacement eyewear for lost or damaged glasses available. <i>Evaluation:</i> repeated observations of workers during harvesting and interviews with workers. <i>Baseline measures</i> recorded before CHW selection and training. <i>Follow-up</i> after CHW exposure (range from 4 weeks to 15 weeks). CHWs observed harvester 4 times daily during data collection periods. <i>Face to face survey:</i> pre and post-intervention workers asked about demographics, work history, experience with eye injuries, opinions on safety glasses. Intervention crew questions: CHW name, if received assistance or first aid from CHW. Also noted if harvester wearing glasses. | <i>Intervention group:</i> Role of CHW: modelling (CHW use of glasses during harvesting), distributing glasses, informal education sessions with crew about eye safety and benefits of protective eyewear, administering eye washings or other first aid to crew (as required), recording incidents or interactions with crewmates and meeting biweekly with the field coordinator of the project. CHW received training (20 hours) and stipend. <i>Pilot Issues:</i> weakest aspect of the program was their effectiveness during educational session with groups. Characteristics of safety glasses selected by CHWs (after testing 20 commercially available pairs): lightweight, low distortion, high quality optics, frameless lenses that could be elevated off face to relieve heat, short nose piece, gap at top of frame to provide ventilation and short band. | Mean baseline percentage of protective eyewear use was 11.1% (intervention) and 2.4% (control). Mean proportion of adoption across crews: 27.5% (intervention) and 2.6% (control). <i>Significant results:</i> Strong correlation with time CHW spent with crew influenced greater use of glasses. <i>Logistic Regression Results:</i> Predictive variables for glasses use (intervention): crews with experience (1-2 yrs), knew and received help from CHW. Workers age <29 (intervention) less likely to wear glasses. Cumulative effect of variables in model – insufficient alone. <i>Facilitators of eyewear:</i> glasses offer protection against foreign objects, risk of injury and sun. <i>Barriers to glasses use:</i> negative attitudes including uncomfortable, too hot to wear, accumulate dirt, get caught, fog up and thus impact efficiency. | Quasi-experimental (no random assignment). Company A involved in pilot. No clear comparison group as some of Company B also had intervention. Crew size varied. Issue of seasonal turnover. Note: no penalty for refusing to wear glasses, and no enforcement by the crew leader so adoption was voluntary. Consideration of the impact of pay increment has on magnification of perceived barriers. Repeated observation used as proxy for adoption of safety eyewear. |

Appendix 6. Focus Group Questions

- Hello and welcome and go round group to say who you are and what you do.
- Has anyone here been injured while working in the past 10 years?
 - Would you be willing to tell us how it happened, i.e. what you were doing at the time, what injury did you sustain (body location, type), time of day / week / month / year, production activity / process, how do you think it could have been prevented?
- Has anyone here had a near miss while working in the past 10 years?
 - Would you be willing to tell us how it happened, i.e. what you were doing at the time, what injury did you sustain (body location, type), time of day / week / month / year, production activity / process, how do you think it could have been prevented?
- How would you describe your current approach to health and safety in your business and how would you describe it more widely for the industry?
 - Prompting (i.e. seek out information, people don't do anything, actively engaged, important but not the most important, have a business plan which it is part of ..)
 - What motivates you to ensure there is health and safety activities in your business? (prompts if needed - my family, safety in general, legal issues...)
- What would you say are your health and safety principles (by this I mean what do you do to ensure your safety and those who work for you or with you)?
- Have you noticed changes to health and safety practices over time (a) on your farm (b) within the industry more widely?
 - And if so what were the changes and when have these occurred?
 - What do you think stimulated these changes?
- What do you see as barriers to the implementation of health and safety in your business?
- What do you see as barriers to the implementation of health and safety for others in your industry?
- What do you see as benefits to the implementation of health and safety in your business?
 - What would help you to implement health and safety initiatives? (Prompts – financial assistance, personnel assistance?)
- What do you see as benefits to the implementation of health and safety for others in your industry?
 - What do you think would help others in your industry to implement health and safety?
 - What could government do?
 - What could the industry bodies do?
 - What areas of research do you think are required?
- Do you think that taking a legislative approach to health and safety is viable in your industry? By legislative approach I mean that each business operating in your industry must uphold the same

health and safety standards and work place health and safety checks would be regularly undertaken.

- Where do you go to find out about health and safety?
 - What is the preferred method of delivery of information that would assist you in identifying health and safety hazards on your business? For example – would you prefer an industry specific information book or a monthly newsletter discussing safety tips?
- How much control do you feel you have in managing health and safety on your property? What things strengthen or decrease this control for you?
- Do you ever worry about the implications of an injury or fatality occurring in your business?
- How confident are you that you can implement health and safety change within your business?
- What do you do to keep children and visitors safe on your property?
- Do you intend to take any action within the next six months to improve health and safety in your business?

To be used if time permitting:

Case study 1. Quad bikes:

1. Who uses a quad bike?
2. What do you do to ensure your safety when riding?
3. What other things do you think you could be doing?
4. What stops you from doing these things?
5. What stops others from keeping themselves safe when using a quad bike.

Case study 2: Workshop

1. What type of work do you undertake in your workshop?
2. Do you think there is a risk of injury?
3. How likely are you to be injured?
4. What do you do to prevent these from occurring?
5. What other things could you do to improve safety?
6. What stops you from doing the these things?

