Agricultural-Related Injuries in Alberta

An injury-free Alberta in which to live, work and play.

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Alberta Centre for INJURY Control & Research

UNIVERSITY OF ALBERTA
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Researched and compiled for CAIR by the Alberta Centre for Injury Control & Research, University of Alberta, 4075 RTF, 8308-114 Street, Edmonton Alberta. T6G 2E1.

www.cair-sbac.ca

Canadian Agricultural Injury Reporting (CAIR) is supported financially by the Canadian Agricultural Safety Association, which receives funding from Growing Forward – a federal-provincial-territorial initiative.

Photo on front cover (Shutterstock Images):

Grain elevator near Dorothy, Alberta. Southwest of Drumheller, Alberta.

In 1900, when a new branch line was being built from Calgary to Edmonton, Bawlf and several associates formed a small company, which they called the Alberta Grain Company Limited. By 1911, the line consisted of 40 elevators. This company merged with the Alberta Pacific Elevator Company Limited in 1911 to form the Alberta Pacific Grain Company Limited.

Acknowledgements

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- Patti Stark, Community Mobilization Coordinator

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Executive Summary

Injury has been identified as a major public health problem in Canada and a significant threat to the economy, health care system and overall quality of life. In other industries, victims of occupational injuries are usually workers aged 18 to 65. Agriculture is unique in that children and the elderly sustain significant numbers of severe work-related injuries. This is partly because farms and ranches are not just work sites, but also places where people of all ages live, play and participate in recreational activities. Also, unlike other industries, it is common for farmers and ranchers to work full time and to operate tractors and other heavy machinery well into their 70s and 80s.

Although the greatest cost of an agriculture-related injury is human suffering and loss to individuals and families, the financial costs are far from trivial. In 2004, agriculture-related injuries in Canada cost $465 million dollars.

There are three categories of injury by intent:

unintentional injuries which are very responsive to injury prevention programming, such as: motor vehicle collisions, falls, poisoning, drowning and suffocation from grain,
intentional injuries including acts of suicide (self-harm), violence
undetermined injuries; those in which intent could not be determined.

This report focuses on unintentional injuries. Unintentional injuries accounted for the majority of costs; 80% of all agriculture-related injury costs ($374 million).[1]

Agricultural-Related Injuries in Alberta for 1990-2009 includes an analysis of the Canadian Agricultural Injury Reporting (CAIR) fatal agricultural injury data in Alberta for the twenty calendar years from 1990 to 2009. It also examines agricultural major trauma hospital admissions. The purpose of this report is to describe the magnitude of the agricultural fatality problem in Alberta and to determine age-related patterns of injury. A main objective of CAIR is to identify agricultural injury patterns in order to facilitate the design and targeting of specific prevention initiatives. Also, by collecting agricultural injury data on an ongoing basis, CAIR is able to monitor the effectiveness of prevention programs and to identify patterns of injury arising from new equipment and changes in farming practices.

CAIR data show that agriculture injuries, are not due to random or isolated “accidents”. There are many recurrent patterns of injury. From 1990-2009, in Alberta:

- 355 Albertans were killed in agricultural injury events.
- The agricultural fatality rate was 10.0 per 100,000 farm population (including non-workers).
- 68% of the agricultural fatalities involved machines.
- The 3 leading machine-related causes were responsible for almost half the fatalities (42%) : machine rollovers, machine runovers, and pinned/struck by a machine.
- The top five causes of agricultural fatalities were machine runovers (16%), machine rollovers (16%), pinned or struck by a machine (13%) animal-related (9%) and machine entanglements (8%).
- 87% of the fatalities were work-related.
- 89% of those fatally injured as a result of agricultural work were male.
- 47% of the fatalities were farm owner/operators.
- 42% of all machine-related fatalities involved a tractor.
- For every agriculture injury death, there were 25 hospital admissions, and of the 25 hospital admissions there were 11 major trauma injury admissions. Agriculture injury major trauma admissions accounted for 11% of all agriculture injury related admissions.
- From 1996 to 2009 there were 678 patients who were seriously injured (ISS ≥ 12) and treated at an Alberta Health Services trauma centre due to an agricultural-related injury.
- 78% of the major trauma admissions were males.
- 21% of the leading cause of agricultural-related major trauma admissions were as a result of a motor vehicle non-traffic collision.

