

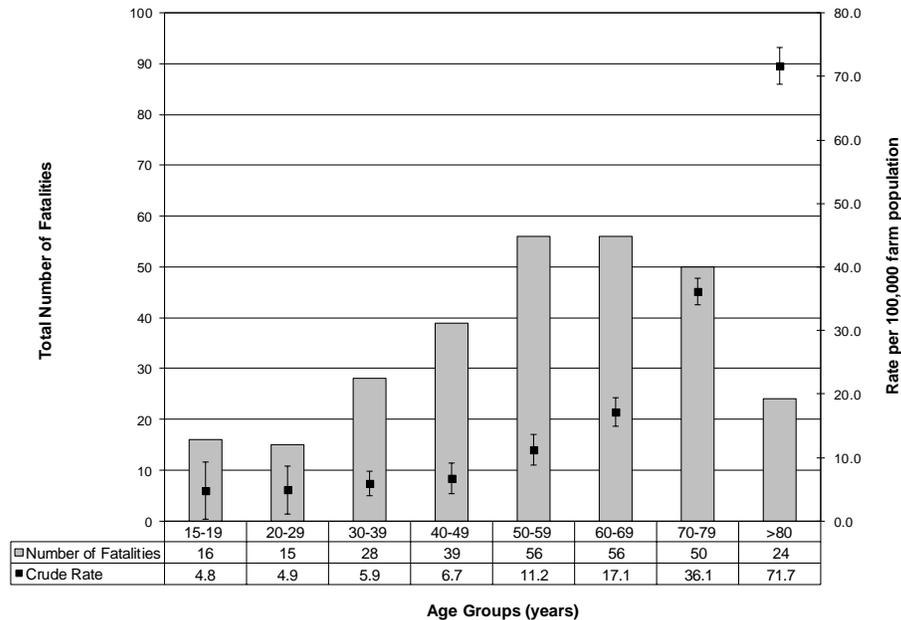
Agricultural Injuries in Adults

Introduction

This edition of the Alberta Centre for Injury Control & Research's (ACICR) *Injury Examiner* addresses agricultural injury prevention in adults (≥ 18 years of age), providing injury prevention stakeholders with injury data in Alberta, a list of factors that increase the risk of injury followed by evaluations of prevention interventions. The material presented comes primarily from Rautianinen et al.'s¹ systematic review of agricultural injury prevention measures and from larger research projects published in peer reviewed journals.

Alberta Data

Between 1990 and 2009, there were 272 deaths in adults which works out to be an average of 14 deaths per year.² Adults include foreign and seasonal workers.



The highest numbers for farm deaths were in the age groups 50-59 (n = 56) and 60-69 (n = 56). The corresponding rates in those age groups were 11.2 and 17.1 deaths per 100,000 farm population. The highest death rate was in the age group, ≥ 80 years old (71.7 deaths per 100,000 farm population). The total number of deaths in the age group 80 years and older was 24.²

The top mechanisms of deaths are:

- Rollovers 18 per cent (50/272)
- Pinning/struck by machine or machine components 16 per cent (44/272)
- Entanglements 8 per cent (21/262)²

Between 1996 and 2009 there were 378 cases of severe trauma (having an injury severity score ≥ 12 ; major injury in multiple regions of the body) in adults.

The top mechanisms of severe trauma were:

- Animals 42 per cent (159/378)
(64 per cent fall from horse; 36 per cent struck by animal)
- Off-highway vehicles - ATVs, snowmobiles, dirt bikes 15 per cent (57/378)
- Fall from heights 7 per cent (27/378)²

Between April 1, 1990 to March 31, 2002, there were 4,636 hospital admissions of adults.

The top mechanisms of hospital admissions were:

- Animals 30 per cent (1,371/4,636)
- Entanglements 11 per cent (501/4,636)
- Fall from heights 7 per cent (341/4,636)²

Risk Factors of Agricultural Injuries

The following section includes summaries of studies on risk factors for agricultural injuries.

Illnesses and medications put older farmers at an increased risk for agricultural injury.

