NATIONAL CENTRE FOR FARMER HEALTH

Influencing a Culture of Safety on Farms

A report from the National Centre for Farmer Health (NCFH), Hamilton and the Institute for Safety, Compensation and Recovery Research (ISCRR) summarising the approach and findings of the Influencing a Culture of Safety on Farms project 2021.

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Influencing a culture of safety on farms project.

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GLOSSARY OF TERMS

Agriculture and Horticulture Development Board (AHDB) - a statutory levy board in the UK, funded by farmers, growers and others in the supply chain, to help famers be ready for agricultural revolution and change

AgriFutures - Formerly known as Rural Industries Research and Development Corporation (RIRDC), an organisation that funds research and development in Australian rural industries

American Farm Bureau Federation (AFBF) - an independent, non-governmental, voluntary organization governed by and representing farm and ranch families in the US

Crush-protection devices – see Rollover protection structures

Emerging agriculture technologies – new technologies that will potentially change and improve the way things are done on farms

Extension officers – Agricultural Extension Officer Advises farmers, agricultural businesses, rural industries and government on the production, processing and distribution of farm products.

Farm managers - Farm managers are responsible for optimizing the production of their farms regarding either crops or livestock, as well as setting operating goals and business plans.

Farm safety advisors – specialist consultants who help farmers establish and improve health and safety on their farms.

Farmer influencers – farmers who try to maximise the positive pressure of families; usually female influencers

Farmer personas – four broad categories that describe farmers' resistance or openness to change

FarmSafe Australia – a network of locally-based farm safety action groups that provide health and safety awareness and resources for farmers

Farm-scale risks – risks that are on the same scale as the farm itself, e.g. financial risks affecting the viability of the whole farm.

Foreman (farm) - a person who is in overall control of all labour on a farm or, in the case of larger farms a person who is in overall control of one section of the farm's activities.

Grey Literature - includes available unpublished pilot data and evaluation reports

Health and Safety Executive (HSE) - a UK government agency responsible for the enforcement of workplace health, safety and welfare, and for research into occupational risks

Hierarchy of control - a system used in workplace environments to minimise or eliminate exposure to hazards.

Kidsafe Victoria – an independent, non-profit, organisation dedicated to the prevention of unintentional death and injury to children through education, advocacy and research

Model of safety behaviour change - an integrated model of safety behaviour change on Australian farms using behaviour-change theory and community-level theories adapted for injury prevention

National Future Farmers of America (FFA) Organization - an intracurricular student organization that prepares members for premier leadership, personal growth and career success through agricultural education

Normalisation of risk – evaluations of danger based on incorrect perceptions

Personal protective equipment (PPE) – things used or worn to minimise health and safety risks, e.g. helmets, guards on machinery

RIRDC - Rural Industries Research and Development Corporation, see AgriFutures

Rollover protection structures (ROPS) – usually found on tractors and quadbikes, a structure or system that provides a protective zone around operators to reduce or eliminate the risk of serious injury or death in the event of an overturn.

Rural Safety and Health Alliance (RSHA) – a leadership group committed to health and safety improvement across all primary production sectors

Safety climate – the perceptions of safety and observed safety behaviours of an individual or a group of people (e.g. employees)

Safety culture – collective individual, organisational, institutional and industry-wide approach to safety

Smarter, Safer Farms program - a four-year (2018-2022) $20 million investment by the Victorian government towards building a safe, empowered and innovative Victorian agriculture sector through a series of initiatives.

Socio-ecological model (SEM) – a theoretical framework that explores the multifaceted levels (individual, interpersonal, organizational, community, and public policy) within a society and how individuals (e.g. farmers) and the environment interact within a social system.

Tasmanian Institute of Agriculture (TIA) - a research institute at the University of Tasmania specialising in research, development, extension and education to support prosperous, innovative and sustainable agriculture and food sectors in Tasmania

Vulnerable workers – workers who have greater exposure to risks and injuries, such as migrant workers, young workers, senior farmers and children living on family farms.

EXECUTIVE SUMMARY

This report presents the findings of a literature search that examined research and initiatives aiming to positively influence the safety climate and culture on farms. The literature search explored both Australian and international work, through a review of both peer-reviewed literature and grey literature.

In this report, the term “safety culture” describes the top-down approach to safety adopted by the broader agricultural industry or the management in large agricultural businesses (e.g. OHS policy). The term also encompasses what some literature refers to as “safety climate”, the day-to-day practices and perceptions of safety in individual agricultural workplaces.

The socio-ecological model (SEM) is a useful framework for understanding the key factors that contribute to a farm’s safety culture. The SEM recognises that culture is influenced by factors at several different levels (see Figure 2): the individual level, interpersonal level (i.e. friends and peers), organisational level (i.e. organisations and social institutions), community level (i.e. relationships between organisations), and policy level (laws and regulations at all levels of government). Based on the findings of this review, this report focuses on three main areas of influence: the individual farmer (i.e. the individual level of the SEM), societal influence (a mix of interpersonal and organisational levels of the SEM), and external influence (a mix of community and policy levels of the SEM). Each of these levels affects a farmer’s (or farmworker’s) perception of the risk involved in a farm task and, ultimately, their decision on whether or not to perform it in a safe manner.

The findings of this review suggest that the factors most heavily influencing farm safety culture are:

- **The farmer’s individual attitude to safety**. Dangers are often normalised on farms, and this has reinforced farmers’ identification with the perception that farmers are ‘stoic’. This attitude is difficult to change, but personal experience of injury (particularly that preventing work) can alter this.
- **The farmer’s social environment**. Intergenerational farming families pass down attitudes about safety to their children. Farming children have already absorbed these attitudes long before they formally enter the workforce. Safety interventions which involve the whole family (particularly the father or primary farmer) are critical to helping overcome this. Peers are also hugely influential on an individual farmer’s behaviour.
- **The broader societal/global environment**. Economic and political pressures (e.g. global market pressures, drought) place farmers at increased risk of stress and/or depression. Stressed farmers (and their children) are more likely to experience injuries on farms. Providing farmers with access to an employee assistance program (EAP) helps reduce both stress and farm injury rates. Until the broader issues causing the stress are reduced, however, farmers will remain at risk. Smaller farm enterprises have poorer farm safety culture and are usually unduly impacted by societal/global pressures.

Findings indicate the interventions most likely to positively influence a farm's safety culture involve:

1. **Engagement with peers**.
    a. The most effective peer interventions involve farmers meeting regularly (e.g. monthly) to discuss safety amongst themselves. Crucially, these are not traditional education sessions. Peers simply share their safety experiences and solutions with each other, guided by a facilitator.
    b. There is limited evidence to suggest that traditional safety training programs are effective at improving farm safety.
    c. Programs targeting teenagers seem to be effective (especially as teens take safety messages home to their families). Programs involving farming parents with their children are particularly effective, as parents are motivated to adopt better safety practices for the sake of their children.
2. **Solutions that are practical, low cost, and easy to implement**. Farmers need to understand how a particular change benefits them, otherwise they are unlikely to adopt it. Farmers prefer solutions that are real-world (e.g. a new type of seat-belt that meets their daily farming practices), rather than abstract (e.g. changes to the organisation of their business).
3. **Government regulation and enforcement**. Regulation needs to be co-produced with the farmers in order for it to be accepted. The community (particularly smaller farms) needs to receive targeted and contextualised education to help understand and comply with them (e.g. one-on-one support to explain legal obligations and provide advice on reducing on-farm risks). Safety messaging from government must be paired with and supported by wider agricultural industry bodies, enterprise leaders and community champions.

Additional roles that government can play include:

1. Coordination of farm safety efforts, to help avoid fragmentation among farm industry stakeholders.
2. Providing incentives for safe farm practices, to help kick-start change. The most successful programs deliver safety messages as part of broader farm support.

Key Recommendations:

Short Term

- Translate information into safety culture change through both peer learning and community leadership: e.g. Develop community farm safety champions/mentors
- Targeted and consistent education and engagement of trusted advisors
- Integration of farm safety consideration into whole farm planning and technology integration

Medium Term

- Improved translation of current legislation to enhance farmer understanding and acceptance of their OHS duty of care. This could be initially achieved through development of content for inclusion in current extension activities and farmer engagement. Evaluation of current farmer

attitude and understanding of equipment standards and duty of care to both self and employees (if applicable).

- Development of programs (or integration of content into current resources) and incentives that increase and encourage the uptake and use of workplace OHS strategies and tools for both large commercial and smaller family farm holdings. eg farm safety induction programs for both family member and workers,

Long Term

- Long-term measurement of the collective impact on safety culture of incentives and initiatives that are attempting to shift specific behaviour and attitudes – there is a need to create a link between injury rates and farm safety culture, translating findings back into interventions, education and extension activities.
- Government to consider ways in which future incentives can be strategically focussed on creating and influencing long-term changes in behaviour and a shift in farm safety culture
    - This could be achieved through linking activities such as training and farm safety planning to insurance rates\
    - Development of certification program for trusted advisors who are trained, and recognised as safety champions and who can also obtain some value-add to their business (eg. Formal public recognition)

- Interventions should be sustained and their long-term impact measured and evaluated.
- Tailor interventions and initiatives to target, engage and influence the specific stage of culture shift required for different safety culture needs and relative safety maturity of industry sectors.

1. BACKGROUND

The scope of this review is designed to answer the following key questions:

- Articulation of a clear and agreed upon definition of safety culture. What is safety culture? (Section 1.1)
- Who and what are the reported key influences on safety culture, behaviour and attitudes of farmers and farmworkers? (Sections 3–5)
- What are the short, medium and long term approaches that can be implemented to influence the culture of safety on Victoria's farms? (Section 10)
- How can Victorian government programs be tailored to influence safety culture? (Section 8)

Farming is a way of life and agricultural communities have been long identified as having a unique culture: hard-working, resourceful, self-reliant and stoic (Smith 2007). It has been suggested the higher levels of risk-taking behaviours identified in farming communities has an impact of the high rates of fatal and non-fatal injuries. In response to this, efforts have been made over the last few decades to improve workplace safety in the agricultural industry. These efforts translated into reductions in injuries and fatalities. However, since the mid-2000s, further reductions have not occurred in Australia. In order to assist with efforts to redress this, this report explores what influences the safety culture in agriculture.

There are several unique aspects of farming communities (which this report will address further) that combine to influence the safety culture in agriculture. For example, risk-taking behaviours are commonly passed on from generation to generation, further embedding and repeating the cultural norm of risk taking. These cultural norms are exacerbated by and attributed to geographic isolation, inevitability of exposure to agricultural hazards, personal behaviours and influence of cultural norms (Smith 2007). As the agricultural industry has the highest rate of self-employed workers and most work is performed on private properties, regulatory standards are harder to both monitor and enforce.

This review identifies and examines recent and current initiatives with a focus on influencing safety culture, behaviour and attitudes on farms, with a view to inform the development of practical, applicable and sustainable recommendations for Victoria. Both peer-reviewed literature and grey literature will be examined. The review will concentrate on work conducted in Australia as well as international examples relevant for informing work conducted in the Victorian context. It will be guided by the socio-ecological model (SEM); this theoretical framework supports our understanding of how individual farmers' behaviour and health is influenced by personal, social, and broader external factors (Stokols et al. 1996; Lee et al. 2017) (see Section 1.2). Given the rapid timeframe for conducting this review, recommendations for further detailed work (which may be beyond the scope of this review) will be highlighted.

1.1 DEFINING SAFETY CULTURE IN AGRICULTURE

SUMMARY

Safety culture is what forms the environment within which individual safety attitudes develop and persist and safety behaviours are promoted. Safety culture can refer to farm level, organisational and whole of industry approaches to farm safety.

Safety climate more specifically refers to the individual perceptions of safety, as well observed safety behaviours, of an individual or a group of people (e.g. individual farms).Given the distinction between safety culture and climate within agriculture can be difficult to distinguish, in this report both concepts are collective referred to as “safety culture”.

The distinction between safety climate and safety culture within agriculture is often not clear-cut, and can vary depending on farm size and management structures. Whilst it is important to acknowledge that this nuance exists, for the sake of clarity, this report will refer to both concepts more generally as “safety culture” throughout this report. The term “safety climate” originated in the wake of the 1986 Chernobyl nuclear accident, to express the approach taken by high-risk industries to safety. Academic debate has occurred since then, in an attempt to delineate the difference in meaning between “safety climate” and “safety culture” (Zhang et al. 2002). Tabali et al. attempt to present the two concepts in context to one another (see Figure 1): safety climate refers to the sense of safety within an organisation or workplace (importantly, as felt by employees, rather than broadcast by senior management, as well as the relative priority of safety over schedules and production (Zohar, 2003). whilst safety culture refers to the stance towards safety taken by an industry or organisation as a whole (2015).

Figure 1: The agricultural industry has its own safety culture. Individual farms are influenced by this, but have their own distinct farm safety climate. Image adapted from Talabi et al. (2015).

What does a good safety culture look like in the farming context? One indicator—a lag indicator—of farm safety culture is lower rates of workplace injury (Donovan et al. 2020; Arcury et al. 2020). Once injuries have occurred, research suggests that workplaces with good safety cultures will provide workers with access to appropriate medical services—for example, migrant farm workers will be provided with access to medical interpretation services—and employees are more likely to make a complete recovery (Arcury et al. 2012; Wilmsen et al. 2019). A challenge in the farming context is the proportion of owner operated family farms who may not be included or represented in many workplace injury and fatality data sets.

Another (and related) indicator of a good safety culture is a high level of OHS reporting. This is more likely to be evident within larger organisations where appropriate reporting systems and policies are in place (Kongsvik et al. 2019). The diversity of Australian agriculture and the prevalence of small to medium enterprises (family owned and operated farms) means that the extent to which OHS reporting and documentation is implemented may vary considerably. This presents as a challenge when determining the influences of safety culture in these differening work environments. Mechanisms and indicators of safety culture in Agriculture have not be well investigated in Australia. These will be further explored and described in the subsequent report investigating the measurement of farm safety culture in Victoria.

1.2 DRAWING ON THE SOCIO-ECOLOGICAL MODEL TO UNDERSTAND FARM SAFETY CULTURE

Bronfenbrenner's socio-ecological model (SEM) explores the influence on culture exerted by individuals, the social environment (e.g. peers, family), and broader society (e.g. organisations, economy) (Figure 2) (Bronfenbrenner 1977; Lee et al. 2017). In this report, the SEM is used to understand the factors that influence the safety culture of a farm. A farm's safety culture is, ultimately, determined by the decisions of the people managing and working on farms to act in a safe manner. A poor safety culture results when farmers engage in poor safety practices. In order to understand why a farmer makes a poor safety decision, one must first understand what drives farmers' decision-making. At the core of this is the farmers' perception of risk.

Despite the high-risk nature of agricultural work, farmers continue to take risks on their farms. Several studies have examined what drives farmers' risk-taking behaviour (Colémont and Van den Broucke 2008; Moradhaseli et al. 2020; Rezaei 2019). There are three primary influences, each corresponding with levels of the SEM:

1. The individual farmer (Section 3): (a) Farmers' pre-existing attitudes (this includes their sense of susceptibility and perceived benefits), and (b) an individual farmer's sense of control
2. Subjective social norms (Section 4): This includes both existing norms and current social drivers for change
3. The environment or external pressures (Section 5): Such as farm size, market pressures, or a farmer's socio-economic status

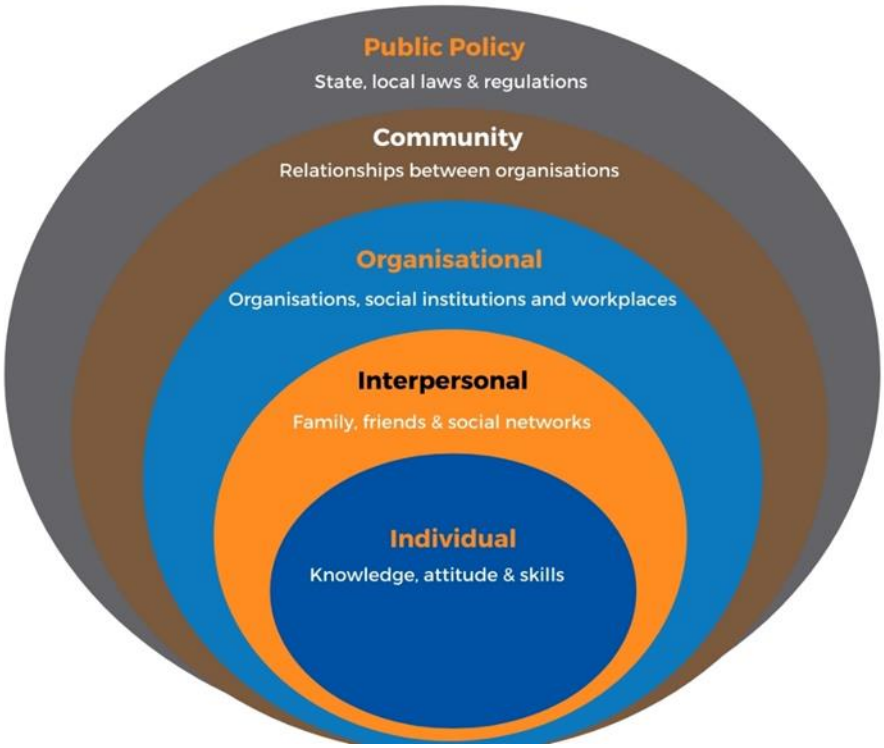


Figure 2: The socio-ecological model (SEM)

1.2.1 Application of the SEM

The scenario below (Table 1) describes an example of an intervention, based on the SEM, of a US national-level campaign to “safeguard youth operating tractors” (Lee et al. 2017). The scenario is an idealistic picture of how the SEM could work, involving entities at all levels, and proposing they would agree and engage in a unified way. Realistically, this would be time and resource intensive and difficult to execute. But undoubtedly, if this scenario were set into operation, there could be a profound change that would drastically reduce the toll of injuries and deaths to youth operating tractors.