About the Alberta Centre for Injury Control & Research

The Alberta Centre for Injury Control & Research (ACICR) is committed to advancing injury control in Alberta by promoting stakeholder collaboration, capacity building and evidence-based practice in the field of injury control and research.

ACICR believes in a population health perspective, where strategies will enhance the health and well-being of the overall population. ACICR provides leadership, initiative, influence, coordination and support for injury-related policies, education, information services, and research across the province in order that stakeholders can fulfill their mandates of injury control.

ACICR is a provincial centre within the School of Public Health at the University of Alberta and receives its core funding from Alberta Health and Wellness.

Agriculture Deaths and Injuries in Alberta

The development of this report is based on the fundamental principle that injury prevention requires knowledge of the frequency and nature of the injury incidents. By disseminating injury data, our objective is to support local stakeholders in the development of coordinated, evidence-based programs and strategies to reduce and prevent injuries.

Surveillance is the monitoring of behaviour, activities or other changing information, usually of people for the purposes of influencing, managing, directing or protecting.[1]

Injury surveillance allows for trending of agriculture injuries over a long period of time rather than "up to the minute" reporting of incidents. Trending identifies leading causes of injuries. Reflecting leading causes of injuries in prevention programming will increase the likelihood of reducing injuries overall.

Objective

The main objective of this report is to provide an overview of agricultural injury-related deaths and major trauma admissions of Albertans and where possible, provide comparisons with the Canadian agricultural injury-related deaths.

[1] Lyon, David. 2007. Surveillance Studies: An Overview. Cambridge: Polity Press.

Canadian Agricultural Injury Reporting (CAIR) - formerly the Canadian Agricultural Injury Surveillance Program (CAISP)

CAIR is an integrated national surveillance project of the Canadian Agricultural Safety Association that guides and informs the national agricultural health and safety agenda.

The Canadian Agricultural Injury Surveillance Program (CAISP) was established in 1995 in response to the need for better information about fatal and non-fatal agricultural injuries. CAISP was a national program with partners in each of the ten provinces in Canada, funded by the Canadian Agriculture Safety Association (CASA). Initially funded as a pilot project in 1995, it became a national CASA program in September 1996. In 2009, CAISP was renamed to the Canadian Agriculture Injury Reporting (CAIR) and coordination of the national activities was relocated from Queen's University in Kingston, Ontario to the Alberta Centre for Injury Control & Research in Edmonton, Alberta.

When compared with other Canadian industrial sectors, agriculture is a dangerous occupation. Agriculture ranks as the fourth most hazardous industry in Canada with respect to rates of fatal injury.[2] In terms of absolute numbers of fatalities, there is no more dangerous occupation. Economic costs associated with agricultural injuries are also substantial. In 2004, agriculture-related injuries in Canada cost $465 million dollars. Eighty per cent of these injuries were unintentional and cost $374 million.[3]

Until the establishment of CAIR, Canadian data on agricultural injuries were limited. This surveillance program has filled an important void in providing national evidence of agricultural injury occurrence that can be used in developing and targeting effective injury prevention strategies. CAIR data has been used by various groups internationally, including Australia, Brazil, Hong Kong, India, Ireland, Netherlands, New Zealand, the United Kingdom and the United States. CAIR has been referenced in a variety of inventories and compendiums including guides to occupational and environmental health and safety, casebooks and inventories published by the Public Health Agency of Canada. In terms of policy, CAIR has been used as a reference source for agricultural injury at international, national, provincial, and regional levels. Information gathered indicates that the program's data has contributed to informing, influencing and enacting policy development at both federal and provincial levels. Evidence of strategic planning influences at provincial and organizational levels is also apparent and contributions can be linked to: child safety guidelines[4], child labour laws[5], occupational health and safety guidelines [6] engineering standards[7] and injury reduction and health promotion strategies. At an international level, the Government of Canada has cited CAIR reports in its 2003 submission to the United Nations, on the Convention on the Rights of the Child and identified CAIR as playing an important role in influencing children's rights in Canada.[8] CAIR has also been identified as a tool for awareness raising, skill building and knowledge development through conference presentations, teleconferences, lectures, course materials, social marketing campaigns, and resource materials. From a research perspective, 132 articles in 56 journals reaching a very wide range of disciplines were related to CAIR.