“Health, medication use and agricultural injury: a review”
A 2009 research review by Voaklander et al.³

Risk Factor	Why?
Prior injury	Resuming work before fully recovering Continuing unsafe practices Continuing work with older equipment
Hearing loss	Being less aware of auditory warning signals and verbal warnings from others on the work site
Sleep deprivation (2 studies)	Decreasing alertness and/or ability to respond to hazards
Arthritis and pain	Affecting mobility which can impair responses to lively hazards like machinery or large animals
Medications	Impairing sensorimotor responses Providing indication of disease or poor general health
Depression	Possible explanations why: Decreasing attention Decreasing ability to react in time due to other thoughts Decreasing ability to deal with a demanding work environment Contributing to fatigue and/or other factors

Economic worry contributed to agricultural injury.

“Economic worry and the presence of safety hazards on farms”
2013 study of 2,390 Saskatchewan farmers by Hagel et al.⁴

Economic worry was associated with:
Absence of safety shields on combines and augers
Poorly maintained buildings⁴

The following safety measures were less common on all farms in the study:
Rollover protection structures (ROPS)
Ladder safety cages on grain bins
Barriers around water hazards⁴

Why is economic worry associated with the presence of safety hazards on farms?
Lower financial ability to purchase equipment with modern safety features
Farmers working longer in fatigued state
De-emphasize safety to maximize productivity⁴

High stress (often caused by economic stressors), stress symptoms and poor safety behaviour contributed to a high risk for agricultural injury.

“Psychosocial factors and safety behaviour as predictors of accidental work injuries in farming”
2006 study of 310 Danish farmers by Glasscock et al.⁵

When stress levels are high, attention and concentration are reduced, making the risks produced by poor safety habits more difficult to avoid. If farmers performed regular safety checks and considered safety when buying machinery, their risk of injury caused by stress might be mitigated.⁵

Lower rates of injury were NOT found in farmers who recognize that injury prevention is in their control and have type-A (high achieving) behaviour and safety attitudes.⁵

Risk Factors of Agricultural Injuries *continued*

Risk perceptions, locus of control and chronic stress influenced farmers' intentions to behave safely.

"Perceptions of risk, stressors and locus of control influence intentions to practice safety behaviors in agriculture"
2008 analysis of 16 research projects by Elkind⁶

Farmers with higher scores on safety knowledge are injured at the same rate as those with lower scores.⁶

Risk perception, locus of control and chronic stress are part of a complex combination of factors influencing the practice of safe behaviours.⁶

Risk taking behaviours have been reported to happen because of tight time lines, economic worries, weather changes and long working hours.⁶

Many individuals on farms often have an external locus of control where they believe that being injury-free is more a matter of luck rather than a vested interest in safety applied to personal practice. Furthermore, wives, children and hired workers tend to put their safety in the hands of others who are seen to be in control of operations.⁶

The author suggests implementing more workshops and informational meetings that present strategies to address common stresses like finances, tight time lines, weather and long working hours. Furthermore, programmers must emphasize and repeat the message that injury is expensive and that it affects family life.⁶

What does research on risk factors tell us?

Risk taking has many influences including individual health status and medication use, the culture of safety in one's community, economics and weather.

Knowledge alone does not reduce risk taking behaviours.

All farm occupants (e.g. wives, youth and workers) rely more on the key farm operator than themselves for safety.

Educational interventions alone were NOT effective for long term change.

"Interventions for preventing injuries in the agricultural industry"
A 2008 Cochrane Systematic Review by Rautianenen et al.¹

Educational interventions were shown to have insignificant to no impact on the incidence of injury, even though evaluated initiatives reflected an array of methods including training by occupational health and safety professionals or peers as well as safety information packages.¹

Some studies reported temporary changes in knowledge, attitudes and behaviours. None showed sustained decrease in injury or illness.¹

Educational interventions combined with other behavioural incentives like financial benefits (e.g. reduced insurance rates) or regulatory requirements are more likely to bring about change in behaviour.¹

If providing education on safety knowledge and attitudes, it must be reinforced with facts that tasks can be done safely without affecting one's fiscal well-being or family lifestyle. Also, empowering wives, children and workers may result in better safety decision making and behaviours.⁶

Financial incentives had short-term impacts.

"Interventions for preventing injuries in the agricultural industry"
A 2008 Cochrane Systematic Review by Rautianenen et al.¹

Financial incentives had an immediate injury-reducing effect but after the intervention, there was no further decrease.¹

The use of financial incentives could be effective but should be studied further before recommending an extensive incentive program.¹

Evaluated Interventions *continued*

Legislation reduced some types of agricultural injury.