Appendix 7. Industry Specific issues identified in focus groups, and corresponding barriers and facilitators.

The Cotton and Grains Industries: Broadacre

“Rather than reinventing the wheel, we’re using the perfectly good one that’s been built”

The Cotton industry focus groups raised many of the same general barriers and facilitators as those addressed above. However, there were a number of barriers raised that appear to be specific to their industry and modes of production. In particular, in joint discussions with grain and Cotton producers, the dangers of overhead power lines for electricity supply revealed concerns, due largely to the height of the equipment and silos they are working with and the proximity of the overhead lines to their production areas. These lines could be caught on augers, or become a hazard for workers on top of silos. There were comments regarding sparks from power lines causing fires and additional fire hazards associated with burn-off of cotton stubble.

Online induction and education modules were also a theme in discussion for the Cotton industry. There were at least two aspects to this concept: one was consideration of the contemporary development of online education and induction modules, which had suffered poor uptake throughout the industry. The other aspect was the value, role and appropriate content of an online induction over traditional face-to-face methods with new employees (see Table 1). This industry has implemented the BMP (Best Management Practice) program for members, providing advice and guidance to farmers about best practice in cotton production, which includes a WHS component.

Table 16. Cotton and Grains Focus Group Sessions – Key Industry Specific Barriers and Facilitators Identified

| Focus Group Session Characteristics | | Specifics |
|--|--|---|
| Location | | |
| Moree* *Joint focus group with Cotton and Grains industry representatives | | n= 9; Duration = 132 minutes |
| Dalby | | n= 8; Duration = 129 minutes |
| Industry Issue | Barriers | Example |
| Overhead Electricity/Power lines | Cost Articulated Solutions: underground, | <p>I was doing some BMP training a year back and one of the practices in there says that power lines have to be more than three metres away from a fuel tank. We were doing training and old mate says, “Why’s that?” Well, this is the reason and we were talking to the guy that was there. He said you wouldn’t believe it, only last year we had a guy standing on top with a dip tube, a metal dip tube, and he arced it on to the power lines and survived on top of a 50,000 litre diesel tank. They ended up moving the tank because nobody had ever thought about power lines and distances and things like that.(Cotton)</p> <hr/> <p>Well, there are a lot of deaths. You hear of a lot of people...swinging augers around, or working near the shed you can be near one, or tip a truck up, and...I mean it’s awareness, but we’ve got to put belts on augers or put a cover on it, why is the bloody power line allowed to be swinging in the air...(Grains)</p> |
| Online induction or education materials | Time to train new staff | <p>So this whole idea of online delivery of workplace safety training, we’ve been trying to develop...the uptake has not been great.</p> <hr/> <p>Male: It's just, well, if there was a generic Cotton farm induction that you could get backpackers to do before they even arrive on your farm, then you'd be...</p> <p>Female: See, I totally disagree with that. I value sitting across the desk from someone and...</p> <p>Female: Yeah, talking to them...</p> <p>Male: No, I'm not for a moment suggesting a generic online thing can cover the whole thing. It's just basic introductory stuff...the real generic stuff. This is a Cotton farm, it has stuff on it. This is what it looks like.</p> |
| Industry Issue | Facilitators | Example |
| BMP Program support | Availability and Credibility of Information Improved farm performance | For me farm safety is the one issue that I see and hear the most about from a BMP point of view. In my experience there is a lot of people out there who really don’t know what they should and shouldn’t do. The goal or part of the goal of BMP is about helping supply some stuff to help people know what they should be doing. |

The Sugar Industry

“We've got to get more ownership of safety as an industry and create that culture”.

The Sugar industry faced challenges regarding the length of their harvest seasons and associated processes, citing staff turnover as a significant issue, both for the supply of labour, resulting in fatigue from overworked employees and continual cycles of induction and training due to the turnover of staff (Table 17). There were also concerns about the awareness of the haulage process for members of the general public. Due to cane train haulage lines cutting across major highway and roadways in Queensland, there was a perception of significant dangers when cane trains and cars would interact. There was a perception that the industry and government have attempted to provide solutions to these hazards through increased signage, warnings on radio and television and railway overpass infrastructure.

Table 17. Sugar Focus Group Session – Key Industry Specific Barriers Identified

| Focus Group Session Characteristics | | Specifics |
|---|----------------------------------|--|
| Location | | |
| Ayr | | n=4; Duration = 116 minutes |
| Ingham | | n=6; Duration = 107 minutes |
| Industry Issue | Barrier | Example |
| Length of season and associated staff turnover | Training/skilled staffing supply | Facilitator: How long does the mill run for? Male: Well, six months of the year. Hopefully a bit shorter, but yeah, June through to November, say. Facilitator: Do you have the same staff through every year... Male: We have done - did a quick look at our labour supply - just my department - we turn over one in three seasonals [employees] a year. We work long hours at the moment we are working both morning and night and people aren't - outside of our industry aren't used to that. |
| Interactions with the public on roadways during haulage of harvest to mills | Environmental conflict | Male: ...So we have harvesting equipment hauling the cane at maximum of 40 to 60 Ks an hour, and a car does 100. So that interface with tourists and stuff is going to be a challenge for us. Male: Most crossings have got lights on them now but there are some of them that haven't but they are spreading quickly. |
| Fatigue | Stress and Time Limitations | I think it is moving that way I think more people are because there's been a lot of emphasis put on health and safety and the biggest problem at the moment is people managing fatigue. That's probably our biggest problem at the moment because of the time in the year. |
| Overhead Electricity/Power lines | Cost Change in farm machinery | Now we've got an elevator, 12 tonne bin or 14 tonne bin that drives beside the harvester. He goes to the siding and then they elevate these four tonne bins...so they go really high. But when we had roll on roll off there was no height involved so a lot of these sidings are still from the roll on and roll off days...See in that case of the sidings down here it would be a matter of ...[Electricity company] raising the line but they want someone else to pay for it so that's a community asset and it's for the community's betterment. Well then the |

| | | |
|--|--|--|
| | | community should just pay for it. Male: Mind you, we don't go around hitting power lines. They send you the bill. It's not cheap. |
|--|--|--|