[2] Pickett W, Hartling L, Brison RJ, Guernsey J (1999). *Fatal farm injuries in Canada*. *Can. Med Assoc. J.* 160:1843-1848.

[3] SMARTRISK, (2010). The Economic Burden of Injury within the Agricultural Population in Canada. SMARTRISK: Toronto, ON (unpublished).

[4] National Children's Centre for Rural and Agricultural Health and Safety, Marshfield Clinic Research Foundation, 2006. Available at: http://www.marshfieldclinic.org/nccrahs/?page=nccrahs_aboutus_center_highlights.

[5] Irwin, John, Stephen McBride and Tanya Strubin. 2005. "Child and Youth Employment Standards: The Experience of Young Workers Under British Columbia's New Policy Regime." Canadian Centre for Policy Alternatives, September 2005. 40 pp.

[6] Ontario Ministry of Labour, 2006; Workers Compensation Board of Prince Edward Island, 2006.

[7] Canadian Standards Association. Available at: http://www.csa.com/

[8] Government of Canada, 2003. Available at:http://www.canadiancrc.com/UN_CRC/UN_Committee_Rights_Child_Canada_2nd_Report- Overview_SEP_2003_34th_Session.aspx

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Challenges of Injury Control in Agriculture

The agriculture environment is unique in that it often combines living and working spaces. Families often live in very close proximity to work spaces where animals are kept and large machinery is operated. This presents hazards not only to those who are working, but others, particularly small children, who may be observing or playing in close proximity to these hazards . Another unique aspect of family owned and operated agricultural operations is that many involve children in the work. Because of the diversity of the environment and those that work in it there are a variety of injury patterns that are unique to the agricultural population.

In other industries, victims of occupational injuries are usually workers aged 18 to 65. Agriculture is unique in that children and the elderly sustain significant numbers of severe work-related injuries. This is partly because farms and ranches are not just work sites, but also places where people of all ages live, play and participate in recreational activities. Also, unlike other industries, it is common for farmers and ranchers to work full-time and to operate tractors and other heavy machinery well into their 70s and 80s.

The prevention of injuries in agricultural work settings is challenging because of the unique nature of the agricultural work environment. Also, in most jurisdictions, agriculture is not a heavily regulated industry in terms of occupational health and safety standards. Unlike other industrial workplaces, many Canadian agricultural workplaces have not benefited from modern industrial hygiene and safety practices. The composition of the agricultural workforce, farming practices and safety practices is geographically diverse. This diversity adds to the difficulty of establishment and enforcement of safety standards. There has traditionally been reliance on voluntary rather than regulatory safety standards, but the effectiveness of voluntary safety standards has not been well evaluated.

Data Sources, Disease Categories and Methods

- Death data was identified through the Office of the Medical Examiner, Alberta.
- The total farm population used in calculations presented in this report differs from previous reports, therefore, a comparison can not be made. Farm population data were obtained from Statistics Canada Census of Agriculture for 1996, 2001 and 2006 and were extrapolated, and do not include children less than one year of age (see appendix D).
- Definitions, data abstraction forms, decision rules and general terms are in the appendices are at the back of the report.
- Trauma data was obtained from the Alberta Trauma Registry and consists of information on patients hospitalized with major trauma related to agriculture from January 1, 1996 – December 31, 2009 in the province of Alberta.
- A major trauma case is included in this report if and only if it fulfills the following criteria:
  - Has an Injury Severity Score (ISS) [3] of greater than or equal to 12. See appendix D.
  - Has an International Classification of Disease External Cause of Injury Code (E- Code) that meets the definition of trauma. The E-code system allows the classification and analysis of environmental events, circumstances, and conditions as the cause of injury. Trauma is defined as an injury resulting in the transfer of energy, e.g. kinetic, thermal. This data set would not include those who died as a result of inhalation of toxic gases/fumes.
- As of April 1, 1995, the Alberta Trauma Registry has entered and analyzed information on severely injured patients seen at a trauma centre. It is essential, however, to consider that this data set represents only a portion of the injured people treated in the province of Alberta. This data set does not include the following: people admitted to a trauma centre with an Injury Severity Score (ISS)<12, people who die at the scene of injury, people with injuries treated anywhere other than a trauma centre.