Table 1: An intervention, based on SEM, of a national-level campaign to "Safeguard youth operating tractors (Lee et al. 2017)

POLICY	Federal child labour laws in agriculture would be changed to set a minimum age of 16 years to operate tractors on public roads and 14 years to operate tractors on private land. The family farm exemption would be eliminated. Federal and state OSHA would establish minimum age limits for all safety standards and would require workers younger than 18 years to wear seatbelts and operate only tractors with ROPS. OSHA standards regarding tractor operations would be enforceable on all farms regardless of number of employees
INSTITUTION/ ORGANISATION	**Tractor manufacturers** (e.g., via **Association of Equipment Manufacturers [AEM**] trade association) would publicly announce a position statement that supports the OSHA standard. Agribusinesses would require compliance with federal/state laws and OSHA standards as an expectation of entities from whom they purchase products. **National FFA** would set a national standard that their Student Agricultural Experience (SAE) ensure youth are in settings where they comply with this safety standard and announce their position via National FFA communication mechanisms that reach advisors, members, and alumni. Other organizations such as the **American Academy of Pediatrics** would post a position on this safety standard. The **national media** would publish stories about this national campaign to protect young tractor operators. Media stories of lives saved would begin to shift traditional thinking about guidelines for young people operating tractors.
COMMUNITY	A comprehensive social marketing campaign would be launched to “Safeguard Youth Operating Tractors.” The campaign would be crafted with messages and dissemination strategies based on stakeholder input. Using targeted campaign messages, including social media outlets at the regional and local level, FFA Chapters, schools, and faith-based groups would facilitate efforts of farm owners to ensure any tractors operated by youth are safely equipped. Incentives would be provided by local insurers and bankers, offering economic aid for farmers needing financial assistance to upgrade their tractors operated by youth. These community groups would promulgate the campaign messages and, where appropriate, the position statements issued by national-level organizations. School-based activities would no longer promote “ride your tractor to school” events but would emphasize campaign messages and facilitate tractor safety certification programs. Community-level advocates for the campaign would be trained to deal with controversies surrounding the tractor topic.
INTERPERSONAL	Peer groups, friends, and relatives would share “Safeguard youth operating tractors” campaign materials and openly encourage farm owners and parents to adopt the recommended practices and OSHA standards. These people would reach out to underserved, hard-to-reach farm owners (e.g., niche farms, special populations) with the same information and expectations regarding youth involved in agricultural work.
ADULT	Farm parents, farm owners, and employers would acknowledge the multilevel pressure being exerted to change farm practices and comply with the new OSHA standard by not allowing youth to operate tractors unsafely.
CHILD/YOUTH	Young tractor operators would have strict safety standards set, having access only to ROPS tractors as well as knowing and understanding they are required to wear seatbelts.

1.3 CONCEPTS UNDERPINNING CHANGE IN SAFETY CULTURE

1.3.1 Attitude and behaviour

Safety culture is influenced by individuals' attitudes towards safety (i.e. their thoughts and views, which they may share with others—for example, what a parent may tell a child), as well as their actual behaviours (i.e. the actions that people take—for example, a parent not wearing a helmet on a quadbike, even though they tell their children to do so). It is important to realise that a person may have particular attitudes towards safety that do not translate into their actual behaviours (Jasper et al. 2017; Kanellis and Kanellis 2020; Lindahl et al. 2015; Tinc et al. 2020). This means that a person who acts unsafely may or may not wish to be doing so.

1.3.2 Models for driving change in safety culture

1.3.2.1 Hierarchy of control

The hierarchy of control is a system used in workplace environments to minimise or eliminate exposure to hazards. The levels in the risk hierarchy of control measures are, in order of decreasing effectiveness: elimination, substitution, engineering controls, administrative controls and personal protective equipment (PPE). Figure 3 shows examples identified in the grey literature for each level. In the higher, more effective, levels there is less reliance on individual farmer safety behaviour and less room for error. These are the most preferred options for control measures. The extent to which individuals working for—or on—both family and larger commercial farms understand and interact with the hierarchy may underpin the safety culture 'maturity' of a farm. A strong safety culture within an organisation or farm is required to implement the highest, most preferred levels of the hierarchy such as elimination and substitution (Tap into Safety 2019).

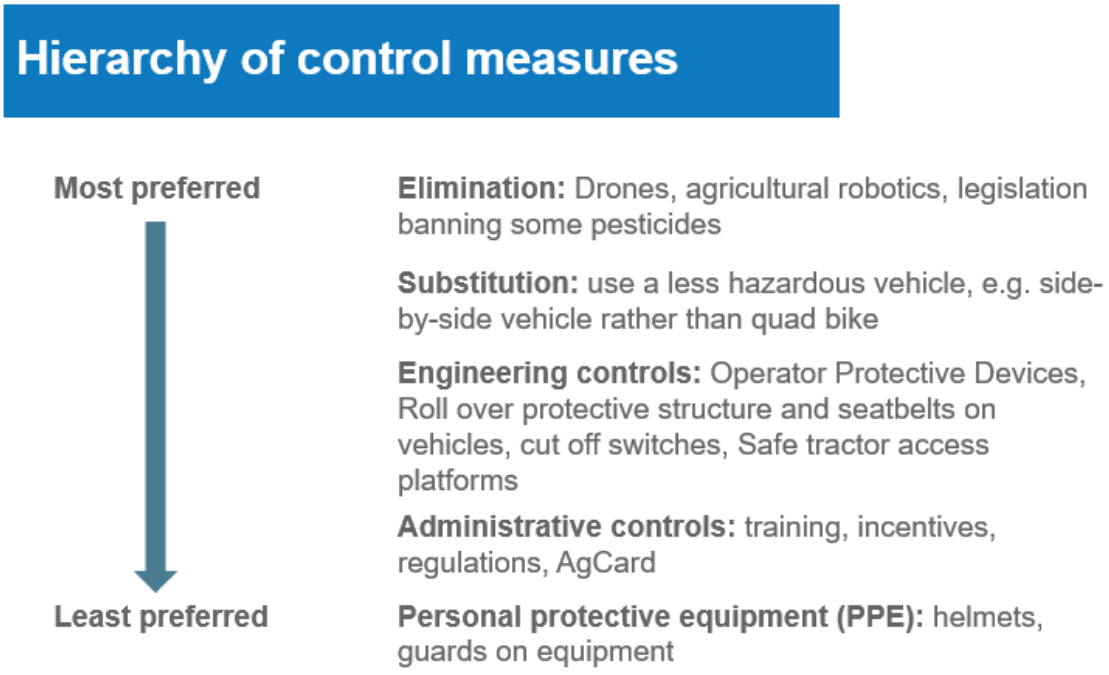


Figure 3: The hierarchy of control measures, with examples for farms

1.3.2.2 Model of safety behaviour change

Another model or framework for change is that which Fragar and Temperley (2008) described and used an integrated model of safety behaviour change on Australian farms (Figure 4) based on that developed by Gielen and Sleet (2003) using behaviour-change theory and community-level theories adapted for injury prevention. This is an example of a model that has been used as a framework for reporting factors influencing adoption of farm safety interventions on Australian farms. The focus of this model has predominantly applied to behaviour change in individuals, however it incorporates important aspects of the SEM to integrate individual behaviour change and the influence of wider industry, community and government. Whilst this model is complimentary to the SEM, the SEM will be referred within this report due to its more recent global application in agriculture (Lee 2017).

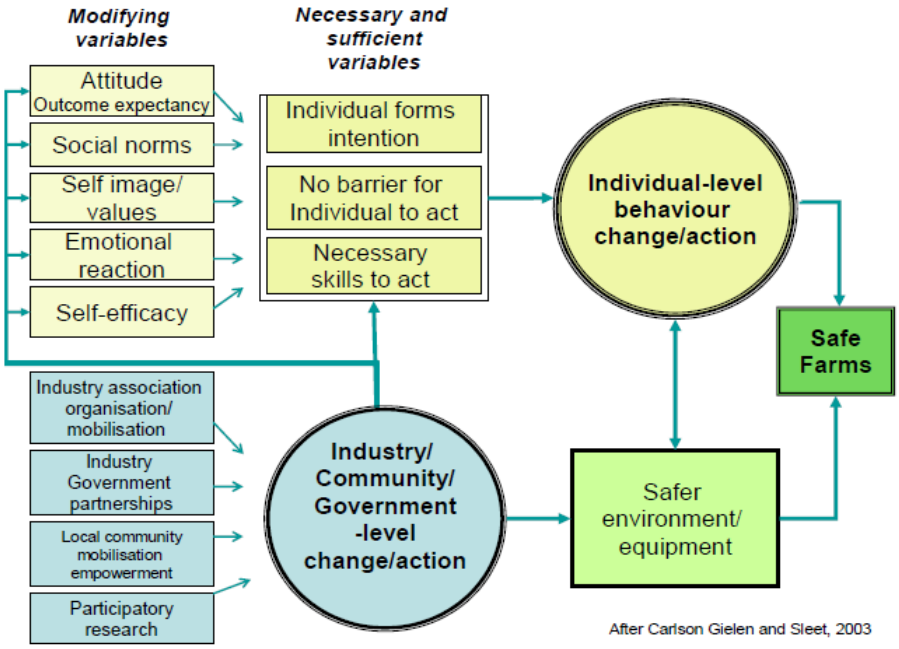


Figure 4: Model of safety behaviour and culture change on Australian farms (based on Gielen and Sleet 2003). Source: Fragar and Temperley 2008.

2. METHODS

SUMMARY:

This review examines peer-reviewed literature and grey literature (including available unpublished pilot data and evaluation reports) conducted over the last 10 years. Both academic (peer-reviewed) and grey literature were included in the review.

Peer-reviewed literature was reviewed using a systematic review approach. A total of 278 peer-reviewed studies were examined (64 were Australian, and 278 were international).

The grey literature review included the search phrases: “influence farm safety”, “farm safety behaviour”, “influence occupational health and safety”, “community influence farm injury” and “influence safety culture agriculture”. A total of 42 global grey literature and stakeholder material was included in this review (21 Australian and 21 International)

This review examines peer-reviewed literature and grey literature (including available unpublished pilot data and evaluation reports) conducted over the last 10 years. The review includes findings from the agricultural industry, as well as other hazardous industries or health-promotion areas that are making efforts to improve safety (e.g. construction, sun safety).

Peer-reviewed literature was reviewed using a systematic review approach (see Appendix 1 for further details). A total of 278 articles were included in the rapid review (see Appendix 1 for further details of the method used). Of these, 64 were Australian and 208 were international (see Figure 6 and Figure 7).

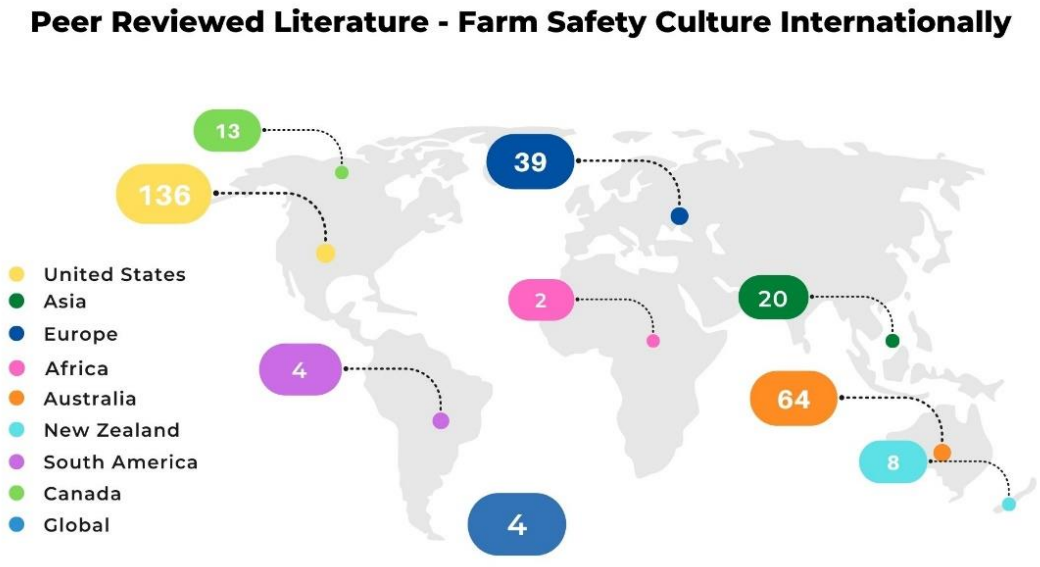


Figure 5: Peer reviewed literature – farm safety culture internationally

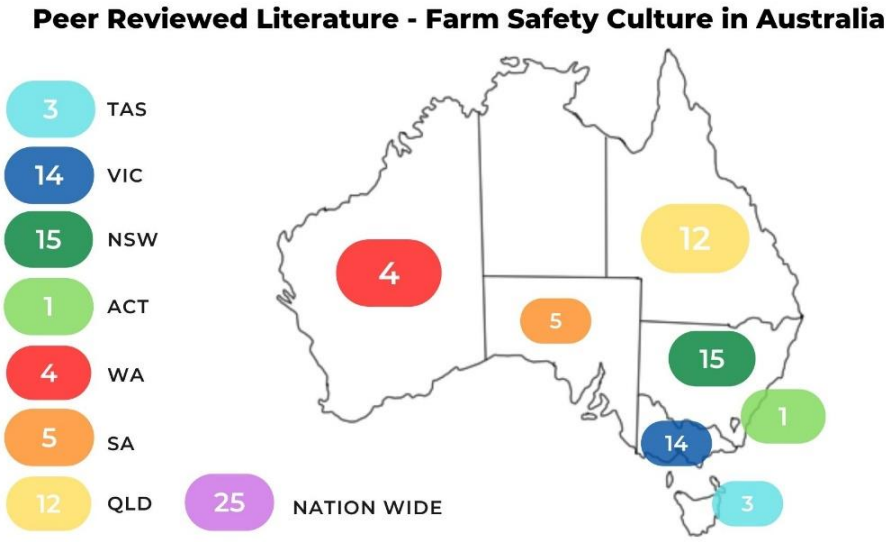


Figure 6: Peer-reviewed literature – articles of interest in Australia

There were several reoccurring areas of study within the peer-reviewed literature (listed in no particular order):

- OHS practices and regulations
- Educating farmers on safety practices
- Pesticide knowledge and PPE use (particularly in US migrant seasonal workers)
- Farm women and children
- Tractors and all-terrain vehicles (ATVs)
- Risk taking and risk perception
- Reduction of zoonotic diseases
- Safety in labouring occupations (e.g. construction)
- Sun safety (in the general public, labour-intensive industries, and agriculture)

The grey literature scan was completed using a desktop search method, utilising Google (March to April 2021) and used the following search phrases: “influence farm safety”, “farm safety behaviour”, “influence occupational health and safety”, “community influence farm injury” and “influence safety culture agriculture”. In particular the focus was on safety change programs/initiatives and factors which influence/change farmer behaviour. A total of 42 global grey literature and stakeholder material was included in this review. Of these, 21 were Australian and 21 were international (Figure 7).

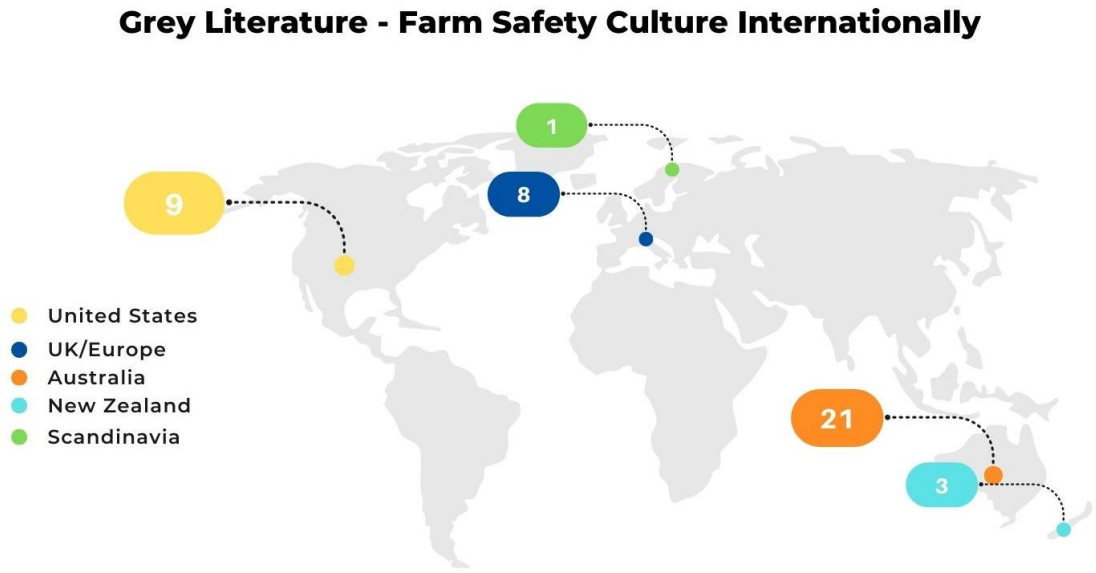


Figure 7: Grey literature – farm safety culture internationally

Thematically, the findings from both peer-reviewed and grey literature searches were similar, highlighting that there is greater emphasis on seasonal workers internationally whist globally specific hazards such as those mentioned above are reported on ubiquitously. The findings of the two searches are presented together throughout the report.

3. INFLUENCE OF THE INDIVIDUAL FARMER ON FARM SAFETY

SUMMARY:

- The individual attitudes of farmers to safety strongly impacts the likelihood of a farmer acting safely on the farm.
- Farmers will only perform safety behaviours if they perceive there to be a risk. Farmers often do not believe that any risks exist or are particularly great. Farmers then perform unsafe behaviours as part of their daily work (despite viewing themselves as risk-adverse).
- Farmers' understanding of risk does not match reality, because risk on farms is normalised. They also tend to overlook personal safety risks, as they are focused on managing risks to the farm business.
- Farmers' willingness to change is also influenced by the farmers' personality. The 'Stalwart' and 'Pressured' farmers are more resistant to safety change while the 'Established' and 'Ambitious' farmers are more open to change.
- Farmers are more likely to change if:
  (a) They have personal experience of injury (particularly an injury that prevents work)
  (b) They see a clear benefit of adopting safer practices, or observe a group of their peers who have adopted these changes (Roger's Diffusion of Innovation Theory).

In the SEM, the inner-most level that influences the safety culture of farms is an individual themselves. The attitudes of individual farmers to safety are key in determining whether the farmer will respond safely in a given situation. A farmer will adopt an attitude towards safety that matches their understanding of how risky the situation is (Section 3.1), and their personal inclination to approach change with openness (Section 3.2). Finally, personal experience of injury may lead a farmer to change their attitude towards safety (Section 3.3). Broader cultural change will occur once a small group of farmers has seen a clear advantage to adopting safer practices; their decision will influence those around them to follow (Section 3.4).

3.1 FARMERS' UNDERSTANDING OF RISK

Farmers are often exposed to high-risk environments and demonstrate a high risk-taking attitude (Fargnoli and Lombardi 2020)—however, farmers often perceive themselves as risk-adverse (Clay et al. 2015). The discrepancy between attitude and behaviour can be attributed to several factors.