Changes to legislation were raised and perceived as being difficult to keep pace with; in particular, there was a brief discussion about the introduction of environmental protections for the Great Barrier Reef in 2010, which was said to have confused producers further with regard to their safety obligations. However, this was somewhat mitigated by the presence of safety officers within the region that were seen to be trustworthy and helpful sources of advice and guidance through the change process (Table 18).

Table 18. Sugar Focus Group Session – Key Industry Specific Facilitators Identified
Continued

| Industry Issue | Facilitators | Example |
|---|--|--|
| Industry-specific training to address industry specific barriers | Education | ...what we try to do with training is get everyone on the same thought pattern – same line of thinking – so when you're at a siding, you do this, or we also provide training for electrical safety for overhead power lines...So certainly, anytime we're working near power lines, it's 'look up and live'... |
| Regular industry gathering to discuss issues | Leadership and Communication | On a positive note - you asked about the interactions; something I've felt very strongly about, being involved in the industry, was the relationship between the mill and the harvester groups and the district really, as well as the farms, and we've got regular meetings that we have - more regular during the season - meetings with the mill and the grower groups and harvesters in some cases. |
| Engagement with an industry best practice management system (Smartcane) | Availability and Credibility of Information Improved farm performance | We've already engaged with best management practice programs like Smartcane. That program there, is basically to demonstrate to community and government how well growers actually do perform in particular areas across the spectrum of farming, and best management and practice... is certainly one of those avenues that we've already recognised as being advantageous, to actually promote the industry. |

The Fisheries Industry

... You don't get to walk away from this job at the end of the day...you don't get to walk away from people you don't like...So without having actually been in that situation it is a bit more difficult for some people to imagine and everything that fits a static workplace like a mine doesn't necessarily transpose itself well into our workplace.

The Fisheries group represent a diverse group of producers, including deep sea fisheries (at sea for extended periods), coastal fisheries and inland aquaculture groups (salmon farming etc.). Thus, there were a range of industry specific barriers that were discussed in the focus groups held in Cairns and Hobart. Not all of these barriers would apply to all fisheries production, but still represent barriers or potential threats to safety within the industry.

The barriers and facilitators that were specifically raised by the fisheries representatives are shown in (Table 19). The Fisheries industry discussed specific types of injuries and health needs that were unique to their focus group sessions, including the risk of injury or death by slipping or tripping, confined space issues, access to medications (and the process to get supplies), fatigue and stick injuries (from prawns, etc.). Some skippers used their master's log book to record incidents and near-miss events where possible. There was positive discussion in this industry regarding the ways that they have had to adapt equipment from land based industries for use on sea-going vessels and the unique problems that this can create for safety of their crews (Table 20). The use of third-party auditing services was also raised as a unique solution to improve safety systems. However, there was also acknowledgement that there had been a degree of flexibility offered to them in terms of training and advice, from government and industry organisations. The acknowledgement of the knowledge and experience of commercial fisherman, as being a traditional safety system that has been transmitted through generations and is now becoming the basis for formal inductions and training, was a consistent theme through the two focus groups.

"We really keep an eye on the guys when they start as well - follow through that induction period, and the commercial fishermen that we've come through our industry are probably some of the most knowledgeable people we've had, and just getting them to explain what's in their head. They've been doing risk assessment all their life. They just haven't realised it."
(Fisheries, Hobart)

Many of the group members expressed concern that WHS had 'gone too far' and had taken away the ability for individuals to monitor and adapt their own behaviours, and take responsibility for their safety.

Table 19. Fisheries Focus Group Session – Key Industry Specific Barriers Identified

| Focus Group Session Characteristics | | Specifics |
|--|---------------------------------|--|
| Location | | |
| Cairns | | n= 12; Duration = 62 minutes |
| Hobart | | n= 6; Duration = 132 minutes |
| Industry Issue | Barriers | Example |
| Enforced confinement (only applicable to some types of production) | Complacency and Work Conditions | ... You don't get to walk away from this job at the end of the day...you don't get to walk away from people you don't like...So without having actually been in that situation it is a bit more difficult for some people to imagine and everything that fits a static workplace like a mine doesn't necessarily transpose itself well into our workplace. |
| Industry required staff qualifications which do not reflect practice reality | Scarcity of skilled workers | ...regulations are being breached with our engineers doing any electrical work on board and the current engineer qualifications... they don't entitle these guys to do any of that work. Yet we |