Key Definitions

Agricultural Fatalities: CAIR defines an agricultural fatality as 1) Any unintentional injury resulting in death that occurs during activities related to the operation of a farm or ranch in Canada and/or 2) Any unintentional injury resulting in death that involves any hazard of a farm or ranch environment in Canada (excluding fatal non-work-related injuries that take place in the farm residence). This includes deaths that occur away from agricultural work locations if agricultural work is being done; e.g., transporting workers, livestock, supplies or harvested crops on public highways; farm animals roaming on public highways. Deaths where victims are killed because a third party is engaged in agricultural work are also included.

Population of Fatalities: All persons who live, work on, or visit a Canadian farm or ranch (as defined below), as well as all persons who are fatally injured in other locations (such as public highways) as a result of agricultural activity and all temporary foreign workers under the seasonal agriculture workers program from Citizenship & Immigration Canada. See appendix D: Agriculture Populations.

Farm: In the Census of Agriculture, Statistics Canada defined a farm as "any farm, ranch or other agricultural holding that produces at least one of the following agricultural products intended for sale: crops, livestock, poultry, animal products, greenhouse or nursery products, mushrooms, sod, honey, or maple syrup products." Canada Census of Agriculture, 1996, Statistics Canada.

Other Inclusion/Exclusion Criteria: *These rules are provided in Appendix A.*

Presentation of Data

The data in this report were presented as:

1. The number of deaths and hospital admissions (frequency).
2. The number of deaths and hospital admissions per 100,000 population (rate). Rates are based on the extrapolated Canadian Farm Population obtained from Statistics Canada, Censuses of Agriculture and are not based on the total Canadian population.

The report will focus on deaths and major trauma, and if they were machine-related or not. The report will also focus on two vulnerable populations within the agriculture community, that of children and seniors.

Due to small numbers and to maintain patient confidentiality some of the cause of injury categories have been combined.

Canadian Agricultural Injury Reporting (CAIR) and Agricultural Injury-Related Deaths and Injuries

Confidence Intervals

Confidence intervals are provided for most rates to aid interpretation. The width of the confidence interval illustrates the degree of variability associated with the rate. Rates are accurate within the upper and lower confidence limits 19 times out of 20 (95% confidence).

Data Analysis

The analysis presented in this report is descriptive and not interpretive to imply cause and effect. It has three main objectives:

1) to illustrate the magnitude of the agricultural fatality problem in Canada,
2) to compare trends in the causes and occurrence of fatal agricultural injuries among genders and age groups and
3) to identify emerging patterns of injuries.

The statistics used include simple counts and frequencies as well as cross-tabulations. To allow for comparison across the provinces and years, age-standardized rates were calculated using the direct method. This method controls for potential sources of bias resulting from variations in age distributions of populations. See Appendix E for calculation explanation and details. Formal hypothesis-testing methods and tests of statistical significance were not employed in comparisons.

Rates of fatal agricultural injuries presented in this report differ from previous reports. The numerators used in calculating these rates are the numbers of agricultural fatalities for particular age categories and mechanisms of injury. These include fatal injuries to farm residents, hired agricultural workers, contractors, persons traveling on public highways and a small number of visitors to farms. Denominators for these rate calculations are taken from the 1996, 2001 and 2006 Canada Census of Agriculture and extrapolated for the years in which the census was not performed. In addition to the Canada Census of Agriculture population, temporary foreign workers under the seasonal agriculture workers program from Citizenship & Immigration Canada were included.