3.1.2 Normalisation of risk on farms

Firstly, risk is normalised on farms (Kennedy et al. 2019). Arcury and Quandt suggest that this helps increase farmers' sense of control in what they would otherwise be forced to acknowledge is a dangerous situation (1998). Normalising risk means that farmers' evaluations of danger are likely to be faulty, as they are based on incorrect perceptions. This can be explained by the 'mental models' approach to safety risk perception and communication, which describes individuals as making sense of the world around them by

processing new information within the context of their existing beliefs. When the person's 'mental model' is incorrect, this can lead to misinterpretations of the world around them and incorrect attitudes (HSE 2009).

When farmers' 'mental models' are incorrect they adhere to their personal view of health and safety strongly and implement safety strategies on the farm according to these beliefs (van Winsen et al. 2016). For example, farmers generally view sun safety to be important, but do not engage in practices that are adequate to protect themselves. A survey conducted by Kearney et al. found that fair-skinned farmers are more likely to value sun protection and engage in protective practices, but that these practices are still inadequate (2013). This demonstrates an incorrect safety belief amongst farmers that only fair-skinned people need to be concerned about sun exposure. Although the survey did not extensively explore the basis of these beliefs, it seems that they are rooted in tradition—some senior farmers noted that whilst they acknowledged the importance of skin protection, they did not grow up with access to sunscreen, or encouragement to wear sunscreen, in their youth.

This attitude is mirrored in other industries; although engaging in inadequate sun safety practices, miners believe their behaviours are sufficient (Street and Thomas 2015). Because farmers believe their 'mental models' account for risk, they perceive the term 'safety' as representing something unnecessary (i.e. 'red tape'). 'Safety' can have negative connotations such as being seen as impractical, authoritarian, bureaucratic and costly (WorkSafe Victoria 2020).

Incorrect safety beliefs can skew a farmer's sense of personal vulnerability—for example, farmers perceive themselves to be less vulnerable to potentially hazardous situations than their peers (Clay et al. 2014). International research (NZ, USA) has found that even after experiencing symptoms of a farming-related illness (e.g. respiratory issues, green tobacco sickness), farmers minimise the seriousness of their symptoms and may not seek medical attention (Carruth et al. 2008; Arcury et al. 2003). This has also been observed in the Australian context; research conducted by the Rural Industries Research and Development Corporation (RIRDC) in 2015 shows that there is a resistance to making changes to improve safety that negatively impact productivity, cost of production or work environment, and that there is also an attitude of complacency and acceptance of risk (Franklin et al. 2015).

Farmers do not feel sufficiently personally threatened by the likelihood of injury or accidents to alter their current behaviours (ASCC 2006). In terms of perception of risk, a survey of 300 farmers across all sectors conducted for WorkSafe Victoria in 2020 identified that farmers accept that there is some degree of risk on farms, but almost half (47%) feel their day-to-day work is zero to very low risk in terms of health and safety (0-2 on a scale of 0-10). Thus, many have an optimism bias and underestimate that negative events may happen to them in the future, an attitude of 'It won't happen to me' (WorkSafe Victoria 2020, QMR 2020). There is a view that the application of common sense is all that is required to avoid injury and accidents and that there is little that can be done to make farm work safer (ASCC 2006).

3.2.2 Focusing on farm-scale risks and overlooking other risks

Secondly, farmers are often focused on risk on the same scale as the farm itself (e.g. financial risks affecting the viability of the whole farm). This leads farmers to potentially overlook smaller-scale issues (i.e. the health and safety of the individuals on the farm (Irwin and Poots 2018)), or fail to consider bigger picture solutions (e.g. new technologies; off-farm market-based risk strategies, such as trading on the

commodity futures exchange) (Meraner and Finger 2019; Findlater et al. 2019). One reason that farmers focus on the farm-level scale is that larger-scale solutions are perceived to involve higher uncertainty (Meraner and Finger 2019). As a consequence of farmers' farm-scale viewpoint, unsafe incidents on farms may come as a surprise to farmers, who believe that they have accounted for risk on the farm, and view the incident as a response to an unexpected but unavoidable risky situation (e.g. a quad-bike loss-of-control event) (Clay et al. 2015).

3.2 PERSONALITY AND LIKELIHOOD OF CHANGE

Farmers' knowledge, values and safety behaviours are some of the most important indicators of safety culture (HSE 2009). In looking at safety behaviour change, research has established that there is a link between personality and resistance to change: a review paper concluded that farmers who score low on openness to new experiences were particularly reluctant to create any change in general (Dessart 2019).

To further illustrate this, a qualitative study conducted by Quantum Market Research for WorkSafe Victoria in 2019 which interviewed farmers, farm workers, internal and external influencers, identified four broad categories of farmer personas (QMR 2019). These are differentiated based on their openness to safety change:

- Stalwart ("I'm at a stage in my life where I'm not really looking for input")
- Pressured ("There isn't money to update things")
- Established ("I'm increasingly focussed on my community and family")
- Ambitious ("You have to grow and evolve to succeed")

The 'Stalwart' and 'Pressured' farmer are more resistant to change and mostly responsive to traditional tactics (e.g., litigation or to fears of personal injury). They are noted to typically be smaller farms with fewer employees and less connection to outside influencers. The 'Established' and 'Ambitious' farmer are most open to change and have the greatest capacity to making safety changes. Many of these farmers set the agenda for the industry with others following their lead (QMR 2019).

In Australia, farming is associated with strong masculine stereotypes (68% of the Victorian agricultural workforce are male) (WorkSafe Victoria 2020) and there are age-linked hierarchies: while young farmers might be knowledgeable about safety and open to improved safety practices, older men in particular can be resistant to feedback and suggestions (QMR 2019). Of note too, the safety practices are also often inherited with the generational transfer of the farm which can be a barrier to farmers being open to learning new techniques (e.g., 'My dad did it this way and his dad did it this way') (Farmsafe Australia 2020). Although the farming population includes a diversity of people, the attitudes associated with the masculine stereotype continue to influence the rest of the farming population. Despite common perception, women in farming do not necessarily engage in safer farm practices (see Section 4.2.1). People from multicultural backgrounds may hold different safety attitudes, but are not always empowered to act on these (see Section 4.3.1).

3.3 IMPACT OF PERSONAL EXPERIENCE ON CHANGE

Although farmers' safety attitudes are deeply entrenched, it is possible for these attitudes to change. Farmers generally do not consider injury to be a real threat likely to impact themselves; safety is therefore a low priority (ASCC 2006). However, if, for example, they know of people who have been killed by animals, then they may view this as something which is likely to be a significant risk to them at some stage (HSE 2009). The greatest shifts in attitude to safety are demonstrated by farmers with direct experience of injury on a farm. This attitude is reflected in farmers' likelihood of PPE use (see Figure 8). These farmers—particularly those who were prevented from working due to their injury—are more likely to become promoters of safe farming practices (Beattie et al. 2018; Clay et al. 2016).

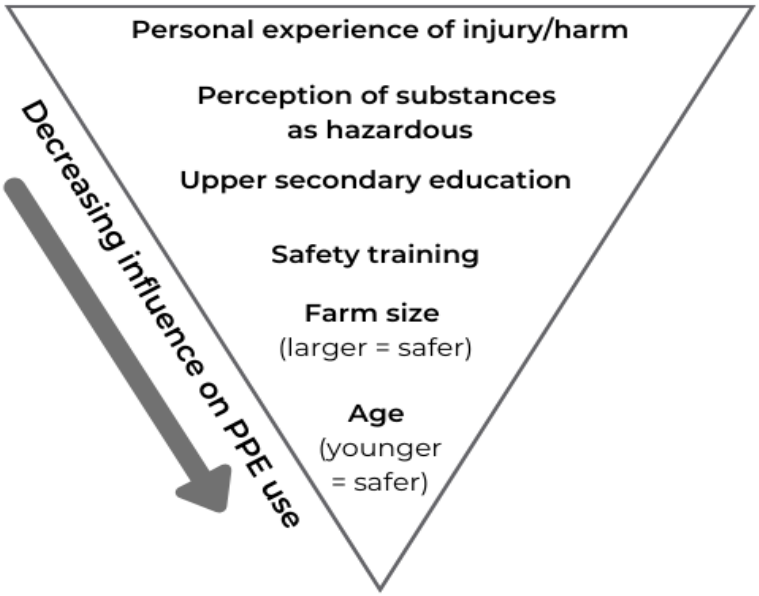


Figure 8: Factors contributing to farmers' use of personal protective equipment (PPE) when handling plant protection products, adapted from (Damalas and Abdollahzadeh 2016).

Additionally, if a farmer perceives a risk that is significantly threatening to the farm (e.g. unavoidable economic challenges), risk-adverse farmers may become early adopters of new technology or practice, *if* they develop the knowledge and skills to clearly understand how these new practices will reduce risk (Mason and Halter 1980).

3.4 ROGER'S DIFFUSION OF INNOVATION THEORY AND CULTURAL CHANGE

Similar to the personas noted above, one could also apply Roger's Diffusion of Innovation Theory to understanding factors which influence farmer's safety behaviour (Jenkins 2013). In this theory, five key groups can be identified as:

1. Innovators: Eager for new experiences and willing to take risks, therefore the first to adopt. They are willing to experiment and are not invested in the status quo.

2. Early Adopters: Make rational, informed decisions based on evidence and the experiences of the innovators. Likely to be in actual or de facto leadership roles, early adopters are the opinion leaders, paving the way for further adopter groups.
3. Fast Followers: Eager to comply and fit in. Based on contact with and the backing of early adopters, an innovation will hit a 'tipping point' within the fast followers, and the rate of adoption will rapidly increase.
4. Late Majority: More sceptical or cautious, therefore will adopt an innovation later than average. Non-compliance tends to be unconscious, meaning in order to comply they will need to be overtly told, led or shown the new practice or behaviour. They are less likely to have contact with earlier adopter groups, slowing up-take further.
5. Laggards: Take longer than average to pick up new innovations, and may deliberately not comply. They will often have a rationale for non-compliance, which could be based on misinformation, or the result of holding to traditional values. They may be comfortable with the status quo, suspicious of new ideas, and confident that they know what is best. They may also resent or resist authority. This group is not inclined to seek out new ideas or experiences and tends to interact with similar minded people (Jenkins 2013).

Brown (2015) notes that a fundamental implication of diffusion theory is that culture change is the cumulative effect of the decisions taken by many people, and that each person's decision to take up a new idea relies heavily on the previous decisions of those around them. Thus, for a new behaviour or innovation to spread through the majority of society, typically smaller groups of innovators must have first been attracted to the change, and early adopters must have seen benefits from making the change and enacted it themselves. If the culture change is accepted and found to be beneficial by the innovators and early adopters then, given enough time, a 'tipping point' should occur where the spread of culture accelerates and a substantial portion of society will make the behaviour and attitude changes associated with a positive farm safety culture.

4. SOCIAL AND COMMUNITY INFLUENCE ON FARM SAFETY

SUMMARY:

- Farmers are strongly influenced by their social environment. This means that individual farmers are more likely to change their attitudes to safety when their social influences (e.g. family, peers) and community advocate and demonstrate a change in safety attitudes.
- Families play an important role in shaping the safety culture of farming communities. Children absorb parents' attitudes from an early age, and by the time they enter the workforce, they have already held these beliefs for many years.
- Intervention programs involving farming families can be effective in changing attitudes. It is important that parents are involved—in particular, the parent with the largest on-farm role (usually the father).
- Children, migrant workers, and senior farmers experience a poorer safety culture than others in the farming community.
- Individual's sense of identity is shaped by the community's image of who a "farmer" is. Peers and other community members (e.g. health professionals) can help shape this identity so that it is more open to safety.

The SEM illustrates that the social environment of individual farmers strongly shapes farmers' attitudes to safety, as well as their risk-taking behaviour (Colémont and Van den Broucke 2008). A farmer's social environment has several unique aspects: farms are often both workplaces and homes; co-workers can be family (spanning multiple generations); personal identity is strongly tied to farming; and workforces can also be transient (i.e. seasonal workers, sometimes from overseas and with different language abilities, cultures, and diverse levels of farming experience).

The influence of the social environment on farmer's safety behaviour is very significant. The UK Agriculture and Horticulture Development Board (AHDB) found that the key message (from their 2018 literature review) was that it may be problematic to focus on influencing individual farmer behaviour in preference to stimulating wider social change, which necessitates actions from organisations, research institutions, policy-makers and funders alike to reach out across a farmer's 'ring of confidence' (Rose et al. 2018). Many of the papers reviewed by the AHDB argued that it is difficult to change individual behaviour without including trusted people, such as advisors, family, and peers, and without wider social and organisational change. The attitudes of peers and community organisations directly influence individuals, for better or worse: positive views of safety promote cultural change, whilst the negative attitude/criticisms can also hold back collective progress or behaviour change (Rose et al. 2018; Blackstock 2007).

4.1 WHO INFLUENCES FARMERS?

A study funded by UK's Health and Safety Executive (HSE) (2009) examined the influences on farmers' attitudes either at their farm or at livestock markets in the South West and South East of England. The sample covered farmers on small and large farms.

A list of possible influences was provided, including sources such as family, OHS regulations, local council, food retailers, financial institutions, rural and agricultural organisations and businesses, trade show exhibits, and advertising sources.

Table 2 shows the top three strongest and weakest influences based on interviews with 35 farmers. Other influences reported by farmers were customer/market influences, time (e.g. quickest and safest way of working in time available), supervisor/farm owner and children. The rest of this section will explore the strongest influences on farmers (family and peers), whilst the influence of regulations is discussed in Section 8.

Table 1: Top three strongest and weakest influences on farmers (Source: Understanding and influencing farmers' attitudes (HSE 2009)).

Strongest influences	Weakest influences
• Regulations	• Radio / TV programs
• Other farmers	• Radio / TV advertisements
• Family	• Safety exhibits

In Australia, the RIRDC identified that social networks and support for positive approaches and attitudes toward safety could improve safety behaviour in farmers (Franklin et al. 2015). This shows that the opinions of trusted people can affect farmer behaviour, perhaps through the provision of formal or informal advice, or through social pressure (Rose et al. 2018).

4.2 INFLUENCE OF FAMILY ON FARM SAFETY

The attitudes of families towards risk profoundly influence the attitudes of farming communities to safety on the farm; social patterns within families can cause intergenerational persistence of poor safety behaviour (Shortall et al. 2019). Children learn safety behaviour from their parents; including children modelling parents' use of PPE (Bodekaer Larsen et al. 2014). However, parents' use of PPE is often inadequate (Kanellis and Kanellis 2020; Schenker et al. 2002; Sideris and Thomas 2020), leading children to potentially acquire sub-par safety behaviour. In turn, parents often believe that their on-farm experience is more credible than the advice that is offered by safety experts (Neufeld and Cinnamon 2004; Summers et al. 2018). Parents' confidence in their decisions to keep children safe on farms is strong; many feel that their farms are safe, whilst the reality is different (Zentner et al. 2005; Williams et al. 2010). Boys with at least one parent with an agricultural background are more likely to perform agricultural tasks on the farm at a younger age than boys with parents with non-farming backgrounds (Yang et al. 2012), and at a younger age than girls (Stoneman and Jinnah 2017).

4.2.1 Influence of women and men on safety within the farming family

In the farming context, traditional notions of women as an influential positive force for safety do not always hold true. Women with active farming roles feel pressure to demonstrate that they are 'authentic farmers' and may consciously undertake dangerous activities (Shortall et al. 2019). Women who perform the primary role on a farm are also socialised to exhibit the same safety attitudes as men (Cole et al. 2000).

For example, within farming couples, one partner's motivation—often female—for safety can directly influence the motivation of the primary farm worker to perform safety behaviours. Also noteworthy, is that a couple's life satisfaction increased with an improvement in safety behaviours (Sprung and Britton 2016). However, farming women are not always able to act in accordance with their safety beliefs, due to competing responsibilities, perceived lack of control, and conflict with their partners' intentions (Strong et al. 2009).

Within the context of farming families with children, fathers play a particularly important role in establishing the household's farm safety culture. Mothers tend to defer farm safety decisions to fathers, as they are less knowledgeable and confident on safety issues (Stoneman and Jinnah 2017). A fathers' influence is also greater than that of grandparents (Lee et al. 1997). Consequentially, fathers' attitudes towards risk directly influence children's safety on the farms. These attitudes are influenced firstly by the farmer's own attitude, social norms, and the farmer's sense of control (Lee et al. 1997), and decisions around safety will likely take into account the perceived risks alongside benefits or impact to the farm, family cohesion, and child-minding responsibilities (Elliot et al. 2018).

This shows that targeting fathers around safety interventions is a key factor. *AgTeen* was a father-led, home-based safety intervention in the United States, in which parents (particularly fathers) communicated with their youth about the importance of wearing seatbelts on tractors with rollover protection structures (ROPS), which led to youth who were more likely to use a ROPS tractor with the seatbelt. The success of this program was attributed to fathers' motivation to practice safety for the sake of their youth (Jinnah et al. 2014; Stoneman et al. 2014; Stoneman and Jinnah 2017). Family-based interventions are most successful if they involve parents discussing safety with youth, in ways that respect family culture and values. It is important that parents model and monitor safety on the farm, increase communication on safety, and are consistent with their discipline (Jinnah and Stoneman 2016). Fathers can also be targeted in different ways to improve farm safety; for example, if fathers are experiencing stress, this acts as a predictor of unsafe youth behaviour. This relates to youth perception of parental stress, as well as their own stress levels. When stressed, youth are more likely to engage in more unsafe behaviours and work longer hours on the farm. Children are also affected by parent stress caused by an increase in farm work, which often leads to rushed prioritisation—often unintentionally putting children at risk (Nilsson 2003). This highlights the importance of addressing mental health in improving farm safety (see Section 2.5).

4.3 THE SAFETY CULTURE OF MORE VULNERABLE WORKERS

4.3.1 Migrant farmworkers

Approaches to safety on the farm are also affected by the cultural background of the farmer. Farmers and farmworkers may be working in a country different to that in which they were raised, and they bring their native language, cultural background and, sometimes, farming practices from their country of origin, to the farming community of the country that they are working in. Most research examining the multicultural influence on farm safety has been focused on farmworkers of Hispanic origin in the United States. This is a vulnerable workforce which is at risk of adverse health and safety outcomes on-farm. Factors contributing to vulnerability include language and cultural barriers (Acosta-Leon et al. 2006), as well as perceived low control in the workplace, compared to workers of European descent (Smith-Jackson et al. 2010). Migrant workers may also be at risk of abusive supervision (Swanberg et al. 2013). Migrant workers look to their peers to learn the farm safety cultural practices in the country they are now working in (Tovar-Aguilar 2017) and also draw on previous farming practices and safety attitudes acquired in their home country. For example, Latino workers in the United States typically bring the belief that pesticides need to be physically perceived (e.g. seen, tasted, or smelled) to cause harm. However, if a worker had previously farmed in Mexico, they also had an increased likelihood of having received training in the safe use of pesticides and general pesticide information (Arcury et al. 2001). The Migrant Workers Taskforce established by the Australian government recently recommended measures to reduce exploitation and best inform migrant workers of their rights and obligations. The taskforce findings suggest that the needs of migrant workers in Australia are diverse and highly dependent on the reason for travel to Australia. The taskforce suggested that accurate, consistent, contextually targeted messaging be used to increase low understanding of workplace conditions and obligations within this population (Department of Jobs and Small Business and the Fair Work Ombudsman 2018).