| | | |
|---|--|---|
| | | know that if that work isn't done that is probably a greater risk to life and limb than them actually going about them doing it. |
| Perceived hypocrisy of legislation which treats commercial and recreational fishers differently | Hypocrisy in depictions of safety and application of the law | If we're talking about occupational health and safety, and we're talking about a marine industry, why is occupational health and safety only applied to the commercial sector? I pull up at boat ramps and here's these guys with these big flash boats, they can't row them with oars yet they've only got one motor on the boat. They haven't got an auxiliary. We have to have an auxiliary. I can only go to sea three by 30. They can go to New Zealand with one motor if they want. No regulation. If it's about protecting the safety of the individual, why is there a line drawn between the workplace and the recreational place? |
| Inherently unstable work environments | Difficult to control environment | Sometimes you'll get a bit of weather which is totally unexpected and you've got to get a dinghy back on board a boat, and the boat's going like this [indicates rocking motion]. We can't stop and wait out till it calms down. Sorry, that's the nature of the environment we work in. You've got - sometimes tasks have to be performed no matter what - no matter what. |
| Adaptation of equipment to fit the needs of the industry requires flexibility in training options | Relevance of training | ...but it's in situations we go, well we need a crane license which is relevant to a truck, [be]cause we use one our boat. So we'll spend half the course learning how to put outriggers out and that's nothing - it's not going help our guys. |
| Species shift | Governmental barriers to innovation and reactive business | Many of the species are going into deep water. We've got species-shift. We've got a government - the previous government that wouldn't let us access new species coming in like the pilchards. |

Table 20. Fisheries Focus Group Session – Key Industry Specific Facilitators Identified

| Industry Issue | Facilitators | Example |
|---|---|--|
| Introduction of quotas | Market Signals – reducing competition | Quotas take the egos and the cowboys out of the equation - not completely, but to a certain extent. When those cowboys aren't competing against each other, once the competition's gone, the risk factors go down a hell of a lot. When we introduced quota in 1998 we went for 10 years without a fatality. |
| Enhanced safety systems for weather prediction, vessels and equipment | Improvements in machinery and equipment | The weather bureau forecasts are 10 times better than what they were. Boats are probably safer than what they were. We have better safety equipment. |
| Industry specific programs incorporating WHS | Programs which allow flexibility and respect accountability | I mean in our industry we've got a thing called the Clean Green Program which encompasses workplace health and safety, and part of that is that each vessel does a risk assessment plan - not the whole lot together, lumbered up with a set of rules for everybody at the end. So that's a lot more sensible outcome for me, that each vessel does its own risk assessment. |

The Meat and Livestock Industry

“...No one wants to see anybody get hurt - and in a perfect world we like to have absolutely everything spot on, brand new and working perfectly...”

Meat and Livestock industries were represented in focus groups held at Bathurst, New South Wales, and Brisbane Queensland (Table 21). There were many discussions of the financial cost and time taken to implement health and safety practices in this industry, and discussions about who should contribute solutions to industry specific problems – bureaucrats and management were often cited as not having the requisite experience or knowledge of industry practice to create solutions which were truly responsive to the issues in everyday practice.

There was one interesting example of barriers posed by bureaucratic requirements that crossed departmental boundaries:

The place we lease at [Property name] is under a heritage order. When we went there, the cattle yards were falling down, the sheep yards were falling down but we weren't allowed to do anything with them because they've got a heritage order on them. I took it to WorkCover and I said, “What do I do here - the yards are falling down, they've got a heritage order on them, the sheep yards are falling down, they got a heritage on them” - but they are not safe work environments? In my tender to lease this place - there was no way I was going to build a brand new set of yards - I was going to upgrade the yards that were there.

Anyway WorkCover wouldn't ever get back to me. The answer was, we've got to protect some of Australia's heritage - this place was settled in the 1830s, the original woolshed that's there was built in 1860. But it's like George Washington's axe - it's had two new heads and three new handles.

There were discussions about the cost of safety innovations and the current state of farmers in meat and livestock industries suffering economic deprivations due to ongoing drought conditions and a number of other political and social factors (including live export bans and limited government assistance schemes). This also touched on issues of expertise in the workforce, where older, more experienced workers were perceived to have left the industry to pursue better payment working in the mining industry (especially in areas where the two industries occupy the same or nearby locations), and the oversupply of inexperienced workers coming from cities for a rural experience. Any of the

experienced young people who had been working in the industry for some time were seen to be reliable, yet unable to lead their fellow workers in the ways that older stockmen might.

Table 21. Meat and Livestock Focus Group Session – Key Industry Specific Barriers and Facilitators Identified