Some caution is warranted in the interpretation of the rates because it is not possible to obtain complete data on the full population at risk, or to determine relative amounts of exposure to agricultural work and associated hazards. Also, the Canada Census of Agriculture includes all farm and ranch residents, some of whom have relatively little exposure to agricultural work hazards, but excludes visitors to farms or ranches and agricultural workers who are not resident on farms or ranches. The accuracy of agriculture census information may vary among provinces, but is the best source of denominator information available at this time.

The change in trending of the age-standardized rates over time is expressed in average annual per cent between time periods. The sum of the average percentage change will give the overall change. The trending was done with the Joinpoint Regression Program.[9,10] To ensure the data in this report are illustrated in an effective and useful manner, data fields with small numbers are often not included in graphs. In these cases, a note is included below the graph.

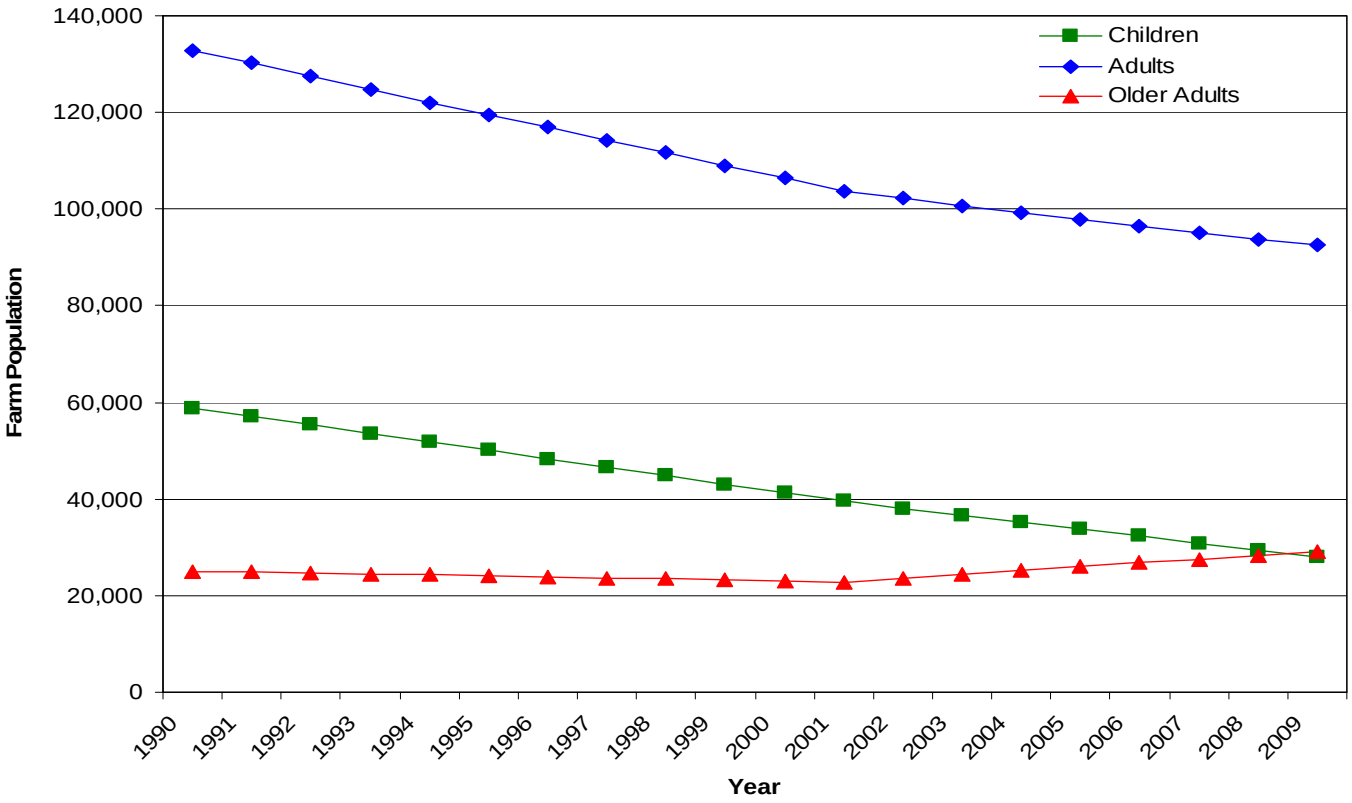
[9] Joinpoint, Version 3.3.1. April 2008; Statistical Research and Applications Branch, National Cancer Institute.