4.3.2 Children

Farms combine both an industrial workplace and family home which means children are often exposed to a range of hazards. This results in children experiencing their own safety culture. On some farms children are allowed to operate large and dangerous machinery (Rudolphi and Retallick 2015). In addition to farm equipment and off-road motorbikes/quad bikes, another major cause of child deaths on farms is related to drowning (Symes 2020). Children account for almost 15% of farm-related non-intentional deaths in Australia (AgHealth Australia 2021). It has been found by researchers both in Australia and internationally, that there is often low ‘mention’ of children in farm safety research surveys (McNamara 2019). This gap is also noted by Adams et al., who suggest the need to explore more deeply the attitudes and behaviours of parents and their children living and working on farms (2021).

While children often learn and observe their safety behaviours and attitudes from their parents, children’s peers can also be another point of influence (Nilsson 2003). Youth who are engaged in farm work and have a high sense of control, resulting from a strong on-farm safety culture, are more likely to report mistakes to parents (i.e. the farm owners) (Cigularov 2009).

It is worth noting that within the broader safety culture experience by migrants, migrant children experience an even poorer safety culture.

International studies suggest that the children of migrant farm working adults are more likely to experience health problems or early mortality (Slesinger et al. 1986). In the United States, migrant children may be hired as farm labour; children report a poor safety culture and are often trained only in how to perform a job, not how to adopt appropriate safety measures (Arcury et al. 2019; Arcury et al. 2020). There are few studies that address this in an Australian context.

4.3.3 Senior farmers

A global review of gender and occupational health of farmworkers conducted in 2014, suggests that older male farmers tend to experience more injuries than older farming women (Habib et al. 2014). The authors suggest that this is because men often start work younger and retire later. Lizer and Petrea (2007) also suggest that older farmers work longer hours than their contemporaries with other occupations. Older farmers in general have been reported to be more resistant to adopting safety practices; however this may be partially improved if they are active participants in safety training (Cecchini et al. 2018; Hwang et al. 2000).

4.4 INFLUENCE OF PEERS AND THE FARMING COMMUNITY ON FARM SAFETY

4.4.1 Strong farming community identity

Farmers' attitudes towards safety risk is strongly shaped by the culture on farms and in the farming community. The risk attitude—the normalisation of risk, as discussed in Section 3.1—instils confidence in an individual farmer that they can persevere in the face of (frequently encountered) adversity. The concept of perseverance is woven strongly into a farmer's identity and can be helpful when overcoming challenges. However, it is also maladaptive, as it can also lead to poor safety decisions and adverse health outcomes (Sorensen et al. 2017). An individual farmer's beliefs can influence the culture on farm—as described by Lovelock, farmers adhere to their sense of identity (i.e. stoic and immune to injury and ill-health), rejecting protective safety measures (e.g. PPE), as this is viewed as feminine and counter to their perceived sense of self (2012).

This attitude is deeply entrenched within the farming community. Farming children and youth are particularly impressionable, and readily absorb these attitudes. Youth who live on farms are more likely to have adopted a poor attitude to safety than their rural peers who do not live on a farm (Mazur and Westneat 2017). Immersion in the on-farm home environment means that youth have already completed an "apprenticeship of observation" by the time they commence work. The acquired messages have to be unlearnt and rewritten in order for youth to adopt safe farm practices. Youth can do this through 'story repair' (e.g. actively exploring their earlier experiences, via social media or digital expression), and by participating in interventions organised by community (e.g. schooling, businesses). Exposure to workplaces that emphasise the importance of safety also has the potential to positively influence youth, as farmworkers (and construction and mining workers) imitate the safety practices of their co-working peers (Xiong et al. 2018; Tovar-Aguilar 2017; Rubin et al. 2020). As outlined in Section 7.2.1.2, youth are also likely to benefit from programs in which community members are trained to share skills and knowledge with others (e.g. youth farmworkers).

4.4.2 Leveraging peer influence

The opinions of trusted people could affect farmer behaviour through the provision of formal or informal advice, or through the means of social pressure (Rose et al. 2018). Advice is more powerful if repeated and reinforced by peers. Blackstock and colleagues also note that while networks and social capital can be harnessed to promote behavioural change, they cannot be artificially created (2009).

Farmers may be apprehensive, even fearful, of trying out new behaviours. Changing social norms and creating societal pressure, amongst other techniques, can be good ways of overcoming such fears. Given that family, friends, advisors, landowners and peers can play such a key role in influencing farming behaviour, it is essential for interventions and knowledge exchange activities to take a holistic approach (Rose et al. 2018).

4.4.3 Influence of health professionals on farm safety

Health professionals within farming communities are in a unique position to influence farm safety in a positive manner. Farmers who experience an injury whilst working are likely, at some point, to approach their local general practitioners (GPs). This interaction offers a unique opportunity to engage with the farmer to discuss risky behaviours and suggest alternative practices (Carruth et al. 2001). Similarly, health nurses with specialist, postgraduate agriculture training play a unique role—they are respected members of the farming community who can discuss health and safety issues directly with farmers, and also serve a function where they join farmers at their workplace to suggest safety improvements (Randolph and Migliozzi 1993, Adams et al. 2020). This is demonstrated in Australia through the Agrisafe™ network, a network of agricultural health clinics delivered in Victoria by the National Centre for Farmer Health and affiliated health services. Agricultural health nurses need to ensure, that their messages are delivered in a way that empower the farmer to make positive changes in their lives. Farmers may feel disempowered if nurses explain the negative health impact of stress, but feel unable to remove stressors from their lives (Sachs 1996).

5. EXTERNAL FACTORS IN FARMING THAT INFLUENCE RISK

SUMMARY:

- Workplaces directly influence the safety behaviours of workers. Workers (including children living on family farms) are more likely to act safely when their autonomy and safety needs are supported by the farm managers (e.g. providing PPE, non-abusive environments). Smaller farms (both employee numbers and physical size) are more likely to have poorer safety cultures.
- Different industries have different safety cultures. Higher levels of regulation compliance in better performing industries may be related to demand for food safety quality assurance, e.g.in dairy and horticulture.
- Organisatons that support farmers also influence the safety culture on farms. The safety ideals of agribusiness can drive or slow change (due to advertising reach, etc.). Farmers who are members of a farming occupational health service experience better health and improved safety behaviours.
- Technology (e.g. use of drones, agricultural robotics) can help improve the safety culture on farms by removing hazards altogether.
- Economic and socio-political pressures (e.g. an economic downturn) result in increased risk-taking, as farmers strive to keep their farms operational.
- These external stressors impact on farmers' mental health. Stressed farmers are more likely

Farm safety culture is also influenced by broader society (i.e. community and public policy spheres). Influencing factors include: workplaces, the agricultural industry, support provided by external organisations, technological innovation, and economic policy (driven by national and global forces, as well as the physical environment). These factors are addressed in Sections 5.1–5.5. These factors are influential, because they have the potential to either increase or decrease the stress faced by farmers. Stress and a sense of lack of control drive farmers to increase risk-taking behaviours (see Section 5.6).

5.1 INFLUENCE OF THE WORKPLACE ON FARM SAFETY

The practices and behaviours encouraged by farm managers directly impacts on a farm's safety culture. Transformational (rather than passive) leadership styles are more likely to improve health and safety outcomes (Hagevoort 2013). The greatest influence on whether farmworkers act safely whilst at work is being provided with the appropriate equipment (e.g. PPE, hand-washing facilities) to do so (Strong et al. 2008; Mayer 2010). Training workers on the use of PPE increases the chance of improved safety behaviours (Janda et al. 2014). The more a farmer is receptive to safety messages, the more impactful safety training is: training a single individual (i.e. 'workplace champion') in farm safety practices does not result in improved safety across the whole workplace—however, if a single person receives training, and there is at least one interested person in the safety training at the workplace (who did not attend the training), there is an increased chance of improving the farm's safety environment (Morgaine et al. 2014).

Farm managers are also responsible for treating farmworkers (and other vulnerable workers, such as youth workers, or children in farm families) with respect, creating an environment in which workers have a sense of control over the actions they can take to protect their safety (e.g. providing appropriate PPE, non-abusive supervision) (Austin et al. 2001; Swanberg et al. 2013; Strong et al. 2008), and in which they feel safe enough to report mistakes (Arcury and Quandt 1998; Cigularov et al. 2009). Supervisors' safety behaviour and expectations have a considerable influence on youths' behaviour (Rudolphi et al. 2018).

Farm size also impacts on safety culture. Smaller farms (both by physical area and enterprise size) generally have a poorer safety culture (Kongsvik et al. 2019; Hope et al. 1999; Lundqvist 2000), despite the farmers themselves believing that smaller farms are safer (Summers et al. 2018). One study identified the three factors that contribute most to safety risk on farms are: farm ownership, using a farm as a primary place of residence, and farm equipment not having rollover protective structures (Chattha, Corscadden, and Zaman 2017)—all of which tend to be associated with smaller farms. When considering the impact of farm size on a change in safety culture, it is helpful to note that small-scale farmers perceive change differently to larger-scale farmers, and are slower to adopt new practices (Kivlin and Fliegel 1967). Smaller-scale farms face time and resource barriers, which results in a much lower level of safety training than in larger-scale farms (Hope et al. 1999).

5.2 INFLUENCE OF FARMING INDUSTRY ON SAFETY

Within agriculture, different industries have stronger and weaker safety cultures. For example, the dairy industry is reasonably proactive in promoting health and safety innovations. A study of Irish dairy discussion groups (i.e. facilitating peer-learning on a variety of issues) found that the vast majority of groups consider how to address hazards and risk management (O'Connor et al. 2020). Within Australia, all industries demonstrate a need for improvement in the areas of safety around vehicles, farm machinery, and horses, as well as reducing children's exposure to hazards on farms (Lower et al. 2011).

A more granular examination of different industries (a decade ago) suggested considerable variation between commodity sectors. The industries that more frequently met health and safety regulatory standards and incorporate health and safety plans within their farming practice include cotton and horticulture, followed closely by dairy; sheep, grains and sugar cane, while and beef showed the lowest compliance (Fragar and Temperley 2011; Lower et al. 2011).. In order to meet food safety or quality assurance standards, industries become more highly regulated, which may lead to ancillary improvements in safety regulations as well. Higher levels of regulation compliance in the better performing industries may have reflected the relative requirements for both quality assurance and/or food safety at that time. It is noted that since then, regulations have been introduced for livestock industries (including dairy, beef and sheep) regarding traceability (for food safety and biosecurity purposes) and production assurance (e.g. National Livestock identification Scheme, Livestock Production Assurance program). The tendency of particular industries to quickly adopt new technologies (e.g. cotton) may also contribute to higher levels of regulation and, as a result of this, farm health and safety (Pollock et al. 2014). There was little evidence in the reviewed literature directly comparing and evaluating health and safety culture between the sectors, there is therefore opportunity to explore this further and generate safety content that fits the safety culture maturity of different sectors.

5.3 IMPACT OF EXTERNAL ORGANISATIONS ON FARM SAFETY

Organisations within community can also help to improve the safety culture on farms. Occupational health services exist in 20–50% of industrialised countries (Kinnunen et al. 2009); for example, in several Scandinavian countries (e.g. Finland, Sweden), occupational health services for farmers have been established to promote workers' health and reduce occupational-related injury and disease (Höglund 1990; Kinnunen et al. 2009). Membership is voluntary, and members pay a membership fee. The services provided (amongst others) include biannual health checks, farm visits, first aid courses, and health education (e.g. information on reducing neck/back pain). Membership is high (e.g. 40,000 farmers in Sweden), and is associated with improved health behaviour and occupational safety.

Businesses that support agriculture can also impact on safety culture. Although crush-protection devices on quad-bikes significantly improve the user's safety, a major barrier identified to their adoption within Australian dairy and other industries is the resistance of manufacturers, who engaged in a negative media campaign (claiming the crush-protection devices are unsafe), leading to confusion within the farming community (Lower and Trotter 2014). This has also been further solidified through manufacturer resistance to recent government mandating of the fitting of operator protective devises on all new quadbikes sold in Australia.

5.4 ROLE OF TECHNOLOGY AND FARM SAFETY

There are many technological advances that can improve safety on farms. A significant benefit of technology is that is can remove people from the hazard entirely rather than relying on administration controls (see section 1.3.2.1). Farmers should be able to move from one part of the farm to another safely, and be able to easily move to safety in risky situations.

In the hierarchy of safety controls, drones are an example of a tool which can eliminate safety risks, particularly as they relate to the use of farm vehicles such as quad bikes. Drones enable real-time surveying of crops and livestock, and are particularly helpful in terrain that is not easily accessible. Using drones can also reduce the interaction between livestock and people, thereby reducing safety risks (Swift 2020). In Australia, some farmers are successfully using drones for mustering cattle (Bolton 2020). Drones also require less time and human effort to complete tasks (Bolton 2020). One barrier for their adoption might be the initial financial outlay (range from $400 to $7,500) with an average drone in the region of $1,500. For farmers who are flying a drone on their own property (not for commercial purposes) and using a drone that weighs 25kgs and under, there is no need for a licence to operate that drone (Woods et al. 2019). Of note, while Australia's work safety laws encourage the use of drones to reduce workers' safety risks, the Civil Aviation Safety Authority (CASA) has the overall responsibility for commercial drone regulation in Australia.

Handlers working with animals are exposed to a range of injury hazards. One of the best practices is to separate workers and animals (e.g. cattle), while allowing the farm workers to do their job (Watts et al. 2016). For example, advances in the automation of cattle handling activities such as remote controlled semi-automatic or automated gates not only reduce labour and risks of injuries, but also increase

efficiency when such engineering controls are fully integrated with the National Livestock Identification System (NLIS) technology. Power-assistance also helps reduce handler fatigue when processing large numbers of animals (Watts et al. 2016).

Systems which can help prevent injuries such as musculoskeletal disorders include the increased use of innovations in areas such as exoskeleton technologies. A Canadian study assessed low back muscle activity of farmers wearing an exoskeleton while undertaking both farm and standardized tasks. Exoskeleton use was found to decrease back muscular load during farming activities up to 65,56, and 48 per cent in static, median, and peak muscle activity, respectively, suggesting potential benefits of exoskeleton use to help farmers work under less muscular load (Thamsuwan et al. 2020). While affordability, durability and compatibility with farming equipment were the most important adoption factors; wearer discomfort, getting caught on equipment, unexpected failure and fall risks has limited adoption of exoskeletons (Upasani et al. 2019).

Another type of emerging technologies are the agricultural robotics. The benefit of this autonomous technology is that farmers are taken away from a hazard or are removed from repetitive tasks. Various concepts of autonomous tractors and machinery have been introduced to Australia. For example, CNH Industrial (CNHi) is focused on developing driverless technology while SwarmFarm Robotics in Queensland creates an army of small machines that move around the farm like worker bees (Law 2019).

5.5 INFLUENCE OF ECONOMIC CHALLENGES ON FARM SAFETY

Economic challenges that farmers face impact on farm safety. Hagel et al. found that high levels of economic challenges increases the risk of lack of building maintenance, as well a decrease in safety shields on harvesters or augers (2013). Farmers experiencing economic hardship (as a result of factors outside of an individuals' control, such as weather or commodity markets) are more likely to engage in poorer safety practices (Colémont and Van den Broucke 2008), as stress causes farmers to work longer and prioritise the farm's continuation over all else (Caffaro, Schmidt, et al. 2018). Farmers gain a sense of control by minimising the perceived danger in the safety risks they are taking to combat the economic pressures (Arcury and Quandt 1998). Crucially, Elkind(2007) noted that until chronic stressors and economic and political pressures are reduced, and farmers perceive that they are in control of their work, injuries and agriculture-related disease are less likely to be reduced on farms without intervention and support.

5.6 INFLUENCE OF EXTERNAL FACTORS ON MENTAL HEALTH

The external pressures described above have an impact on farmers' mental wellbeing. Stressed farmers who practice poor safety behaviour are at an increased risk of acquiring an injury (Glasscock et al. 2006). Farmers who already have poor safety practices, and who then experience depression, are also at higher risk of experiencing injury (Beseler and Stallones 2010). More generally, workplaces with a poor safety climate are more likely to result in poor psychological health (Law et al. 2011), underscoring the importance of encouraging stress reduction to improve the safety climate on farms. Stress on the farm also impacts the safety of family members. Children and youths whose fathers were experiencing stress had a higher risk of injury, and of experiencing stress themselves (Stoneman and Jinnah 2015). Notably,

an employee assistance program (EAP) for dairy farmers reduced farmer stress and on-the-job injuries (Dickens et al. 2014), and may be a good model for the farming community more broadly.