| Focus Group Session Characteristics | | Specifics |
|--|---|--|
| Location | | |
| Bathurst | | n=4; Duration = 89 minutes |
| Brisbane | | n= 7; Duration = 45 minutes |
| Industry Issue | Barriers | Example |
| Confusion regarding responsibility to induct contractors | Managing contractors and discerning WHS responsibilities | We've had the same contractor out at the property I manage, since I've been there. I go through - I've got an induction form. We've had sections in it - well when I say, induction form, it's 12 pages long - and there's sections in it for him to make comments about the shed and things like that. It's up to him to induct his employees into the shed. It's a part of the - their induction is that he does the individual inductions for his employees. |
| Lack of official systems of documentation or recording of changes or WHS issues | Administrative burden | ...so, looking at Dad and I, who are the main ones on the farm, we're aware of safety, definitely. We're doing things to minimise it [the risks]. But there's no official documentation, no official plan. We don't do an audit every 12 months or anything like that. But we're in the process of planning our yards. We did half of it last year. We got that rebate to put a - order in a draft room. It didn't cover much of it but it covered it. That wasn't for an OH&S reason but now having it, it is. You realise how - just everything works a lot quieter, smoother. Sheep are less stressed. |
| Industry Issue | Facilitators | Example |
| Use of local, trustworthy contractors to develop specialised WHS induction and safety systems | Responsive training and availability and credibility of information | ...we have agricultural consultants, [Name of consulting company], local blokes - and we have induction forms for any contractors that come on the place, for inducting visitors that come and stay, campers, Sydney visitors, friends or whatever. We have a speed limit on the property. All motor bikes would be - worn helmets. We don't allow anyone to use the chainsaw on the place unless they're a contractor that's been inducted and got appropriate paperwork to go with it... Facilitator: So [business name], they've well and truly embraced health and safety and got systems in place... Interviewee: Yeah, I've got sheafs of paperwork and it's nearly prohibitive... |
| Limited rebates to upgrade equipment and processes (not necessarily safety driven motivations) | Financial limitations | Interviewee: Yeah, we've got a new drafting race with the rebate that they had. The one before was wooden and it was slowly getting narrower and falling apart and now it's all steel... Facilitator: Okay and I asked you how far that rebate would then enable you to do that. Interviewee: Just the draft. |

| | |
|--|---|
| | Interviewee: Yeah, it only just got us a draft. |
|--|---|

The Meat Processing Industry

“I think most of the large processors in Australia have good systems in place to manage their OH&S.”

While the Meat Processing industry representatives felt that the industry overall seemed to have a good handle on WHS, there was general agreement that workers were subject to musculoskeletal injuries and stressors. It was felt that the ageing workforce in the industry provided wisdom and experience, but also saw the need for the adaptation of technologies to suit older workers’ needs (Table 22). It was perceived by this group that minor yet more general injury or incident types (such as hand lacerations), had been well covered and mitigated in the industry, but the focus for future efforts would need to address issues of ageing. There was also identification of the need for the industry to share information about WHS innovations, so that more workers and employers may benefit from them. Issues of commercialisation were seen to complicate sharing information of this kind. However, discussions of technology improvements and automation of repetitive tasks was seen as having two outcomes: while ageing workers would be protected from some of the physical stresses of the job, automation could also signal the demise of certain positions in the workforce.

Job rotation was discussed as both a barrier and facilitator to WHS changes and was variously described as an ‘industrial nightmare’, and a way to break the boredom and monotony of repetitive tasks. It creates meat processors who are skilled in many areas and can assist with minimisation of repetitive stress injuries related to parts of the meat processing process.

The ability to access data about industry-related deaths and injuries was a common discussion point, and demonstrated the frustrations of not being able to differentiate between size, type, or level of operations within meat processing, to accurately assess the risks of these events occurring for different enterprises.

Table 22. Meat Processing Focus Group Session – Key Industry Specific Barriers and Facilitators Identified

| Focus Group Session Characteristics | | Specifics |
|--|--|---|
| Location | | |
| Teleconference (multiple locations) | | n= 3; Duration = 88 minutes |
| Industry Issue | Barriers | Example |
| Musculoskeletal injuries and older workforce | Education or skilled based barriers | Most of our injuries are related to musculoskeletal and the organic and innate natures of people as they get older and the body degenerates is where we're seeing most of our claims. Unfortunately a lot of people sort of want or feel that their work is wholly responsible for these wear and tear and age-related sort of factors. That's sometimes very difficult to differentiate. |
| Access to industry specific (and intra-industry specific) injury data, to design better working conditions | Lack of access to information – or information sharing | You mentioned I think the area that we're focusing on is meat processing...under the banner of meat processing, it's not just abattoirs. Now, I understand your focus is probably looking at the Meat industry overall, whether that be from the abattoir, a very large export abattoir down to a small retail butcher shop. The point will be that, without having that breakdown [in the injury data], that creates a barrier in itself of not being able to |

| | | target the appropriate areas of injuries. |
|--|---|---|
| Industry Issues | Facilitators | Example |
| Sharing safety solutions | Leadership and Communication – Industry bodies assistance with this | ...the industry itself needs to probably step up and start sharing solutions to things, because I've been to a few different companies and we're not doing things a hell of a lot different to what everyone else is doing in the industry, but everyone seems to think that they're doing something more secret than someone else. |
| Meat Industry advisory group to advocate for meat processors | Team approach to identification of hazards and solutions | We've got a lot of benefit out of that [advisory group] when the regulator's gone on a little campaign to do something, and then all of a sudden, it comes to the attention of the committee, and the industry experts in the committee go back to the government and say, well hang on, have you realised this, this, this and this in effect? |

Appendix 8. Farmsafe Workshop Summary of Participant Identified Barriers and Facilitators

The workshop was used to coordinate a wider clarification and discussion of our literature review and focus group results. In order to fit the allotment it was necessary to group up like facilitators and barriers and this appears in our slide presentation along with a brief verbal overview. There were a number of issues discussed during the workshop session however from the general discussion and feedback some of our groupings may not have been as intuitively connected or clearly named as previously though. This feedback went on to help inform clearer groupings in the Delphi process. As such the barriers and facilitators discussed during the workshop session are listed in the table below (Table 23) includes points previously articulated in earlier sections but some new barriers and facilitators did arise and are marked with an asterisk.