[10] Methods by Kim HJ, Fay MP, Feuer EJ, Midthune DN. Permutation tests for joinpoint regression with applications to cancer rates. Stat Med 2000;19:335-51 (correction: 2001;20:655).

Alberta Farm Population by Age Group

Over the time period from 1990-2009 there has been an overall decline of 31 per cent in the number of people reported living on Alberta farms.

Children and youth (0-14 years) experienced the largest decline with 53 per cent. This was followed by adults between 15 and 59 years of age with a decline in farm population of 30 per cent. The older farmer, those 60 years of age and older experienced an increase of 16 per cent. The trends experienced in the Alberta farming population are similar to that of the Canadian experience.



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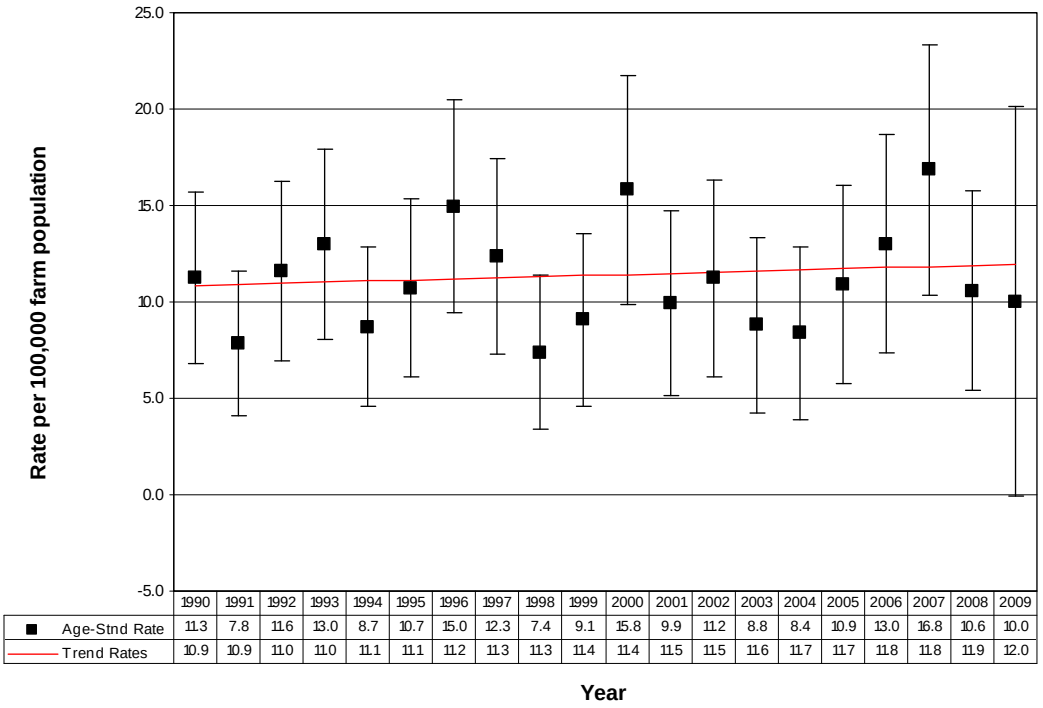
AGRICULTURE FATALITIES IN ALBERTA OVERVIEW

Agricultural Injury Death Rates by Year (age-stand), Alberta, 1990-2009

In Alberta, over the period from 1990 to 2009 there was a slight increase in the agriculture injury death rate with an average of 0.51 per cent each year (trend line rates of 10.9 deaths per 100,000 farm population in 1990 to 12.0 deaths per 100,000 farm population in 2009).