6. SETTING UP INTERVENTIONS FOR SUCCESS

SUMMARY:

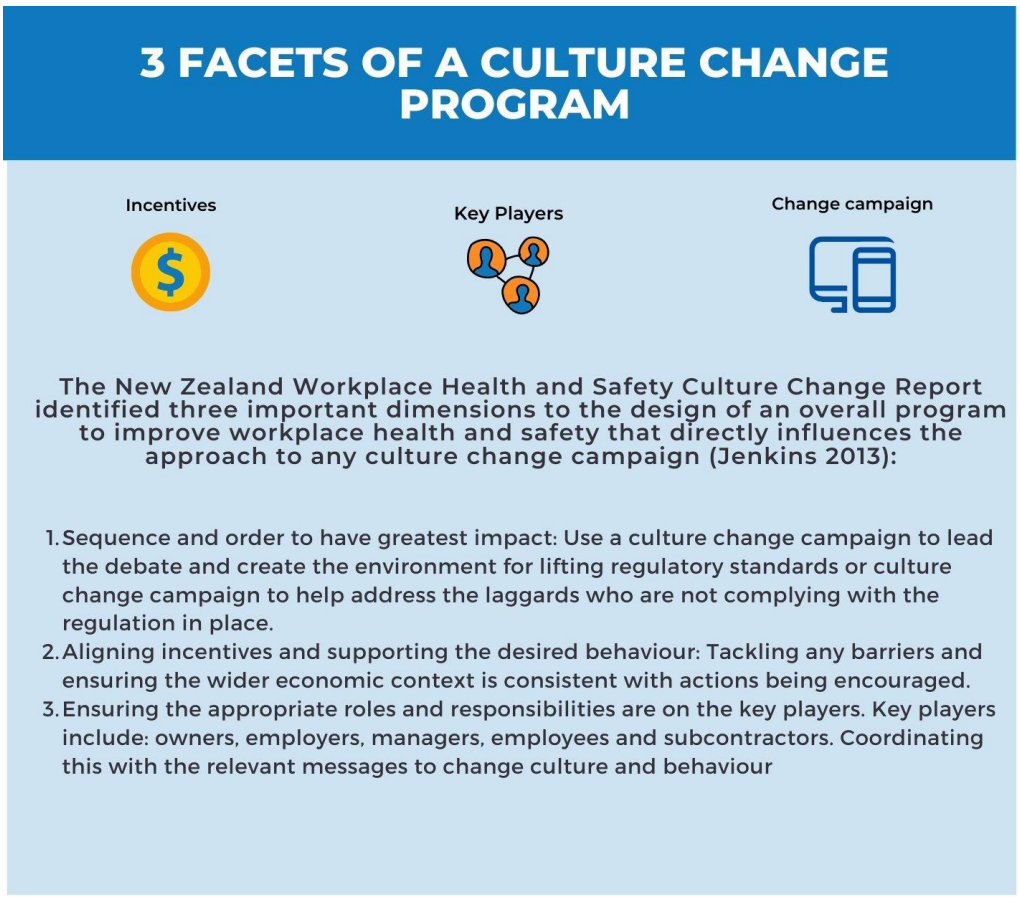
Three aspects of interventions consistently contribute to improved safety behaviours.

The first of these is involvement with peers (that is, farmers observing their peers (e.g. co-workers, employers, families, friends) performing safety behaviours, or learning from a peer leader). The most effective peer interventions involve farmers meeting regularly (e.g. monthly) to discuss safety amongst themselves. These sessions are not education sessions; rather, a facilitator helps guide the conversation in which farmers listen and learn from each other.

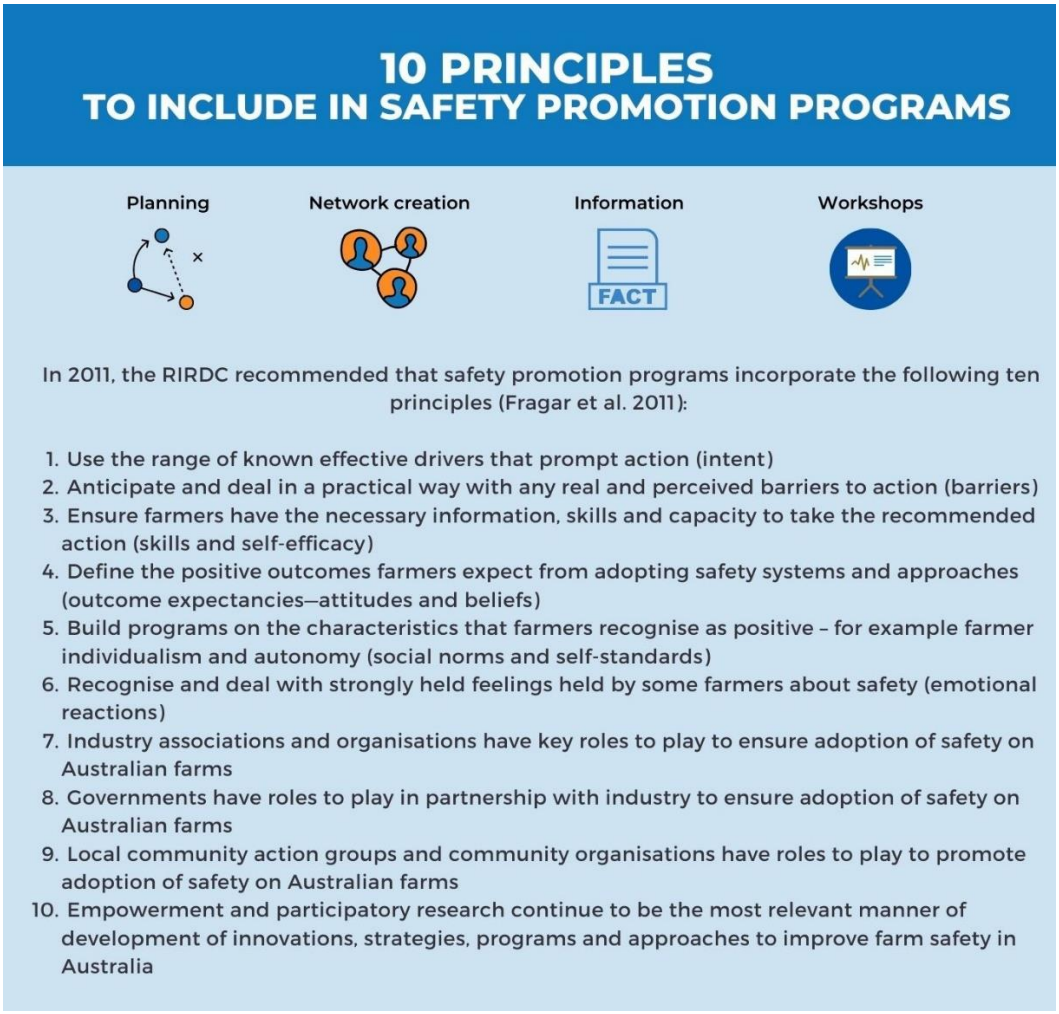
The second aspect is ensuring that the intervention is practical, low-cost, and easy to implement rather than more abstract, organisational changes. Farmers need to understand how the change benefits them, otherwise they are unlikely to adopt it.

Thirdly, interventions are most successful if they are regulated and this regulation is enforced (see Section 8). Regulation needs to be developed with farmers, and farmers need to be supported to understand it and implement it.

There is minimal research that rigorously examines the effectiveness of previous interventions designed to improve farm safety and so care must be taken when reviewing the literature to pinpoint proven methods of changing farm safety culture. A study from Finland noted this lack of evidence and sought to more rigorously identify the factors that influence the success of interventions most strongly (Kaustell et al. 2011). Kaustell et al. identified: (1) examples of peers performing safety behaviours (Section 6.1); (2) interventions that are easy to implement (Section 6.2); and (3) enforcement of regulations (i.e. OHS) (2011) (Section 8). These findings were mirrored in the Australian agriculture and fisheries context; McBain-Rigg et al. identified that peers (including direct managers and family) most directly influence safety culture. Safety culture was also shaped by individuals' attitude and behaviour, as well as skills and experience, and was transmitted via safety training and industry (see Section 7) (McBain-Rigg et al. 2017). Government also plays a less influential, but still important, role in driving safety culture, through legislation (McBain-Rigg et al. 2017) (see Section 8). Appendix 2 outlines several existing interventions which aim to improve safety on farms. Although these methods have not been validated by peer-review literature, government agencies have proposed different frameworks for facilitating change in farming safety culture. These are outlined in Box 1 and Box 2.



Box 1: Three facets of a culture change campaign



Box 2: 10 principles to include in safety programs (RIRDC).

6.1 THE PARTICIPATORY APPROACH—INVOLVE FARMERS AND THEIR PEERS

6.1.1 Peer-to-peer participatory programs

Many successful interventions involve farmers engaging with their peers and community. It is possible that this success stems from farmers' pre-existing willingness to tackle risks facing the farming community by sharing information with peers (to foster reciprocation) and upholding community-minded values (Liao et al. 2018). This openness to engaging with peers results in successful uptake of peer discussion interventions (e.g. similar to dairy discussion groups, as discussed in Section 2.1.2). For example, Stave et al. designed an intervention in which groups of Swedish farmers and farm-workers gathered seven times over the course of one year. The intervention involved discussion of safety issues amongst peers – crucially, the farmers were not receiving advice from experts, but instead shared their own experiences and solutions, guided only by a process consultant. Participation in these discussions produced significantly increased safety activity, and decreased work stress and risk acceptance. Interestingly, the best improvements to safety occurred when farmers did not receive safety information, but rather analysed incidents themselves (Stave et al. 2008; Stave et al. 2007).

A similar problem-discussion approach was adopted by two teams of agricultural professionals in the United States, who used action learning to discuss ways in which farmers may be encouraged to increase uptake of rollover protective structures (ROPS) on tractors (Biddle and Keane 2012). In this case, one team successfully suggested solutions, whilst the other concluded there were insurmountable problems; it was suggested that team composition may be integral to the success of such discussions, and may be worth bearing in mind when creating farmer discussion groups. The success of discussion groups is even more likely if focus group interventions are more intensive (i.e. frequent peer-to-peer discussion groups, as opposed to a once-off field day event), and are followed up with strong community interest, support, and leadership to enforce what participants have learnt (Orozco et al. 2011).

6.1.2 Peer-delivered programs

Another successful use of farmers' willingness to engage with peers is training community members to activate change by engaging with their peers. This is particularly successful in reaching vulnerable communities (e.g. migrants, inadequately supported workers in developing nations) (Grzywacz et al. 2009; Kawakami et al. 2011; Marín et al. 2009; Arphorn et al. 2011). For example, community health workers (i.e. the community representatives), working in healthcare settings, have successfully facilitated focus groups to improve migrant farmworkers' understanding of safe work practices (Ingram et al. 2015). Discussions can occur using participants' native language and within a familiar cultural context. Community members can also be trained as 'model farmers', to work within their community and share skills on appropriate safe farming practices (e.g. pesticide application) (Helitzer et al. 2014).

6.1.3 Co-designed resources

The benefits of farmers' increased likelihood of engaging with peers does not necessarily need to occur through direct interaction with every farmer. For example, Galvin et al. co-produced a guidebook for the farming community in the United States, aimed at improving pesticide safety (2016). This guidebook incorporates farmers' solutions to on-farm problems (rather than 'expert' opinion only), and is available in both English and Spanish. It serves as a way for farmers to look to their peers without needing to personally communicate with them.

6.1.4 Co-designed participatory programs or other solutions

Alternative frames of reference, including those of farmers and farmworkers (who are often part of minority groups), may express different aspects of the safety risk problem (HSE 2009). Others argue that incorporating farmers as active participants early on, including in the co-design phase, and throughout a project, is important (WorkSafe Victoria 2020; Rose et al. 2018)– this has also been referenced by WorkSafe Victoria as a strategic goal of their 2020-2023 education and awareness programs. If farmers are included, then they are more likely to feel like they are in control of decision-making and hence are then more likely to adopt a particular behaviour (Rose et al. 2018). If OH&S approaches are seen to undermine farmers' values of autonomy and self-reliance, or threaten their own sense of expertise, it is likely to be met with resistance (ASCC 2006).

A participatory approach that recognises farmers' expertise (e.g. through consultation with a range of established farmer-adviser networks and groups) is most likely to yield success (Dwyer et al. 2007). For example, the Director of the Occupational Health Nursing Program at the University of Michigan, School of

Nursing partnered with the American Farm Bureau Federation and Progressive Agriculture Foundation to create effective interventions to protect farmers' hearing and health. One nurse involved with the project consciously obtained input from farm families and agricultural workers to create and test five prevention strategies in hearing protection on the farm. She found out that the most effective intervention was ensuring farmers had an ample supply of protective devices so that they could keep them in the tractor, in the shop, and in their pockets. This dramatically increased the odds that the devices would be used.

6.2 APPEALING TO THE FARMER—PRACTICAL, LOW-COST AND EASY TO IMPLEMENT

Farmers are also more likely to respond to interventions that are easy to implement are typically low cost, practical, and not time-consuming (Wilson 2005; Franklin et al. 2015). This is because, to some extent, safety requirements and financial considerations are seen as competing priorities, as safety measures are often equated with purchasing new equipment (ASCC 2006). There is also a perception that doing things safely takes longer and in an environment where completing tasks quickly is prized, it brings a distinct disincentive to safe behaviours when a high priority is given to making a living and minimising costs (HSE 2009; ASCC 2006). As such, cost serves as a barrier for implementing preferred hierarchy of controls levels (elimination, substitution and engineering) eg. retrofitting tractors and quad-biked with rollover protective structures (ROPS) (Sorensen et al. 2008; Myers 2020). It may also contribute to the use by older farmers of decades-old equipment, which can result in fatality (McLaughlin and Mayhorn 2011). Ways this has been addressed through the introduction of government incentives will be discussed in Section 8.

In addition to interventions needing to be low-cost and practical, research in Asia investigating how to improve ergonomics on small farms found that interventions also needed to be voluntary and participatory and built on existing local practices or farming achievements (Kogi 1998).

Farmers also prefer interventions and solutions which involve physical changes that are functional (e.g. windows on silos) and fit well within the context of their working lives (rather than, say, organisational changes) (McNamara et al. 2017; Thorvaldsen et al. 2021; Irwin and Poots 2018).

The AHDB's 2018 review of literature found that if farmers do not perceive that there is value in adopting a new behaviour, then they are likely to stick with the status quo (Rose et al. 2018). Once the incorrect work habits had been developed, farmers are unlikely to want to change and have to re-learn how to perform a task (HSE 2009). Farmers need to be convinced of the utility of the safety advice for them and of the need to change (Blackstock 2007). One strategy could be to ensure organisations find ways to prove the value of adopting all of the tools, policies, and practices that are recommended. Active demonstrations could be a good way to do this, as well as collating evidence from long-term studies that prove benefits to a farmer's bottom line, or other aspects of their farm business. It is much easier to encourage adoption if recommended actions are already matched with the workflow of the farmer, and if they address relevant tasks (behaviour change on the part of the farmer is not then needed).

Blackstock et al. note the following are the most common benefits of interest for farmers (2007):

- Resolves a problem or allows them to do what they planned to do more easily
- Makes money through increased competitive advantage, increased yields or access to new markets
- Saves money through efficiency savings
- Avoids prosecution and provides peace of mind; demonstrates cross compliance
- Maintains skills, continuing professional development
- Addresses a particular interest (bird watching, botany, soil condition)
- Invests in their farms/properties for the future

7. COMMUNICATION, EDUCATION AND AWARENESS RAISING

SUMMARY

- Farmers are a diverse group of people and communication needs to consider the unique characteristics of different groups of farmers.
- Messages are better received when they focus on the positive (i.e. gain) rather than the negative (i.e. loss).
- Farmers respond best when messages are delivered by people from within their community (other farmers, spouse/family, vets, events with farming experts).
- There is little evidence to show that general education programs (aimed at delivering knowledge only) improve safety behaviours. On the other hand, participatory training programs consistently show improvements in knowledge and safety behaviours. They must be multi-session (i.e. over the course of a year) to result in sustained change.
- Children and youth are likely to benefit the most from education programs, as education helps mitigate any incorrect messages received in the family, and serves as a way to more broadly influence farming families/communities.
- Social media content is most influential when it focuses on family responsibility and family farm legacy (personal stories of incidents on farms do not result in long-term change). The content should depict safe farming practices.

7.1 COMMUNICATING WITH FARMERS

Farmers are not a single cultural group and one size communication does not ‘fit all’ (Fragar and Temperley 2008). Rather, farm safety behaviour is influenced by many ‘agri-cultures’. Who the target audience is, and what their needs are, must always be considered.

However, there are some common elements that should be considered when communicating more generally with farmers. Messages should appeal to their sense of autonomy and self-reliance, and acknowledge their expertise as a farmer (ASCC 2006).

Messages should (HSE 2009):

- Relate the message to the audiences' perspectives, stressing information relevant to any practical actions that they can take
- Be communicated in clear and plain language
- Clearly state the existence of uncertainty
- Avoid risk comparisons which trivialise the concern
- Ensure completeness by referring to the nature of the risk, the nature of the benefits that might be affected if the risk were reduced, the available alternatives, uncertainty in knowledge about risks and benefits and management issues.

People, including farmers, generally respond better to positive (or gain) messaging as compared with negative (or loss) messaging. The literature suggests that there is some benefit in adopting an approach that uses positive language/scenarios and does not make behavioural manipulation obvious (Rose et al. 2018). Messaging that elicits negative emotions could be associated with lack of interest in adoption (Rose et al. 2018). The New Zealand Workplace Health and Safety Culture Change report notes that any campaign must work from where people are currently in their views and behaviours, and address the choices and decisions which need to change. It is not simply about making people feel bad about their actions, and should not be perceived as telling them what to do (Jenkins 2013). Thus, as far as possible, presenting optimistic messages to farmers, and stressing the benefits of adopting particular behaviours are more likely to be successful in terms of safety messages having their intended effect (Rose et al. 2018). Also, using messages that focus on the possibility of positive change as opposed to using 'shock value' to highlight the consequences of non-compliance may assist (Jenkins 2013). The authenticity of the message and the voices presenting them (i.e., using true stories told by real people who have engaged in activities that constitute poor practice and then made improvements) can add credibility and reinforce that positive change is possible (Brown 2015).

In terms of communication methods, previous research indicates that the most preferred channels were to hear directly from other farmers (80%), then spouse/other family (72%), vets (70%) and at events with other farmers and experts (64–67%) (Brown 2015). In previous studies in the UK farmers were found to be wary of seeking advice from their regulators for fear of attracting their attention and subsequent enforcement if they were found to be in breach of health and safety requirements (HSE 2009).

7.2 SUCCESSFUL EDUCATION OF FARMERS

Many interventions aiming to improve safety behaviours on farms have focused on education. Despite this, there is limited evidence to suggest that generic education programs (i.e. programs focused on imparting knowledge only) improve safety behaviours (Afshari et al. 2021; Loosemore and Malouf 2019; Murphy et al. 1996). Programs which only aim to improve safety knowledge show limited success in increasing safety behaviours (Chapman et al. 2008; Colémont and Van den Broucke 2008). However, participatory training programs consistently show improvements in safety knowledge and behaviours.

7.2.1 Participatory education programs

Participatory training programs are adapted to local practices and culture and are often group-based and/or peer-to-peer. This style of education shows improvements in farmers' safety knowledge and behaviours (Kogi 2006; Santaweesuk et al. 2014; Caffaro et al. 2018; Kee and Haslam 2019). It should be emphasised that, in order for knowledge to translate into action, intensive training is required (i.e. a once-off workshop is insufficient) (Morgaine et al. 2014; Ospina et al. 2009), and widespread support of improvements to farm-safety should be supported by the community (Orozco et al. 2011). Continued engagement should be seen as something more valuable than simply providing information through leaflets (Rose et al. 2018).