Table 23. Overview of Barriers and Facilitators Discussed in Workshop Session

| Barriers | Facilitators |
|---|---|
| Lack of clarity of message* | Role of women as safety drivers |
| Lack of appropriate support | Ability to be proactive in seeking individualized solutions |
| Working in home environment* | Fear of the regulator – if improves safety |
| Attitude to risk; Allowable risk; Default and easy option* | Training which considers literacy, skills competency and variability and is context specific ie. Safest routes for Quad bikes |
| Financial limitations/affordability | Personal drivers – longevity of the individual and the enterprise* |
| Turnover of staff; Training concerns | Championship – particularly at management level*; Leadership with a focus on commitment and communication |
| Safety can negatively influences productivity | Market signal change* |
| Ease to put off making adjustments; Low priority | Tools for compliance – quick, easy |
| Reluctance to enforce safety | Appreciation of common standards |
| Confusion regarding contractors and responsibilities | Technology*; Farm risk mapping tools; Diagnostics with machinery |
| Lack of leadership, team work and role models | Simplification: reporting systems*; procedures |
| Fear of the regulator – if causes avoidance behavior* | Consistent application of regulation* |
| Information Provision – type, availability, flexibility, timeliness, credibility of message and messenger | Role of discussion to reinforce and explain policy and procedure* |
| Lack of industry resources to help make informed decisions* | Positive performance measures at an industry level: share success* |
| Habit, prejudices and practices; Culture of doing things a certain way | Highlighting that individuals have a choice but in making the choice they will also suffer the consequences |
| Time limitations | Realignment of regulation to encourage good behavior and not just to punish |
| No personal experience with consequences | Push resources into industry and create support* |
| Limited knowledge of available solutions* | Culture change* |
| Design of products which don't take into account | Competency transfer – how we want them trained |

| Barriers | Facilitators |
|---|---|
| physical attitudes and use behavior* | and not allowing mediocrity* |
| Remoteness of properties compounding existing staff, information and training difficulties* | Kids as an enabler and participant in identifying risks in a family environment |
| Feelings of hypocrisy | Harmonisation across industry* |
| Focus on probability not consequences* | Safety delivers efficiencies which positively impacts productivity |
| Barriers narrow focus – individual what about broader context barriers – Ecological approach* | Returning skills of mining labour force and safety culture established within that sector |
| | Pilot programs – to encourage trial and to received feedback |

* This issue was a novel way of discussing the concept which didn't arise or not to the extent it did during the workshop session.

Appendix 9. Delphi Questions



Cairns
Singapore
Townsville



Adoption of health and safety in primary industries

You are invited to take part in a research project about the barriers and enablers to adoption of workplace health and safety practices in Primary Industries. The study is being conducted by Associate Professor Richard Franklin and Associate Professor Tony Lower. The study has ethics approval from the James Cook University Human Research Ethics Committee (H5587).

The aim of this research study is to explore the barriers to adoption of improved work health and safety practices and develop strategies to address these barriers which would lead to a reduction in workplace injuries and illness.

You recently participated in a focus group session for this project and indicated that you would be willing to participate in our next phase of the research. This survey should take approximately 5-10 minutes to complete, and your responses will be anonymous. Taking part is voluntary, and you can stop taking part at any time without explanation or prejudice. Please complete this survey by Friday 9th January, 2015.

If you have any concerns regarding the ethical conduct of the study, please contact: Human Ethics, Research Office James Cook University, Townsville, Qld, 4811 Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Validation: Max. answers = 1 (if answered)

1) What industry do you work in? Please select one of the following:*

☐ Beef

☐ Sheep

☐ Grains

☐ Cotton

☐ Sugar

☐ Fisheries

☐ Meat processing

☐ Other: _____ *

2) What is your role/occupation?*

for example: farmer, OHS manager, etc.

Validation: Max. answers = 1 (if answered)

3) Do you work on a farm/fishing enterprise?*

☐ Yes

☐ No

Validation: Max. answers = 1 (if answered)

4) What is the size of the enterprise, based on the number of employees?

☐ 0 employees - small enterprise

☐ Less than 10 employees - medium enterprise

☐ More than 10 employees - large enterprise

5) Below is a list of identified barriers that have prevented people from implementing health and safety practices in their business. Please rank these according to how relevant they are to you and your enterprise.

Please drag the appropriate boxes across to the grey box. You do not have to drag all options across if they are not relevant.

TOP Box = most relevant

BOTTOM Box = least relevant

If you are completing this on a smart phone or tablet, the layout will be slightly different - please tap the factors in order of relevance, and they will automatically be assigned a ranking.

- _____ Cost to make changes
- _____ Attitude toward OH&S
- _____ Legislative uncertainty
- _____ Comfort of PPE
- _____ Changes restrict innovation
- _____ Lack of access to information about safety
- _____ Administrative burden
- _____ Hassle of making changes
- _____ Turnover of staff
- _____ Training costs
- _____ Other
- _____ Time to make changes

**6) If you included 'Other' in your ranking, please specify what the other barrier is.
(If this does not apply to you, please answer N/A).**

7) Below are the same barriers. This time, please rank these according to how relevant they are to implementing health and safety practices in your industry.

Please drag the appropriate boxes across to the grey box. You do not have to drag all options across if they are not relevant.

TOP Box = most relevant

BOTTOM Box = least relevant

If you are completing this on a smart phone or tablet, the layout will be slightly different - please tap the factors in order of relevance, and they will automatically be assigned a ranking.