“Interventions for preventing injuries in the agricultural industry”
A 2008 Cochrane Systematic Review by Rautianenen et al.¹

A successful policy cited is a toxic pesticide banned in Sri Lanka. Poison deaths were significantly reduced in the long term, and it did not lead to other illegal and more dangerous use of pesticides.¹

Legislation in northern European countries requiring roll-over protective structures (ROPS) has proven to increase the percentage of tractors with ROPS and reduce the number of injuries and fatalities. However, some questions remain as to the exact mechanism that brought about these changes.¹

ROPS and seatbelts essentially eliminated rollover fatalities.

There is strong evidence showing that ROPS prevent fatalities.^{1,7} Northern European countries with legislation requiring ROPS on all tractors have nearly eliminated roll-over fatalities.¹ The requirement of crush-proof ROPS cabs may have contributed to the elimination.¹ Seatbelt use is critical to the effectiveness of the ROPS system. In the very few cases where a fatality has occurred while using a tractor with ROPS, the farmer was not wearing a seatbelt and was thrown from the tractor.¹

In a survey of farmers in British Columbia, the most common reasons for not retrofitting a tractor with ROPS were:

- the cost of the ROPS (40 percent),
- cost of installation (16 per cent),
- limited use (11 per cent),
- low clearance in dairy barns and orchards for examples (5 per cent) and
- not important (5 per cent).⁸

In study a of New York state farmers, barriers to retrofitting went well beyond costs as well to include the ‘optimistic bias’, the persistent denial of personal risk to a readily acknowledged risk.⁹ Findings led the authors to recommend that retrofitting safety messages should focus on the risk of injury to significant others like children and wives or on the financial impact of rollovers, and that there should be financial incentives and assistance to make retrofitting less costly and convenient.⁹ As such, a social marketing intervention which included financial incentives, tailored messages (“Of course you’ll never get hurt. What about them?”) and extensive promotion (including a ROPS hotline which made ROPS purchases more convenient) had the greatest influence on message recall, readiness to retrofit tractors and intentions to retrofit tractors.¹⁰ Changes in individuals’ perceptions of community norms had the highest impact on behaviour intentions.¹⁰

What does this research on interventions tell us?

Education ALONE is not effective at reducing agricultural injury; education must be combined with other interventions.

Legislation has been proven effective at reducing some types of agricultural injury in other parts of the world.

ROPS used with seatbelts can virtually eliminate roll-over deaths, the most common cause of agricultural fatalities.

Financial incentives have the potential for sustained reduction in injury.

Injury prevention interventions should stress the financial and family impacts of injury and the minor costs of prevention. Stress and health management should also be addressed in interventions.

Empower and equip all farm occupants including wives, youth and workers to employ safe farming equipment and procedures.

The Situation in Canada and Alberta

No OHS legislation for Alberta farm workers

In Alberta, farming and ranching operations are excluded from the Occupational Health and Safety Act, Regulation and Code as well as its enforcement of safety standards through inspections,

The Situation in Canada and Alberta *continued*

investigations and prosecutions.¹¹ Farming and ranching operations are also exempt from mandatory workers' compensation coverage; however, farm operators may voluntarily apply for workers' compensation to protect themselves and their employees.¹²

Financial incentives in Alberta

Currently, Alberta Agriculture and Rural Development is piloting a program where farmers can earn Workers' Compensation Board (WCB) rebates for disability and liability insurance by implementing the Alberta *FarmSafe Plan*.¹³ The *FarmSafe Plan* was developed to provide Alberta farmers with a step-by-step process to develop their own health and safety plan. A completed *FarmSafe Plan* will provide farmers with the necessary criteria to obtain their Certificate of Recognition (COR) which makes them eligible for financial incentives in the form of insurance rebates through WCB.¹³

1/3 of tractors in Canada DO NOT have ROPS

As a result of voluntary standards, almost all new tractors sold in Canada since 1985 have ROPS or crush proof cabs.¹ This has likely contributed to the steady decline of rollover deaths in Alberta.² However, rollovers were still the leading cause of agriculture-related deaths in adults from 1991 to 2009.² In a 2010 Prairie Agricultural Machinery Institute report, conservative estimates indicate that 1/3 of tractors in Canada do not have ROPS and that there could be 230,000 to 460,000 tractors in Canada without ROPS.⁸ These are usually old tractors that remain on farms over time because they are durable and easily fixable.⁸ These are also newer tractors without ROPS which were built for other countries and then imported (against the manufacturers' wishes) to Canada as used tractors.⁸