Facilitated peer discussion groups can be useful in considering current farm management and OH&S issues. These are often semi-democratic groups and indicators are that it is useful in increasing OH&S adoption as well as achieve higher profits for farmers (McNamara 2019). For example, the Irish Farmers Association rolled out a peer-to-peer farm safety learning initiative in 2019, encouraging farmers to undertake practical measures that will reduce the risk on their own farms (IFA 2019). With three to five members in a group, they would meet monthly to discuss any near miss incidents in the last 12 to 18 months. Farmers were expected to choose an item or behaviour they would change before the next meeting. Further studies examining the effectiveness of this initiative are in progress (McNamara 2019).

Educational programs should not only be participatory in delivery, but also in their design. Programs that are developed with farmers' input are more likely to resonate with farmers and be accepted by the farming community (Thu et al. 1990; Acosta et al. 2009). This helps overcome a distrust of experts who do not have practical farming experience (Neufeld. and Cinnamon 2004).

7.2.1 Who benefits most from education programs?

7.2.1.1 Children

Educating the youth that work within agricultural settings is essential to adoption of safe farming practices and behaviours (Rudolphi and Retallick 2015). The types of interventions that are typically targeted towards children and youth are commonly interactive with the aim of raising awareness and changing attitudes as well as behaviours. This sometimes takes the form of day camps on farm safety, interactive exhibits, demonstrations at field days, guest speakers at schools with the 'interactive' component often credited as the success factor (Hartling et al. 2004). Locally, the Kidsafe Victoria's *Farm Safety Creative Competition* is running again in 2021 (Kidsafe Victoria 2020). The competition provides an opportunity to engage Victorian primary school children to learn and discuss farm safety issues in a fun and engaging way. Children are invited to use their creativity and design educational farm safety materials and messaging based on the year's theme. *Think Farm Safe, Be Farm Safe (*this year's theme) centres around encouraging children to take the time to stop and think about the potential injury hazards that exist on farms, and to ensure that safety is kept front of mind at all times in the farm environment. It includes farm safety learning sessions and resources to assist teachers and caregivers to focus on farm safety in the classroom or at home.

Educational activities such as this serve the purpose of increasing awareness and knowledge with children themselves about safety on farms. It also serves to highlight to adults the importance of safety,

not only for the children, but also for the farmers, thus applying a positive social pressure advocating for improved safety behaviour.

7.2.1.2 Youth

Programs targeting teenagers in the classroom (e.g. agricultural studies students) seem to have good success (Kidd et al. 2003). Furthermore, youths then help spread safety messages within their families (Reed et al. 2003). Youth farmworkers with migrant backgrounds benefited from farm safety training being incorporated into their English as a Second Language (ESL) curriculum (Teran et al. 2008). Success seems to be independent of the mode of delivery – youths receiving safety training alone (via computer) demonstrated safety improvements similar to those which were either solely teacher led, or supplemented with the use of an app (Khan et al. 2018). The importance of effective program administration should emphasised. In the United States, agribusiness invested over $1 million in the National Future Farmers of America (FFA) Partners Program, which delivered farm safety education program in schools. Inconsistent program implementation saw no measured change in teenagers' safety knowledge or behaviours (Lee 2004).

7.2.1.3 Farm managers and trusted advisors

Whilst farmers are typically the target of education-focused farm-safety interventions, other members of the farming community (e.g. extension officers and trusted advisors) also influence farmers' safety beliefs. Sometimes these individuals hold views on safety which may hinder farmers' adoption of safe farming practices. A variety of professionals may educate farmworkers who receive farm safety training. Amongst these educators, healthcare professionals tend to view pesticide risks more cautiously than extension officers or university educators (LePrevost et al. 2013). In a study in the United States (North Carolina), both extension officers and farm managers perceived the threat of pesticides as exaggerated by the media and public. Additionally, they believed farmworkers have received adequate training and, because PPE provision is mandated by law, they believed farmworkers were safe. In fact, many farmworkers have not received training, and may not fully utilise PPE (Rao et al. 2004). This highlights the importance of ensuring agricultural professionals and farm managers are educated of the actual dangers and risks facing the farming population.

7.2.2 Informal learning and on-farm learning

Drawing lessons from the construction industry, studies had found that safety communication training for foremen can increase the use of fall protection, improve safety behaviours, and enhance on-the-job training and safety communication at their worksites (Kaskutas et al. 2016; Kaskutas et al. 2013). In a 2013 pilot project designed to improve residential construction safety, the foremen carried out a higher frequency of daily mentoring and toolbox talks after the training. As a result, compliance with fall protection increased and unsafe behaviours during worksite audits decreased (Kaskutas et al. 2013).

Theatrical events can also be used to convey safety messages with the aim of changing safety behaviour. Reed and Claunch conducted an intervention with 33 farmers in central Kentucky, USA (2017). The aim of the project was to convince farmers to adopt better farm safety practices. They invited the farmers to an event called a 'dinner theatre' where local farmers performed three humorous plays lasting between two and fifteen minutes, which contained messages about farm safety. After these plays, the researchers gave

a short presentation on farm safety. After one week, a phone survey discovered that 42% of participants had made safety changes, while 67% were thinking about doing so. Over 90% of participants indicated they would use the information gathered themselves or share it with others. This study used the theory of planned behaviour to inform the project, and asserted that shifting social norms was a key part of the process. The authors claimed that hearing funny and engaging real-life stories from local farmers convinced them that farm safety behaviours were normal and easy to implement (perceived behavioural control). While the sample size was small, and the phone survey only monitored behaviour or behavioural intention one week after the event, the authors considered a scale-up to a larger study was warranted (Reed and Claunch 2017).

7.2.3 Designing education programs

7.2.3.1 Gaps in farmers' knowledge of farm safety

It is worthwhile noting the areas in which farmers' knowledge of safety practices is particularly poor, as this may serve as a guide when considering the content of future education programs. Produce growers' knowledge of food safety was found to be incomplete - growers best understood worker safety and hygiene, and least understood water handling and soil amendments (Chen et al. 2020). In the context of hearing and respiratory health, farmers display poor knowledge of proper PPE use and fitting, and poor understanding of the long-term health consequences of noise and dust exposure. In general, farmers' knowledge of zoonotic disease (illness that can spread from animals to humans) is poor (Teixeira-Costa et al. 2020; Singh et al. 2019).

7.2.3.2 Format and delivery of education content

Farmers are often time constrained. One study looking at understanding positive behaviour change in farmers identified that collective farm safety events should prescribe to farmer preferences of good practice, which include brief events (no longer than 2 hours), that are understandable, focused and relevant, with clear financial and business payoffs stated (Dwyer et al. 2007). It is important to note that the source of the information will be considered more reliable when the source has an occupation and experience which resonates with farmers and show a thorough understanding of their values and challenges. In this regard the credibility of the source is also based on the reputation of the source organisation (Blackstock 2007). There is also a preference for two-way conversations recognising farmers' professional expertise rather than being told what to do by an external entity (Blackstock 2007; Armstrong 2021). In the UK, the AHDB's review of literature identified that knowledge exchange and education initiatives, ideally delivered in a face-to-face manner or making the most of active demonstrations, were key factors in influencing behaviour (Rose et al. 2018).

Many countries such as the US, Canada and Australia, offer online (free and fee paid) farm safety training and resources. Apart from common farm hazards, modules in these online series may also encompass general safety, leadership techniques and critical thinking skills. For example, FarmSafe Australia has a free induction tool for workers on their website which can be used in discussion during their induction with the farm owner/manager (Farmsafe 2021). FarmSafe also includes Child Safety and Teaching Kits which can be used by employers and workers to improve safety for children, with some also developed specifically for education and community groups. Similar to the construction industry, FarmSafe have

developed electronic toolbox talk resources (e.g. safe chemical handling, tractor operation, safe handling of cattle) which can be used as the basis of discussion with workers and includes risk assessment/planning. An assessment is also often part of the training to ensure comprehension and help cultivate on-farm behaviour change.

7.3 RAISING AWARENESS VIA SOCIAL MEDIA

In addition to stories in the media, strategies to raise awareness about farm safety often have several components, including websites, popularised hashtags, social media posts/blogs, school awareness-raising campaigns or educational programs, seminars at farming events, print and video resources (e.g. podcasts, YouTube).

7.3.1 Cautionary tales in media to promote safety: "Tell a story, save a life"

These personalised stories of farmers who had a near miss or who survived a close call or family of a deceased farmer are very powerful. Some platforms collate these stories (Telling the Story Project 2019). The aim of this is to raise awareness of safety. It can have a strong impact when delivered to the target audience of farmers, as many can relate to hearing from someone very similar to them. However, while it can be useful for targeting specific issues, some expert opinion note that behaviour change attached to victim testimonials are often short lived (McNamara 2019).

Many of the stories feature similar tales – providing opportunities for corrective behaviour:

- They were working alone
- They didn't tell anyone where they were
- They were in a hurry
- They didn't have their mind fully on the task
- They weren't aware of their surroundings
- They didn't take precautions
- They did something they knew they shouldn't

7.3.2 Farmer influencers

While many partners/other family members self-identify that they have minimal meaningful influence on farm safety (QMR 2019), there are some who are trying to maximise the positive pressure of families, in particular female influencers. Social media has created more opportunities to use the power of community. In Australia there are campaigns by farmer influencers such as Alex Thomas – Rural Woman of the Year (2018 AgriFutures Rural Women's Award in South Australia). Her #PlantASeedForSafety campaign profiles and celebrates a minimum of 100 rural women who are making lifesaving changes to safety across a range of primary industries (Thomas 2021). These are collated on a website and promoted through social media (e.g., Facebook, Twitter, Instagram). Alex Thomas is also encouraging the use of the hashtag #SaveALifeListenToYourWife. The approach is based on the assumption that many rural women are innately risk averse and are often in a position to influence change and improve safety.

Focusing on role modelling to children, familial responsibility and family farm legacy protection are also approaches which are likely to affect positive pressure on farmers to implement higher safety standards and behaviours (QMR 2019).

8. THE ROLE OF GOVERNMENT IN DRIVING CHANGE

SUMMARY:

- Government exerts one of the strongest impact on influence farm safety culture change through its role with OHS regulation, enforcement and engagement. Regulations are successful when developed with the input of the farming community, and the community receives support to help comply with them.
- Government best influences and motivates farm safety culture through a combination of regulation, coordination of farm safety efforts, support for farm safety programs and incentives. Government can also help coordinate farm safety efforts, to help avoid fragmentation among farm industry stakeholders.
- Government can play an important role in the development and administration of programs in other sectors that help drive change. For example, government can oversee the introduction of food labelling that raises consumers' awareness to products that have been produced in worker-friendly work environments.
- Government can help kick-start change by supporting incentives for safe farm practices and through development and support of programs which incorporate farm safety as part of health or farm management programs (e.g. Certified Safe Farm in the US; Farm Safety Advisory Pilot Program in NSW).

The strongest influence on farm safety culture is exerted by peers and community. However, government also plays an important (although less influential) role in driving cultural change. It is important that efforts are focused on the programs with most impact (i.e. focus on OHS legislation, rather than safety message campaigns). Farmers in New South Wales cite OHS regulations as one of the primary motivating factors for making safety improvements on farms (Pollock et al. 2014). However, safety messages from the government tend to be ineffective in changing farmers' attitudes (Pedersen et al. 1999).

Government is best placed to influence the development and enforcement of OHS regulation (Marlenga et al. 2007; McBain-Rigg et al. 2017; Pollock et al. 2014) (Section 8. 1). Government can also take a leading role in helping drive coordination amongst organisations working towards improvements in farm safety (Section 8.2). Several government programs, including those offering incentives to farmers, have also been successful in driving change (Section 8.3).

8.1 GOVERNMENT AND OHS REGULATION

Research suggests that OHS regulations can be perceived by some as impractical or unachievable, and a small proportion of farmers may attempt to conceal non-compliant behaviours in order to match regulatory demands (Tingey-Holyoak and Pisaniello 2017). In order for specific OHS regulation and safety programs

to achieve maximum impact, acceptance and compliance, they need be developed in consultation (or co design) with the farming community (Huy 2010).

As well as developing regulations, government is well placed to positively influence farm safety through facilitating compliance (Kaustell et al. 2011). For example, across the Australian agricultural industry, farms have consistently low levels of both implementing farm OHS plans and inducting new workers and contractors (Lower et al. 2011). Similarly, government can help with OHS regulation formation and compliance in areas which are currently overlooked—for example, whilst mid- to large-scale dams are often required to meet certain legal design and review requirements, this is not the case for small farm dams (Pisaniello 2010). More generally, government can provide assistance to small farms, which currently have a poor understanding of OHS issues. Small farms may require assistance to understand their legal OHS obligations, as well as how to reduce their on-farm risks (Temperley et al. 2013).

In developing OHS regulations, it is worthwhile considering the rights of workers to workplace health and safety. New OHS regulations may become an instrument through which workers' human rights are violated, if policy-makers are unaware of the human rights obligations resulting from a particular regulation. For example, a state may breach its human rights if it fails to regulate the import or use of known hazardous pesticides. Similarly, a state would violate its obligations to protect rural workers if they are not provided with safety information or opportunities to protect themselves (London 2011).

8.2 GOVERNMENT-LED COORDINATION OF SAFETY INITIATIVES

An additional role that government can play is helping to coordinate both the government agencies and independent organisations working towards improving farm safety (e.g. in Australia, a role played by Farmsafe). This reduces overlap in service provision and prevents organisational siloing. Fragar noted that it is important for these partnerships to be sustainable (1996). Government can provide the overarching institutional structure to help achieve this (Box 3).

The RIRDC identified that there were specific facilitating factors which could improve safety behaviour in farmers. Government can provide assistance with many of these (Franklin et al. 2015):

- Social networks and support for positive approaches and attitudes toward safety
- Financial incentives
- Assistance with work health and safety 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)
- Improved access to information about safety, designed in consultation with producers to address their identified needs

Box 3: Factors that encourage farmers to adopt safer farm practices

The coordination role will help avoid fragmentation among farm industry stakeholders and will facilitate collaborative partnerships that align with national strategic plans to improve safety on Australian farms (Fragar et al. 2011, Moore 2010).

This will help industry agencies to become more actively involved in supporting and sponsoring national single-issue campaigns that address priority safety issues (e.g., quad bike safety and helmet wearing campaigns) (Fragar and Temperley 2008).

This coordination role can also help to remove some of the barriers identified by the RIRDC that prevent farmers from implementing safety practices (Franklin et al. 2015). These include:

- 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
- Legislative uncertainty that came from perceived cycles of changes in legislative requirements

8.3 GOVERNMENT PROGRAMS AND INCENTIVES

There has been significant investment in farm safety programs by a range of agencies (mostly governments), and some of these have demonstrated significant safety impact (Fragar et al. 2011). For reference, a list of Australian Agriculture Industry Associations is included (Appendix). In Australia, a collaborative partnership for farming and fishing health and safety funded through a number of government departments including AgriFutures (formerly RIRDC) have reported successes (Clarke 2009). Outcomes of 30 projects were reported in 2011 and cost-benefit analyses showed positive returns of 2.2 to 5.6. These projects included communications and media strategies, targeting farmer health behaviours, farm safety studies (including in-depth investigations of farm machinery injury), and information dissemination (e.g. conferences).

8.3.1 Government incentives

Incentivisation has had numerous successes, one such example is the successful Victoria quad bike safety rebate scheme (2016-2019) (Twin et al. 2019). One Australian study (completed in 2004) looked at accreditation schemes as a mechanism to encourage farmers who take OH&S training to implement safety measures. The study suggests that discounts on workers' compensation and public liability insurance were an important incentive to farmer engagement with the training and adoption of safety measures (Clarke 2009). In March 2021 FarmSafe Australia announced incentivisation as one of its key impact opportunities in its National Farm Safety Education Fund Strategy (Armstrong 2021; Farmsafe Australia 2021). As part of the Smarter, Safer Farms program, the Victorian Government implemented a $5 million *Farm Safety Rebate Scheme* (Agriculture Victoria 2021). In this scheme eligible farm

businesses could apply for a rebate of up to $5,000 to invest in infrastructure and equipment to keep them, their workers, visitors and family safe. This rebate scheme was fully allocated within four weeks.

The Agriculture and Horticulture development Board (AHDB, UK) 2018 review of literature concluded that incentives and follow-up are a key strategy to change safety behaviour (Rose et al. 2018). They found that where behaviour change was incentivised, there were signs of positive change, although perhaps not in the long-term (more research was needed), and only if rewards were sustained. They conclude that if behaviour change was to be incentivised, it should be underpinned by rewards that can be sustained, and that it uses other forms of interventions to underpin financial rewards (e.g. education). Other research conducted in Australia identified that financial incentives are more successful if used in combination with farm safety training, regulatory action, and partnerships between industry and government information providing authorities (Fragar et al. 2011).

8.3.2 Other government programs

Programs that provide safety advice as part of a larger, more holistic program (e.g. farmer health or farm business management) tend to be well-received by the farming community. For example, the Certified Safe Farm program, administered in the United States, showed widespread improvements in farmers' health outcomes (e.g. fewer incidences of organic dust toxic syndrome; improvements in blood pressure and cholesterol). This program involved clinical health screenings, on-farm site reviews, education (including one-on-one advice from an AgriSafe nurse), and incentives (Donham et al. 2011; Donham et al. 2019).

Another example is the Farm Safety Advisory Pilot Program, funded by SafeWork NSW (NSW Farmers 2021). Farmers could have a face-to-face meeting with a Farm Safety Advisor free of charge to assess if their businesses complied with the work health and safety (WHS) framework. The advisor would work with the farmer to develop a customised WHS program in order to reduce risk for all members of the farm. Similar to this is WorkSafe Victorias OHS Essentials, delivering free workplace safety consultation with an independent OHS expert and available to all businesses (farm or otherwise) in Victoria (WorkSafe Victoria 2020).

Government can also help administer other programs that help drive change. For example, government can oversee the introduction of food labelling that raises consumers' awareness to products that have been produced in worker-friendly work environments. This provides the broader community (i.e. as consumers) with an opportunity to help drive workforce-wide change (Lundqvist and Svennefelt 2014).

In July 2020, the Tasmanian state government launched an online pre-farm employment induction program, AgCard, which provides workers essential awareness and understanding of standard WHS procedures before they start working on a farm (Barnett 2020). AgCard is similar to a white construction card and equips potential employees with basic farm safety and biosecurity advice. Since its launch to March 2, 2021, there had been 865 individual users, made up of about 40% employees, 20% employers, and 20% students. However, the total user base does not always reflect program success. As noted by stakeholders in Appendix 4, a program such as AgCard should be implemented based on supporting findings in academic literature, to help ensure it achieves the desired aims of improving safety culture.