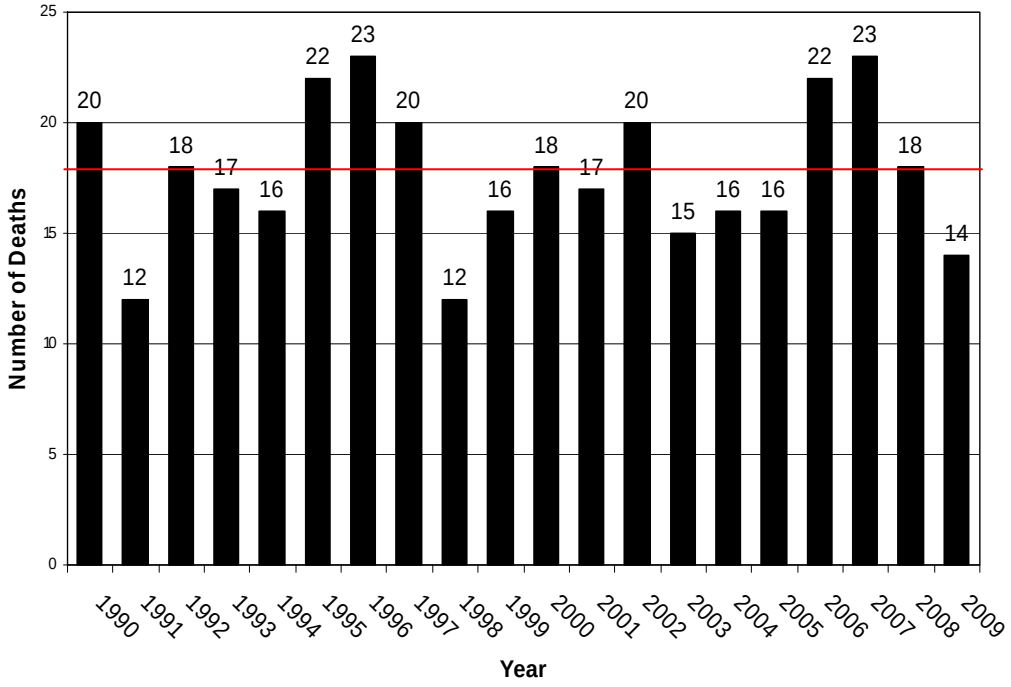
The yearly rates varied throughout the time period with the lowest rate of 7.4 deaths per 100,000 farm population in 1998 and the highest rate of 16.8 deaths per 100,000 farm population in 2007.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Age-Stnd Rate	11.3	7.8	11.6	13.0	8.7	10.7	15.0	12.3	7.4	9.1	15.8	9.9	11.2	8.8	8.4	10.9	13.0	16.8	10.6	10.0
Trend Rates	10.9	10.9	11.0	11.0	11.1	11.1	11.2	11.3	11.3	11.4	11.4	11.5	11.5	11.6	11.7	11.7	11.8	11.8	11.9	12.0

Agricultural Deaths by Calendar Year, Alberta, 1990-2009

Over the 20 year period from 1990 to 2009 a total of 355 agricultural-related deaths in Alberta. This equates to an average of 18 deaths each year.



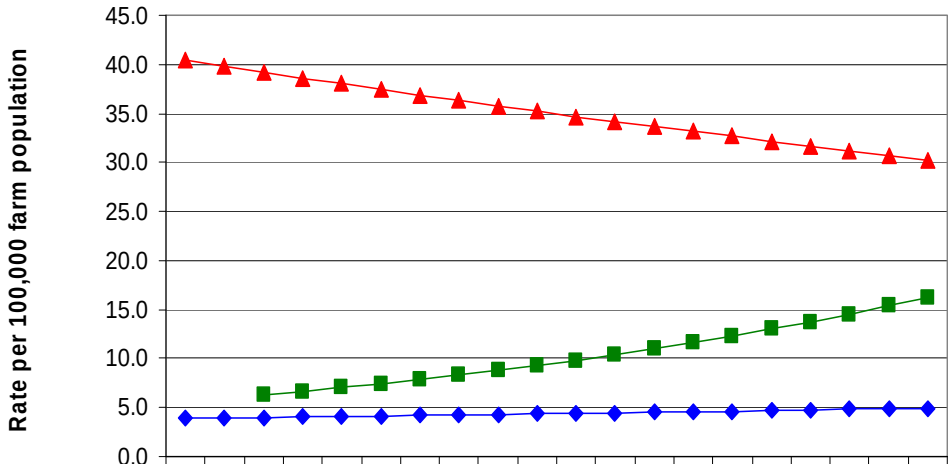
Agricultural Death Rate Comparison by Age Group, Alberta, 1990-2009

When comparing the death rates by age group, children (0-14 years) had the highest rates with an average annual percentage increase of 6 per cent.