- _____ Cost to make changes
- _____ Attitudes toward OH&S
- _____ Legislative uncertainty
- _____ Comfort of PPE
- _____ Changes restrict innovation
- _____ Lack of access to information about safety
- _____ Administrative burden
- _____ Hassle of making changes
- _____ Turnover of staff
- _____ Training costs

8) Please consider the list of barriers again. Please indicate for each barrier:
Do you think this barrier could be addressed/changed?

| | Yes | No |
|--|-----|-----|
| Time to make changes | () | () |
| Cost to make changes | () | () |
| Legislative uncertainty | () | () |
| Attitudes toward OHS | () | () |
| Lack of access to information about safety | () | () |
| Hassle of making changes | () | () |
| Turnover of staff | () | () |
| Administrative burden | () | () |
| Comfort of PPE | () | () |
| Changes restrict innovation | () | () |
| Training costs | () | () |

9) Have we missed any barriers? Please explain.

10) Below is a list of ten things that help people to implement health and safety practices on their enterprise. Please rank how important these enablers are to you in your enterprise.

Please drag the appropriate boxes across to the grey box. You do not have to drag all options across if they are not relevant.

TOP Box = most relevant

BOTTOM Box = Least relevant

If you are completing this on a smart phone or tablet, the layout will be slightly different - please tap the factors in order of relevance, and they will automatically be assigned a ranking.

- ☐ Cost incentives
- ☐ Attitudes and leadership on OH&S
- ☐ Enforcement of legislation
- ☐ Improved PPE
- ☐ Safety practices which increase efficiency
- ☐ Training and access to information about safety
- ☐ Assistance with paperwork or administrative guidance
- ☐ Convenience in making changes (i.e. easy to make changes)
- ☐ The presence of vulnerable people (i.e. children, visitors, older persons)
- ☐ Reward/recognition for innovative safety practices
- ☐ Other

11) If you included 'Other' in your ranking, please explain.
(If this does not apply to you, please enter N/A).

12) Below are the same ten enablers. This time, please rank how important these enablers are to implementing changes to health and safety practice in your industry.

Please drag the appropriate boxes across to the grey box. You do not have to drag all options across if they are not relevant.

TOP Box = most relevant

BOTTOM Box = Least relevant

If you are completing this on a smart phone or tablet, the layout will be slightly different - please tap the factors in order of relevance, and they will automatically be assigned a ranking.

- ☐ Cost incentives
- ☐ Attitudes and leadership in OH&S
- ☐ Enforcement of legislation
- ☐ Improved PPE
- ☐ Safety practices which increase efficiency
- ☐ Training and access to information about safety
- ☐ Assistance with paperwork or administrative guidance
- ☐ Convenience in making changes (i.e. easy to make changes)
- ☐ The presence of vulnerable people (i.e. children, visitors, older persons)
- ☐ Reward/recognition for innovative safety practices

13) Please consider the list of enablers again. Please indicate for each enabler:
 What is the likelihood that this enabler could make a difference to health and safety practice?
 How long would it take to implement this enabler?
 Who should be responsible for delivering this enabler?

| | Likelihood of making a difference | | | Timeframe for implementation | | | | | Responsibility for delivery | | | | |
|--|-----------------------------------|-------------------|-------------------|------------------------------|-------------|------------|-------|----------------|-----------------------------|----------|------------|------------|----------------|
| | Highly likely | Moderately likely | Not at all likely | Long term | Medium term | Short term | Never | Not applicable | Individual enterprise | Industry | Government | All levels | Not applicable |
| Cost incentives | — | — | — | — | — | — | — | — | [] | [] | [] | [] | [] |
| Positive attitudes and leadership on OH&S | — | — | — | — | — | — | — | — | [] | [] | [] | [] | [] |
| Enforcement of legislation | — | — | — | — | — | — | — | — | [] | [] | [] | [] | [] |
| Improved PPE | — | — | — | — | — | — | — | — | [] | [] | [] | [] | [] |
| Training and access to information about safety | — | — | — | — | — | — | — | — | [] | [] | [] | [] | [] |
| Assistance with paperwork or administrative guidance | — | — | — | — | — | — | — | — | [] | [] | [] | [] | [] |
| Reward/recognition for innovative safety practices | — | — | — | — | — | — | — | — | [] | [] | [] | [] | [] |

14) Have we missed any enablers? Please explain.

15) Do you wish to make comment on any of your answers?

16) How would you rate the importance of workplace health and safety?

☐ Not at all important ☐ Slightly important ☐ Important ☐ Fairly important ☐ Very important
☐ No opinion

17) To what extent do you think it is possible to prevent people from being injured in everyday life?

☐ Impossible ☐ Some could be prevented ☐ About half could be prevented ☐ Most could be prevented
☐ All could be prevented ☐ Don't know

Validation: Min = 0 Max = 10

18) How safe would you rate your workplace on a scale of 0 to 10 (with 0 being not safe at all and 10 being totally safe)?

0 _____ [] _____ 10

19) How committed do you think your workplace is about health and safety?

☐ Not at all committed ☐ Slightly committed ☐ Committed ☐ Fairly committed ☐ Very committed
☐ Don't know

20) Please answer the following questions

Are you:

☐ Male
☐ Female

21) To which age group do you belong?

☐ 18-24
☐ 25-34
☐ 35-44
☐ 45-54
☐ 55-64
☐ 65-74
☐ 75 and older

Thank You!