9. RESEARCH GAPS

SUMMARY:

- A major ongoing challenge in the Australian agricultural field is the consistency and completeness of health and safety (injury and fatality) data
- Long-term measurement of the collective impact on safety culture and climate of incentives and initiatives that attempt to shift behaviour and attitudes is not evident in the literature. Improving evaluation and measurement will provide further knowledge, understanding and validation of the factors influencing farm safety culture both on farm and within the industry more broadly.
- While there is promising evidence that legislation and financial incentives can affect safety culture, there are still knowledge gaps regarding evidence of what combination of influences can lead to sustainable change to farm safety culture/climate.

An ongoing challenge in the Australian agricultural field is the completeness of health and safety data. The Rural Safety and Health Alliance, comprised of nine Rural Research and Development Corporations, is currently working with FarmSafe Australia and other key stakeholders to review the current health and safety data frameworks, to clearly identify the uses and objectives of this data, current challenges and identify opportunities to improve health and safety data nationally (Farmsafe Australia 2020). This concept is discussed in detail in the subsequent Measuring Farm Safety Culture report.

A recent (2019) National Injury Prevention literature review developed for the Australian Government Department of Health, identified the following as ‘promising’ evidence in the agricultural field (Hunter et al. 2019; Rautiainen et al. 2008):

- Legislation requiring safety features on tractors. Rollover protective structures and safety cabins showed decrease in fatal injury over time
- Progressive effect of legislation banning Endosulfan pesticide on reducing injury (poisoning and deaths)
- Financial incentives have potential to reduce injury rates

However, the evidence is considered ‘weak’ for the following:

- No evidence to support education alone for reducing injury or changing safety culture (Rautiainen et al. 2008)
- Farm safety camps were shown to increase short-term safety knowledge but no suggestion of measurement impact on safety culture (Hartling et al. 2004)
- Mixed results for youth programs in reduction reduce individual farm injury, self-auditing group programs showed best results in changing attitudes toward safety (Hartling et al. 2004). No indication or measurement on ways this has influenced safety culture on their farms.

- Community based tractor knowledge intervention corresponded to decrease in fatalities and sale of rollover protection increased. Suggesting a shift in attitude. However, inconsistent results seen for other specific tractor training programs (Hartling et al. 2004)
- Limited intervention studies published that focus on injury prevention among older worker in agriculture (Nilsson 2003).

The UK's AHDB 2018 review of literature identified that there are very few robust, long-term studies which examine and measure farmers' behaviour change and its impact on farm safety culture/climate (Rose et al. 2018). This highlights the importance of funding that enables monitoring of behaviour-change long term and its impact on culture. One other aspect to note is that there is often a limited understanding of farmers' past behaviour (Rose et al. 2018).

Understanding past behaviour gives greater certainty in predicting current and future safety behaviour, and greater understanding of what types of activities might be more/less successful in attempting to shift the safety climate on farms. The AHDB review also notes there are limited studies which map the 'ring of confidence' – that is where key information is coming from which influence farmers' behaviour change (Rose et al. 2018).

It is highlighted in the academic literature that there is not a solid understanding of the role that trusted advisors play, or even the influence that farmers exert on each other to adopt enhanced safety behaviours. It has also been raised that there was little knowledge of which policy tools are more likely to get results in specific contexts (Rose et al. 2018). The AHDB review notes that since each farmer is different, and each farm is different, one might expect different messages to be salient to different farmers. For example, a technical pro-innovation message might be more appealing to younger farmers, while an incentive-based message might be more exciting for those with limited cashflows who need greater monetary support to perform a behaviour. It is certainly true that a one-size-fits-all behavioural approach is unlikely to work across different 'agri'-cultures, and thus we do need to understand better how to shape policies and messages for different groups of individuals (Bolton 2020).

Finally, it's worth noting that behavioural studies have been criticised for employing 'status quo thinking', in that they see the behaviour of individuals as the problem to be addressed rather than the prevailing power structures in society that may produce those behaviours in the first place (or at least significantly contribute to them). This review has attempted to examine the social, economic and political conditions that shape outcomes (i.e. including the regulatory 'rules of the game') and which are currently understood as operating largely or wholly independently of the individual, who have a tendency to create their own rules (Rose et al. 2018).

10. RECOMMENDATIONS

SUMMARY:

Key Recommendations:

Short Term

- Translate information into safety culture change through both peer learning and community leadership: e.g. develop community farm safety champions/mentors
- Integration of farm safety consideration into whole farm planning and technology integration
- Targeted and consistent education and engagement of trusted advisors

Medium Term

- Improved translation of current legislation to improve farmer understanding and acceptance of their OHS duty of care to family and employees working on farm.
- Development of programs (or integration of content into current resources) and incentives that increase and encourage the uptake and use of workplace OHS strategies and tools for both large commercial and smaller family farm holdings. eg farm safety induction programs for both family member and workers,

Long Term

- Government to consider ways in which future incentives can be strategically focussed on creating and influencing long-term changes in behaviour and a shift in farm safety culture
    - This could be achieved through linking activities such as training and farm safety planning to insurance rates
    - Development of certification program for trusted advisors who are trained, and recognised as safety champions and who can also obtain some value-add to their business (eg. Formal public recognition)
- Interventions should be sustained and their long-term impact measured and evaluated
    - Long-term measurement of the collective impact on safety culture of incentives and initiatives that are attempting to shift specific behaviour and attitudes – there is a need to create a link between injury rates and farm safety culture, translating findings back into interventions, education
- Tailor interventions and initiatives to target, engage and influence the specific stage of culture shift required for different safety culture needs and relative safety maturity of industry sectors.

SHORT TERM

1. Translate information into safety culture change through peer learning and community leadership

Evidence in both peer-reviewed and grey literature has shown that farmers identified with other farmers, looking to their peers for safety advice and example of behaviour. Collectively this can create the safety culture within specific farming communities and can be maladaptive depending on the farming identity and values of peers. Studies suggest that other farmers were the second strongest influence on farmers, after regulations.

Discussion groups help farmers keep up-to-date with the latest information and practices and share ideas. The Tasmanian Institute of Agriculture (TIA) has been facilitating five regional dairy discussion groups that meet approximately six times per year, typically in an informal setting. Discussion group meetings take place on farms around Tasmania and include discussions around a particular topic, sometimes with a guest speaker, and a farm walk to look at particular aspects of the host farm's management practices. Farmers from dairy discussion groups mentioned how discussion groups have helped them cope, simply through knowing other farmers are experiencing the same challenges. While the focus of TIA's discussions groups is to disseminate new information and ways of doing things from observing the practices of the host farm, it can also be a platform to promote farm safety. Farm workers look to their peers for safety advice.

Community leadership and intervention intensity are still required to bring about change (not just focus group discussions). Participatory/self-organising/action focussed/peer-to-peer systems are generally good for improving safety; right mix of people is a key. Programs for regular discussions with peers were successful in improving behaviour/changing culture. Interventions are more successful when in small groups, in a familiar 'home turf' setting, interactive (farmer-to-farmer), provide good examples and action checklists.

Agriculture Victoria currently engage both farming communities and stakeholders across a broad range of sectors and topics of importance to agriculture and rural communities. The department is well placed to support and facilitate the implementation of a community driven, action focused safety leadership program, facilitating information exchange between regulators, educators, researchers and farming communities.

2. Integration of farm safety into farm planning content and extension programs

Holistic farm planning enables farmers to generate a blueprint for future farm development, providing a guide for a landholder on the development of the property and farm business. These can be staged over a number of years or implemented immediately. Benchmarking and farm planning are becoming standard annual practices on many farms—regardless of enterprise—and are often undertaken with assistance of an agribusiness consultant or through agricultural extension.

The process of planning provides an opportunity to consider the safety implications or risks associated with future developments eg. safety implications of capital developments such as livestock handling equipment, placement and development of laneways, gates and fences as well as integration of technology and innovative methods for improving both safety and productivity.

Based on the current gaps in the literature, this review recommends the review and further integration of safety concepts into Agriculture Victoria's education programs eg. Whole Farm Planning and Farm Business Resilience Planning courses, followed by evaluation of their impact and influence on safety culture. This will further support other programs initiatives that have a more specific focus on safety. This would also assist and support the future uptake and understanding of and developments and updates to government safety regulation as described in section 8.3.

3. Targeted Education and engagement of Trusted Advisors

Trusted advisors have been shown to play an important role in influencing a number of aspects of farm business management, animal health and husbandry, agronomy and to have an influence across the wider agricultural industry in Victoria. There is currently a lack of clarity within this group regarding the role they should play in influencing a culture of safety on the farms and with the families they work closely with.

This review recommends the development of part day, farm safety culture 'training' sessions that bring together advisors and service providers from a number of sectors to address the following:

- The current farm injury and fatality statistics in Victoria and Australia.
- Define and highlight the known influences of farm safety culture
- Discuss perceived barriers to engaging with clients/groups about safety
- Identify the role advisors play in shaping safety culture within industry and the farm community.
- Develop tailored, achievable, measurable actions to influence safety culture within the farming communities in which they provide service.

MEDIUM TERM

4. Improved translation of current legislation to improve farmer understanding and acceptance of their OHS duty of care to family and employees working on farm.

5. Development of programs (or integration of content into current resources) and incentives that increase and encourage the uptake and use of workplace OHS strategies and tools for both large commercial and smaller family farm holdings. eg farm safety induction programs for both family member and workers,

Involvement in safety awareness needs to come from more than just one person at a farm. Safety images in workplaces are not always comprehended. Safety information needs to be appropriate for the audience (e.g. pesticide label language) and communicated well by the farmer/farm manager.

Issues of workplace control have been reported as a barrier to adoption of safe practices (particularly amongst seasonal workers). Farmers are more likely to adopt physical changes—rather than organisational—to improve farm safety. Strong governance and communication is required between organisations (industry and farm-gate level).

Online farm safety inductions are available but are not mandatory in Australia. For example, in 2018 FarmSafe Australia introduced an interactive online Safety Induction Tool. In 2020, Primary Employers Tasmania launched its AgCard project, a pre-farm employment induction program that uses Safe Farming Tasmania's resources to give farm workers essential awareness and understanding of work health and safety procedures. No information was found on the uptake of these online inductions. The only obvious incentive for workers to complete the online induction is that they will be provided with a certificate as evidence of their learning. Workers could then add this into their resume when looking for a job at a farm.

LONGTERM

6. Long-term measurement of the collective impact on safety culture of incentives and initiatives that are attempting to shift specific behaviour and attitudes – there is a need to create a link between injury rates and farm safety culture, translating findings back into interventions, education and extension activities.
7. Government can consider ways in which future incentives can be strategically focussed on creating and influencing long-term changes in behaviour and a shift in farm safety culture
    a. This could be achieved through linking activities such as training and farm safety planning to insurance rates
    b. Development of certification program for trusted advisors who are trained, and recognised as safety champions and who can also obtain some value-add to their business (eg. Formal public recognition)

8. Interventions should be sustained and their long-term impact measured and evaluated.
9. Tailor interventions and initiatives to target, engage and influence the specific stage of culture shift required for different safety culture needs and relative safety maturity of industry sectors.

Whilst recognising the distinction between influencing culture and measurement of culture more broadly - measuring the cultural impact of communications, interventions and resources over time will play an important role in ensuring the methods for influencing farm safety are achieving community impact as efficiently as possible. Targeted social media, coupled with mass media campaigns can be effective in influencing, but need to be sustained and adapted with shifts in safety awareness and culture.

An ongoing challenge in assessing safety in Australian agriculture is the consistency and completeness of health and safety (including injury and fatality) data. There is a need to connect this data with the methods of influence and the culture of safety on farms. Achieving this requires the development of a validated framework for evaluation - that enables effective and repeated evaluation of behaviour and attitude changes and their collective impact on culture over time.

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APPENDIX 1: RESEARCH METHODS

This review examines peer-reviewed literature, grey literature and available unpublished pilot data and evaluation reports conducted over the last 10 years. Seminal work that is older than 10 years is also be considered. The 10-year search timeframe was re-evaluated to incorporate literature published from 2000 onwards due to the large portion of farm safety research and reporting conducted between 2000 and 2010. The literature review process is described below for academic literature (Step 1) and grey literature (Step 2).

STEP 1 (PEER-REVIEWED LITERATURE)

A systematic search of the peer-reviewed literature was conducted in: MEDLINE Complete (via Ebsco), Embase (via Embase.com), APA PsycINFO (via Ebsco), Global Health (via Ebsco) and SocINDEX (via Ebsco). The searches incorporated the following concepts: safety and workplace and farming and attitude (farmers, farming families, agricultural-dependent communities), Australia and international, culture, influence occupational safety, safety climate and community influence farm injury (programs, training, partnerships, support initiatives). Each concept was searched independently and then combined. Prior to being fully translated (including subject headings) into the remaining bibliographic databases (specified above), the search strategy was evaluated peer reviewed by a Health Librarian. Search results from all sources were limited to studies published in English and published between 2000 and 2021. Additionally, all bibliographic database search results and selected grey literature have been collated in EndNote. X9 citation software and duplicates were removed. Full-text documents were sourced for remaining citations. Finally, citations were exported to Covidence for screening workflow aligned to the PRISMA guidelines, where two reviewers independently screen studies at each stage and discrepancies were resolved by a third reviewer. Search comprehensiveness and literature sourcing is being adapted to align with time constraints, language proficiencies (English) and nature of review conducted.

The method of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guided the process for literature screening (Figure 5). That is, all abstracts were double-screened against the inclusion and exclusion criteria. If required, a third reviewer arbitrated any disagreements. Within the software, abstracts that are deemed potentially relevant are sent to full-text screening. Each full-text is then double-screened for inclusion. Those excluded are designated an exclusion reason that is reported in a final PRISMA flow chart that is included as a best-practice indicator of the search rigour.

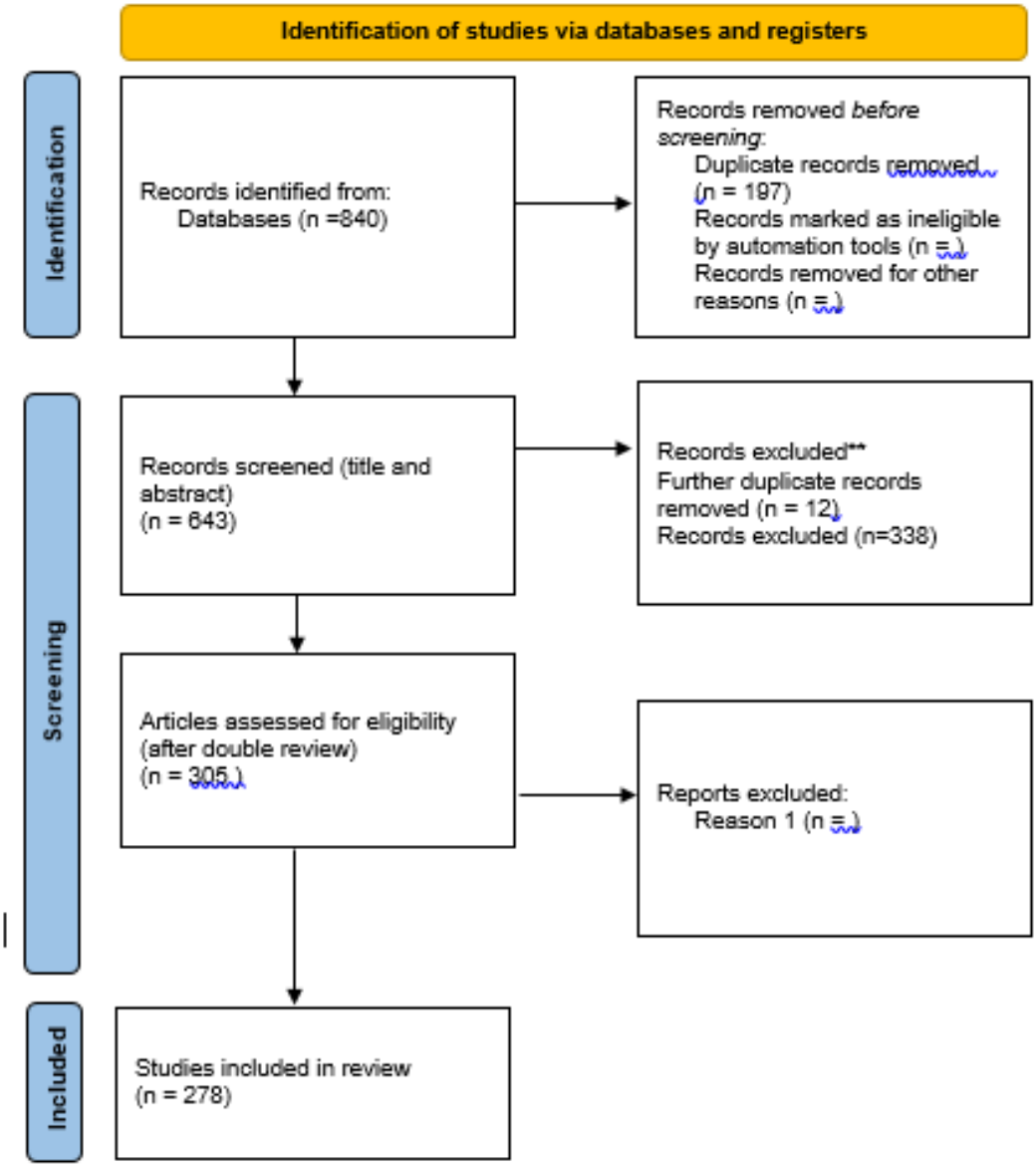

Figure 9: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

A search of the literature identified 643 potential articles of interest. From these, a total of 305 articles were identified for further investigation (where full text was available). After review, a total of 278 articles were included in the rapid review (see Table 3: Step 1 (peer-reviewed literature)).

Table 2: Step 1 (peer-reviewed literature)

References screened (title and abstract)	References identified for further investigation
643	305 (after double review)

Of these, 64 were Australian and 208 were international. Division of articles into broader geographic regions was conducted following the United Nations Geoscheme, designed by the United Nations Statistics Division (UNSD), which identifies six regional groups (with 22 subregional groups). The location of study could not be identified for a further six articles. Articles were identified across a total of 32 countries. The majority of articles identified were from the United States (n=136), followed by Australia (n=64) and Canada (n=13) (Figure 6). Some articles were conducted across more than one country, and have been included in each individual country's total.

Of the Australian articles, 25 were nationally focused, with the remainder conducted within specific states or territories (Figure 7). Some articles were conducted across more than one state and/or territory, and have been included in each state/territory's total.

Step 2 (grey literature)

The grey literature scan was completed using Google (March to April 2021) and used the following search phrases: "influence farm safety", "farm safety behaviour", "influence occupational health and safety", "community influence farm injury" and "influence safety culture agriculture". It excluded direct searches for academic literature, direct advice to farmers on safety (e.g. from regulators), identification of safety risks, farmers' mental health, farm safety commercial products/systems, farm safety advocacy organisations' advice (e.g. who represent farmers) and the search was limited to the last 20 years. Any site with the words assessment, tool or measure were included with the web address limited to .edu, .gov and .org. The first one hundred websites, contained within the first 9 pages of search results, met the project criteria. In particular the focus was on safety change programs/initiatives and factors which influence/change farmer behaviour. Geographic mapping was not undertaken during the grey literature desktop search.