Australian Sustainable Farm Families program in Alberta

Sustainable Farm Families (SFF) is a comprehensive health education program that was developed in Australia. Physical and mental health as well as farm safety are included in the curriculum. The program consisted of a structured two-day adult learning workshop in year one and a one-day workshop in years two and three. Participants also received a physical assessment to identify personal health risk factors and to measure health improvements. Brumby et al. indicated that the key to the success of the SFF program was the multisectoral involvement where all partners (including industry) had key roles in the development, recruitment, analysis and delivery of the program. Evaluation results from one group of Australian farmers showed statistically significant improvements in knowledge and physical and mental health-related measures. Furthermore, when they were asked if the SFF program prompted them to think differently about managing the work on the farm, 30 per cent of participants reported specific action to improve health, 24 per cent reported greater attention to improving farm safety practices and 15 per cent stated they wanted to spend more time with their family.¹⁴ SFF will be piloted in southern Alberta by the Farm Safety Centre in early 2015.

Conclusion

Preventing agriculture-related injury in adult populations is complex because there are a variety of factors that contribute to the risk of getting injured. Reducing agriculture-related injury and death in adults requires a comprehensive approach incorporating various strategies and using multiple levels of influence. This means working in partnerships with community and health organizations, governments, industry and other influencers.

References

1. Rautianinen RH, Lhettola MM, Day LM, Schonstein E, Suutarinen J, Salminen S, Verbeek J. interventions for preventing injuries in the agricultural industry. Cochrane Database of Systematic Reviews. 2008; Issue 1 Art No.: CD006398.
2. Alberta Centre for Injury Control & Research (ACICR). Agricultural-Related Injuries in Alberta. Edmonton, Alberta: ACICR; no date
3. Voaklander DC, Umbarger-Mackey ML, Wilson ML. Health, medication use and agricultural injury: a review. American Journal of Industrial Medicine. 2009;52:876-889.

References *continued*

4. Hagel L, Pahwa P, Dosman JA, Pickett W. Economic worry and the presence of safety hazards on farms. *Accident Analysis and Prevention*. 2013;53:156-160.
5. Glasscock DJ, Rasmussen K, Carstensen O, Hansen ON. Psychosocial factors and safety behaviour as predictors of accidental work injuries in farming. *Work & Stress*. 2006;20:173-189.
6. Elkind PD. Perceptions of risk, stressors, and locus of control influence intentions to practice safety behaviors in agriculture. *Journal of Agromedicine*. 2008;12(4):7-25
7. Reynolds SJ, Groves W. Effectiveness of roll-over protective structures in reducing farm tractor fatalities. *American Journal of Preventive Medicine*. 2000;18(4S):63-69.
8. Prairie Agricultural Machinery Institute. 50 ROPS in BC a pilot project. August 5, 2010 http://www.pami.ca/pdfs/safety/A3107_Final.pdf
9. Sorensen JA, May JJ, Paap K, Purschwitz MA, Emmelin M. Encouraging farmers to retrofit tractors: A qualitative analysis of risk perceptions among a group of high-risk farmers in New York. *Journal of Agricultural Safety and Health*. 2008;14(1):105-117.
10. Sorensen JA, Jenkins PL, Emmelin M, Stenlund H, Weinehall L, Earle-Richardson GB, May JJ. The social marketing of safety behaviors: A quasi-randomized controlled trial of tractor retrofitting incentives. *American Journal of Public Health*. 2011;101(4):678-684.
11. Occupational Health and Safety Act Farming and Ranching Exemption Regulation 27/1995 (Province of Alberta)
12. Workers' Compensation Board Alberta. Compensation. 2009 (cited 2014 May 2). Available from: <http://www.wcb.ab.ca/employers/coverage.asp>
13. Alberta Agriculture and Rural Development. Alberta FarmSafe Plan. 2013 (cited 2014 May 2). Available from: [http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/aet14540](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/aet14540)
14. Brumby SA, Willder SJ, Martin J. The Sustainable Farm Families project: changing attitudes to health. *Rural and Remote Health*. 2009; 9: 1012.