Thank you for taking our survey. Your response is very important to us. Your responses will be strictly confidential. The data from the study will be used in research publications, reports and conference proceedings. You will not be identified in any way in these publications. If you have any questions about the study, please contact Associate Professor Richard Franklin. Principal Investigator: Associate Professor Richard Franklin College of Public Health, Medical and Veterinary Sciences James Cook University Phone: 07 4781 5939 Email: richard.franklin@jcu.edu.au

Appendix 10. Delphi Participant Communication

Invitation Email

From:

Richard Franklin <richard.franklin@jcu.edu.au>

Subject:

Addressing the Barriers to Adoption of Health and Safety Practice in Primary Industries

Last Send

Not Sent

Greetings [contact("first name")] [contact("last name")],

Earlier this year you participated in a focus group session or said you were interested in the project "Addressing the barriers to adoption of health and safety practices in primary industries". As part of your involvement in that project we also asked you if you would be interested in being re-contacted to complete a brief anonymous survey. That is the reason we are contacting you now, we have created a survey that will take approximately 5 to 10 minutes of your time which provides a summary of our findings across the focus group sessions.

The main point of this survey is to allow you to rank the importance and likelihood of success for addressing the barriers and enablers that emerged out of the focus group sessions, to explore their relevance and importance to different industries.

Any data obtained from this survey will be anonymous and the aggregate data will be used in research publications, reports and conference proceedings. You will not be identified in any way in these publications. Your participation is voluntary and you can stop participating at any time. This research has ethical approval from the James Cook University Human Ethics Research Committee (H5587).

If you would like to complete the survey simply select the link below and it will re-direct you to the Survey Gizmo website.

[invite("html link"), title="Begin"]

If you do not wish to participate, simply select the unsubscribe link below and you will not receive any further correspondence about this project. Thank you again for your involvement in this project.

Thank You!

Kind Regards,

Associate Professor

Richard Franklin

Principal Investigator

College of Public Health, Medical and Veterinary Sciences

James Cook University

Phone: 07 4781 5939

Email: Richard.franklin@jcu.edu.au

If you have any concerns regarding the ethical conduct of the study, please contact: Human Ethics, Research Office James Cook University, Townsville, Qld, 4811 Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Unsubscribe link: [invite("unsubscribe link")]

Reminder Email

From:

Richard Franklin <richard.franklin@jcu.edu.au>

Subject:

[Reminder] Addressing the Barriers to Adoption of Health and Safety Practice in Primary Industries

Last Send

Not Sent

Greetings [contact("first name")][contact("last name")],

Earlier this year you participated in a focus group session or said you were interested in the project "Addressing the barriers to adoption of health and safety practices in primary industries". As part of your involvement in that project we also asked you if you would be interested in being re-contacted to complete a brief anonymous survey. We sent you an email last week about participating, if you are interested it will take approximately 5 to 10 minutes of your time. If you aren't interested simply select the 'Unsubscribe link' below.

The main point of this survey is to allow you to rank the importance and likelihood of success for addressing the barriers and enablers that emerged out of the focus group sessions, to explore their relevance and importance to different industries.

Any data obtained from this survey will be anonymous and the aggregate data will be used in research publications, reports and conference proceedings. You will not be identified in any way in these publications. Your participation is voluntary and you can stop participating at any time. This research has ethical approval from the James Cook University Human Ethics Research Committee (H5587).

If you would like to complete the survey simply select the link below and it will re-direct you to the Survey Gizmo website.

Barriers to adoption survey: [invite("html link"), title="Begin"]

If you do not wish to participate, simply select the unsubscribe link below and you will not receive any further correspondence about this project. Thank you again for your involvement in this project.

Thank You!

Kind Regards,

Associate Professor

Richard Franklin

Principal Investigator

College of Public Health, Medical and Veterinary Sciences

James Cook University

Phone: 07 4781 5939

Email: Richard.franklin@jcu.edu.au

If you have any concerns regarding the ethical conduct of the study, please contact: Human Ethics, Research Office James Cook University, Townsville, Qld, 4811 Phone: (07) 4781 5011 (ethics@jcu.edu.au)

Unsubscribe link: [invite("unsubscribe link")]

Thank You Email

From:

Richard Franklin <richard.franklin@jcu.edu.au>

Subject:

Thank You for Completing the Barriers to Adoption Survey!

Last Send

Not Sent

Greetings [contact("first name")] [contact("last name")],
Thank you for taking part in our survey for the project "Addressing the Barriers to Adoption of Health and Safety Practice in Primary Industries". The final report for this project will be submitted early 2015. If you are interested in reading about this project and the results, please keep an eye on the Primary Industries Health and Safety Partnership section of the Rural Industries Research and Development Corporation website <http://www.rirdc.gov.au/research-programs/rural-people-issues/primary-industries-health-and-safety-partnership>.

Kind Regards,

Associate Professor Richard Franklin

Principal Investigator

College of Public Health, Medical and Veterinary Sciences

James Cook University

Phone: 07 4781 5939

Email: Richard.franklin@jcu.edu.au

If you do not wish to receive further correspondence about this project select the unsubscribe link below: [invite("unsubscribe link")]

Exploring the barriers and facilitators to adoption of improved work practices for safety in the primary industries

by Richard C Franklin, Kristin E McBain-Rigg, Jemma C King and Tony Lower



RIRDC Publication No. 15/O68
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