Data identification and extraction

The dataset was tabled in discrete forms (grey literature, stakeholder materials and peer reviewed) with identifiers to show where it was sourced. An internal review of stakeholders' programs of interest contributed to the data. During the summarising process duplications were found; but both were retained and counted once only.

APPENDIX 2: EXAMPLES OF FARM SAFETY INITIATIVES

Table 3: Examples of farm safety initiatives around the world

Initiative / Location (year, if known)	Organisation	Aim	Delivery method	Description	Impact
Quiet4Healthy Farm US (2018)	University of Michigan School of Nursing	Promote health and improve the quality of life among farm operators and farm youth by eliminating work-related hazardous noise exposures To increase farmers' self-determination in changing their behaviours to prevent noise-induced hearing loss and noise associated health problems	Education via face-to-face, mail, or web-based formats.	Preventive strategies (turn it down, walk away, and wear hearing protection) Highly interactive and predictor-based programs that use multiple tools such as farmer-to-farmer communication, role modelling, cognitive strategies, videos, persuasive techniques, and animations of hearing physiology	Interventions being used to inform national and state farm organisation policies and programs Adopted in standard curriculum reaching over 100,000 people in 338 US communities annually Included in a smartphone app for noise monitoring and education of farmers. Interventions have demonstrated sustained effectiveness over a 12-month period in increasing the use of hearing conservation strategies (AAN 2021)

Farm Dinner Theatre US (2017)	University of Kentucky's College of Nursing, University of Alabama Institute for Social Science, Cooperative Extension programs in Kentucky, Tennessee, and Virginia, and local agricultural communities	To convince farmers to adopt better farm safety practices	Theatrical events by farmers	Local farmers performed three humorous plays lasting between two and fifteen minutes, which contained messages about farm safety. After these plays, the researchers gave a short presentation on farm safety.	Phone survey a week later: 42% of participants had made safety changes while 67% were thinking about doing so Over 90% of participants indicated they would use the information gathered themselves or share it with others
Telling the story project US (2018)	The Central States Center for Agricultural Safety and Health (CS-CASH), Great Plains Center for Agricultural Health (GPCAH), Upper Midwest Agricultural Safety and Health Center (UMASH), National Farm Medicine Center (NFMC)	Help raise awareness about farm safety	Storytelling	Farmers, agricultural workers, and family and community members who have been impacted by injuries, fatalities, or close calls tell their experiences to provide information to learn what went wrong and how to prevent similar incidents.	No information
Peer-to-peer farm safety learning initiative	Irish Farmers Association	Encourage farmers to undertake practical measures that will	Peer learning Discussion groups	Three to five members in a group would meet monthly to discuss any near miss in the last 12 to 18 months.	Further studies examining their effectiveness are in progress.

Ireland (2019)		reduce the risk on their own farms		Farmers were expected to choose an item or behaviour they would change before the next meeting.	
Farm Safety Advisory Pilot Program NSW, Australia	NSW Farmers	Reduce farm-related death, injury and disease and improve health and safety of workers in the farming industry	Face-to-face meeting with a Farm Safety Advisor	A Farm Safety Advisor assesses and develops a customised work health and safety (WHS) program with the farmer to reduce risk for all members of the farm Free of charge.	No information
AgCard Tasmania, Australia (2020)	Primary Employers Tasmania	Provide essential awareness and understanding of standard WHS procedures before workers start working on a farm	Online pre-farm employment induction program	Consists of two courses: AgCard Safe Farming and AgCard Human Resources	Since its launch to March 2, 2021, there had been 865 individual users, made up of about 40% employees, 20% employers, and 20% students.
Farm Safety Creative Competition Victoria, Australia (2020)	Kidsafe Victoria	Engage Victorian primary school children to learn and discuss farm safety issues in a fun and engaging way	Competition	Children are invited to unleash their creativity and design educational farm safety materials and messaging based on farm safety.	Running for the second year in 2021. In 2021, Victorian children aged 3 to 5 years are invited to get involved and enter a collage in our newly added ‘Early Childhood Category’.
National Farm Safety Week	FarmSafe Australia	Raise awareness of farm safety issues in	Media package that includes media releases, social	Highlight the dangers of working in the agriculture industry	Been running since 1998

		rural communities across Australia Increase the well-being of Australian farmers through improved awareness of on-farm health and safety	media posts, hashtags to use	Educate farmers on how to increase on-farm safety and reduce fatalities	
#PlantASeedForSafety and #SaveALifeListenToYourWife Australia	https://plantaseedforsafety.com/	Amplify industry-driven, practical solutions that inspire rural men to save a life, by listening to their wife	Storytelling	Share stories to improve the health, safety and wellbeing of men, women and children in rural industries and communities.	Not yet evaluated

APPENDIX 3: AGRICULTURE INDUSTRY ASSOCIATIONS

AgriFutures Australia
AgriFutures Australia partners with Australian rural industries and the Australian Government to focus on the future of Australian agriculture.

AUS-MEAT and AUS-QUAL
AUS-MEAT and AUS-QUAL are agribusiness auditing, certification and training providers that support compliance with local and international growing and production requirements.

Australian Farmers' Markets Association (AFMA)
AFMA is a voluntary organisation which supports the development and growth of sustainable farmers' markets across Australia.

Australian Women in Agriculture (AWiA)
AWiA helps women influence the agricultural agenda by providing current information to assist them to influence decision-making at all levels.

Future Farmers Network
Future Farmers Network builds the engagement and networks of participants in agriculture aged 18 to 35 years.

National Farmers' Federation (NFF)
NFF is the peak national body representing farmers and, more broadly, agriculture across Australia. Individual farmers join their respective state farm organisation and/or national commodity council. These organisations collectively form NFF.

Australian Dairy Farmers (ADF)
ADF is a not-for-profit organisation representing the interests of Australian dairy farmers. The organisation is a strong collective voice to Government and the community on national issues affecting dairy farmers and their profitability.

Australian Dairy Industry Council (ADIC)
ADIC is a peak national representative body which provides a unified approach to industry and government advocacy.

Australian Egg Corporation Limited (AECL)
AECL is a producer-owned company representing about 400 commercial egg producers (caged, barn-laid, free range, specialist). Members receive industry news, involvement in marketing and public relations campaigns and a range of other benefits.

Australian Pork Limited (APL)
APL is a rural industry service body for the Australian pork industry. As a producer-owned company, APL keeps members up to date with a comprehensive range of general pig industry information, while investing in marketing, export development, and research and innovation.

Australian Wool Innovation (AWI)
AWI is a not-for-profit company owned by more than 27,000 Australian woolgrowers. AWI invests in research, development, innovation and marketing along the global supply chain for Australian wool.

Boer Goat Breeders' Association of Australia (BGBAA)
BGBAA is the Australian breeders association that oversees the development of the Australian Boer goat for the commercial market.

Cattle Council of Australia (CCA)
CCA is the peak producer organisation representing Australia's beef cattle producers.

Dairy Australia
Dairy Australia is a national industry body that assists farmers in a changing operating environment to achieve a profitable and sustainable industry.

Goat Industry Council of Australia (GICA)
GICA is the peak national body representing and promoting the national interests of Australian goat meat, fibre and dairy producers.

Leading Sheep Queensland
Leading Sheep Queensland is a network of Queensland sheep and wool businesses leading the way for a more profitable industry through new technologies, knowledge and skills.

Meat & Livestock Australia (MLA)
MLA is the declared industry marketing and research body for Australian red meat and livestock producers, contributing to profitability, sustainability and global competitiveness.

Apple and Pear Australia Limited (APAL)
APAL is the peak industry body representing commercial apple and pear growers in Australia.

Australian Asparagus Council (AAC)
AAC is the peak industry body representing asparagus in Australia to achieve long-term industry growth by developing new markets and improving existing markets.

Australian Banana Growers' Council Inc (ABGC)
ABGC is the Australian banana industry's peak national association, representing over 800 banana growers. ABGC provides key industry information about a range of issues, including tracking the retail pricing of bananas.

Australian Lychee Growers Association (ALGA)
ALGA is the peak national body which initiates and oversees the promotion, research, export market access and the agri-political issues that will ensure the long-term sustainable future of the Australian lychee industry.

Australian Macadamia Society (AMS)
AMS is the peak industry body for the Australian macadamia industry, and currently has over 600 members who are responsible for 90% of Australia's macadamia production.

Australian Mango Industry Association (AMIA)
AMIA is the peak industry body for the Australian mango industry. Its aim is to encourage the growth and development of the industry. AMIA members include mango growers, associated businesses and industry representatives.

Australian Melon Association (AMA)
AMA supports the melon agribusiness in Australia.

Australian Nut Industry Council (ANIC)
ANIC is the federation representing 7 Australian nut producing industries at a national level.

Australian Olive Association (AOA)
AOA is Australia's peak industry body for olive growers. The association provides members with up-to-date information about the industry, discounts when participating in AOA-organised events and the opportunity to actively participate in and contribute to the development of the olive industry.

Australian Society of Horticultural Science (AuSHS)
AuSHS is a professional society for the promotion and enhancement of Australian horticultural science and industry.

Australian Table Grape Association (ATGA)
ATGA is the peak industry body representing Australian commercial table grape growers.

AUSVEG
AUSVEG is the national peak industry body representing the interests of Australian vegetable and potato growers and is committed to securing the industry's future.

Avocados Australia
Avocados Australia is the representative industry body for the Australian avocado industry. It provides a range of services to members and the broader industry to foster growth and development.

Citrus Australia
Citrus Australia is the recognised peak industry body representing Australia's commercial citrus growers. It is supported by over 250 grower and affiliated members to provide vital services to the industry.

Custard Apples Australia
Custard Apples Australia represents and promotes the Custard Apple industry in Australia.

Feed Ingredients and Additives Association of Australia (FIAAA)
FIAAA is the national peak industry organisation representing suppliers of feed ingredients and additives in Australia. Feed ingredients are nutritive component parts or constituents of any combination or mixture making up a feed. Ingredients may be of plant or animal (including aquatic) origin or other organic or inorganic substances.

Greenlife Industry Australia
Greenlife Industry Australia is Australia's peak industry body representing commercial nursery growers, retailers and suppliers. NGIQ is charged with providing leadership, support and additional resources to drive key industry initiatives, which meet the goals of the industry strategic plan.

Passionfruit Australia Inc. (PAI)
PAI is the peak industry body and represents growers, nursery owners and workers, processors and other passionfruit industry participants.

Strawberries Australia Inc.
Strawberries Australia is Australia's peak industry body for the strawberry industry.

Summerfruit Australia Limited (SAL)
SAL is the industry voice on a national and international level. It is the peak industry body for growers and works closely with other interested groups, government and supply chain partners to maximise profitability for the industry.

Australian Cane Farmers Association (ACFA)
ACFAs goal is to provide sugarcane farmers with information and representation to better run their farming businesses.

Australian Sugar Milling Council (ASMC)
ASMC represents Australia's raw sugar manufacturers and exporters to create opportunities for a profitable and sustainable industry.

CANEGROWERS
Canegrowers is the peak representative body for Australian sugarcane growers. On behalf of growers, CANEGROWERS negotiate with government on industry issues and provides services and advice tailored to local needs.

Cotton Australia
Cotton Australia is the peak body for Australia's cotton-growing industry. Cotton Australia's main role is to provide information, support and advice to assist growers in cotton production.

Cotton Innovation Network
Cotton Innovation Network coordinates the cotton industry's research, development and extension activities to facilitate a collaborative approach to achieving the industry's long-term goals.

Pulse Australia
Pulse Australia is the peak industry body representing all sectors of the Australian pulse industry, from growers and agronomists through to researchers, merchants, traders and exporters.

APPENDIX 4: COMMUNITY STAKEHOLDER FEEDBACK

An online stakeholder feedback workshop was held on 9 June 2021 to present the findings of this report and gain additional insight into key factors contributing to farm safety. A variety of representatives from the agricultural and safety communities attended, including (amongst others): Agriculture Victoria, WorkSafe Victoria, Kidsafe Victoria, Fruit Growers Victoria, Livestock and Rural Transporters Association of Victoria, Wodonga TAFE, and the Country Women's Association.

Participants were divided into small groups, and provided feedback on the following questions:

- Based on research and the experience of current and previous programs, how can we best influence the culture of safety on Victoria's farms?
- How can we effectively tailor Victorian government programs intending to influence this culture?
- Do you have any further ideas to add to each of the key areas of influence identified in the presentation (social, education, external, industry/workplace)?

The feedback received addressed the following points:

- **Ensure that safety initiatives are as effective as possible:**
    - Target hazards that are higher on the Hierarchy of Hazard Control, as this will entirely remove or significantly reduce some (e.g. installing livestock ramps).
    - Implement initiatives that draw on scientifically robust findings which result in demonstrable improvements in safety culture. This reduces the risk to industry and individual farmers when making significant financial investments. This strategy can be applied when considering the duplication of initiatives such as AgCard.
    - Investigate existing farms to learn which safety initiatives are most likely to be adopted.
    - Government must follow up initiatives that are implemented, and continue its engagement with community, if safety programs are to have a lasting effect.

- **Innovation and technology**: investment in innovation and technology can help improve safety (e.g. new cattle yards, or developing bike helmets to detect hazards).

- **Reducing financial burden on farmers whilst improving safety**: Several suggestions for how this may be done were made:
    - Providing incentives or subsidies help cover the costs of new, safer equipment (e.g. Farm Safety Rebate Scheme—this program was received very well by farmers).
    - Providing free on-farm advice/consultations to farmers to improve the financial efficiency of their businesses (incorporating safety as part, but not all, of what is discussed—e.g. via

discussions of farm compensation). Advice sessions should be reoccurring (i.e. not just a once-off, but followed up with). This type of scheme should target smaller enterprises.

- **Formal education**: Formal education is a good way of targeting younger farmers (perhaps this is responsible for the attention younger farmers typically give to safety these days). It may not be as effective at reaching older farmers, as they have already developed preferred farming practices (in this instance, formal education serves as another avenue to reinforce broader safety messages). Educational institutions can improve the effectiveness of safety training by:
    - Incorporating safety into all aspects of the TAFE curriculum (not just as a stand-alone unit).
    - Safety education needs to be part of all agricultural courses (i.e. universities as well), as recent graduates of some institutions (particularly academic-focused tertiary institutions) have had very little safety knowledge.
    - Increased discussion between education providers and farmers will help us understand what safety training today's young farmers are actually receiving (and what the educational gaps are).
    - Non-agricultural disciplines can also benefit from increased knowledge of farm safety (e.g. nursing). Training should be given to rural nurses to help them understand farming practices and causes of farming incidents.

- Safety messaging and safety promotion (including social media):
    a. ***How can safety messaging have a long-lasting impact?*** The impact of safety campaigns tends to be short-lived. A comment was also made that safety messages tend to stay within a localised area (and do not have a wider reach). The suggestion was made to make use of existing groups within the farming community to help push the message further and help it last longer (e.g. parenting groups), as well as to share safety messaging with other regions.
    b. ***What safety messages are the most effective?*** The consensus is that real stories have the strongest impact. A comment was made that legal requirements need to be met when using personal stories. There was some discussion that there is a lack of messaging targeting women—and although the primary demographic for poor safety behaviours are men (35–55 years old), women contribute significantly to farm-work, and may be primary farmer (and possibly working alone).
    c. ***What considerations should be given to social media?*** Two main themes emerged relating to social media:
        1. *Connection with farmers is more likely through traditional media*. Farmers tend to engage with printed materials rather than social media. The comment was made that throughout COVID, farmers were buying farm machinery online, and that hard-copies

of safety manuals, etc., need to be provided when this occurs. In different group, WhatsApp was mentioned as an appropriate platform for reaching farmers.

2. *Improving current safety messaging in social media.* Images and footage shared in the media should display safe farm practices. This can be encouraged by:
    - Creating a database of images for organisations/individuals to use in the media (similar to the Agriculture Victoria photo database)
    - Ensuring social media safety champions understand the safety guidelines and continue to post appropriate safety photos outside of their official 'champion' roles
    - Provide social media guidelines/safety code of conduct to the media when participating in interviews (*The Weekly Times* supports this). These guidelines can then be supported by organisations within the farming community (e.g. CWA).
    - Organisations promoting safety (e.g. NCFH) can help drive change through engagement with the media (e.g. letters to the editor, writing to popular television programs—*Farmer Wants a Wife, Big Brother*) and alerting organisations to appropriate representations of safety (e.g. through writing to organisations which have been observed to present safety poorly).

- **Influence of peers, families, and community on safety**: Changing attitudes within the farming community (i.e. through peers and families) was seen as key to improving safety practices, as farmers seek advice from their peers first of all. Several ideas were raised:
    a. The farming identity can be problematic to safety change (e.g. 'stoic farmer'; gender roles—male hierarchy, female reluctance to interfere). It is passed on through the generations, and maintained through intergenerational farming families.
    b. As part of these gender roles, women are assumed to be the 'safety police', and unfairly shoulder the burden (and guilt) for enforcing safety. Several organisations are working to change this perception (e.g. WorkSafe Victoria, CWA).
    c. Highlighting the importance of safety on the continuation of the family may help reinforce why adopting safety practices are important.
    d. Children are one way to help change community attitudes (e.g. influencing parents). The Farm Safety Creative Competition (Kidsafe Victoria) currently targets children.
    e. Farm managers and the heads of farming families should be targeted to help drive change, as workers are often not in a position to be able to make change.
    f. Peer-sharing initiatives that focus on farmers encouraging other farmers to make small, incremental changes are likely to be successful (e.g. Irish example). This will also help overcome the 'all-or-nothing' thinking that some established farming families have to farm safety (i.e. if I can't implement *all* of the required safety measures, I won't bother with any of them at all).

g. Safety programs may be better received by the farming community if they are delivered by industry or employer groups (e.g. Dairy Australia), as they are perceived as more approachable than government. Industry groups should receive more support.

- **Understanding and measuring safety:** The comment was made that workplace surveys (to measure safety culture) may be ineffective in helping understand the existing safety culture, and that a different approach is needed. A survey at a large farming organisation (with approximately 220 employees) yielded little valuable information.

- **Impact of COVID-19 on safety:** New approaches to safety are required in the event of disruptions such as COVID-19. For example, learning how to best engage farmers in the digital space is key. New risks to safety also emerged—for example, children studying at home posed challenges to child supervision whilst completing farm tasks.