Adults (15-59 years) had an average annual percentage increase of 1 per cent.

Older adults (60+ years) had an average annual percentage decrease of 2 per cent.

The significant rate change experienced by children may be due to a consistent number of deaths but a significant decrease in the reported child agriculture population.

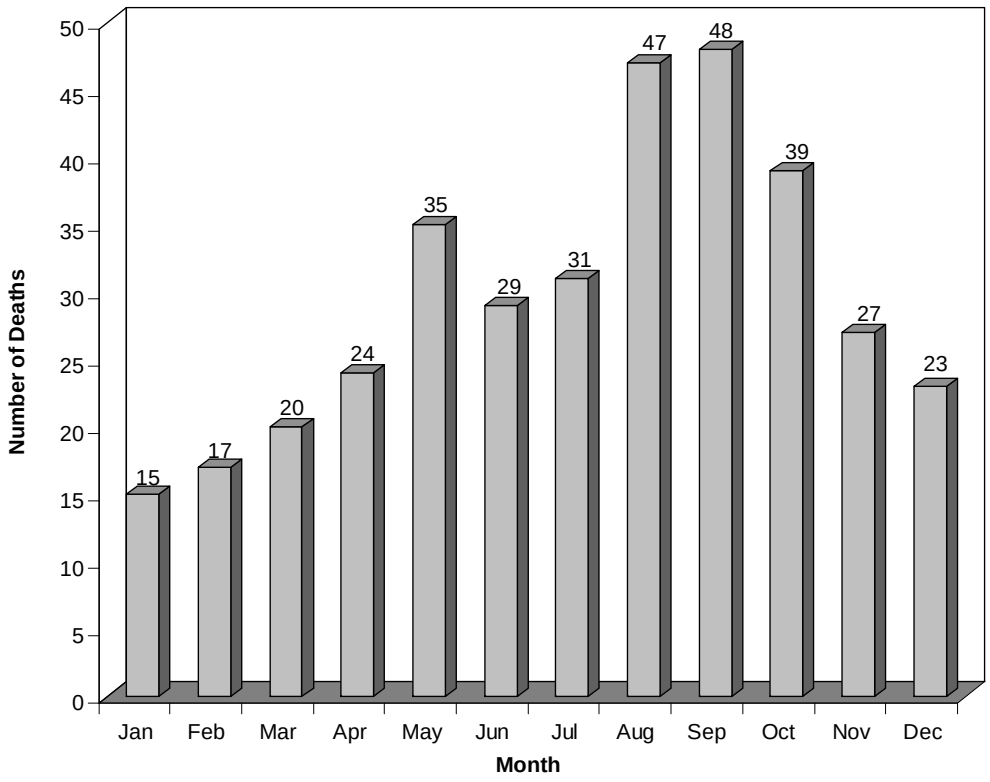


	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Children (0-14 yrs)			6.3	6.7	7.0	7.4	7.9	8.3	8.8	9.3	9.8	10.4	11.0	11.6	12.3	13.0	13.7	14.5	15.4	16.3
Adults (15-59 yrs)	3.9	4.0	4.0	4.1	4.1	4.2	4.2	4.3	4.3	4.4	4.4	4.5	4.5	4.6	4.6	4.7	4.7	4.8	4.9	4.9
Older Adults (60+ yrs)	40.4	39.8	39.2	38.6	38.0	37.4	36.9	36.3	35.8	35.2	34.7	34.2	33.7	33.2	32.7	32.2	31.7	31.2	30.7	30.3

Agricultural Deaths by Month, Alberta, 1990-2009

65 per cent of all agriculture deaths in Alberta occurred from May to October with 229.

The highest proportion of deaths occurred in September with 14 per cent, this was followed by August with 13 per cent and October with 11 per cent.



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Agricultural Deaths by Season, Alberta, 1990-2009

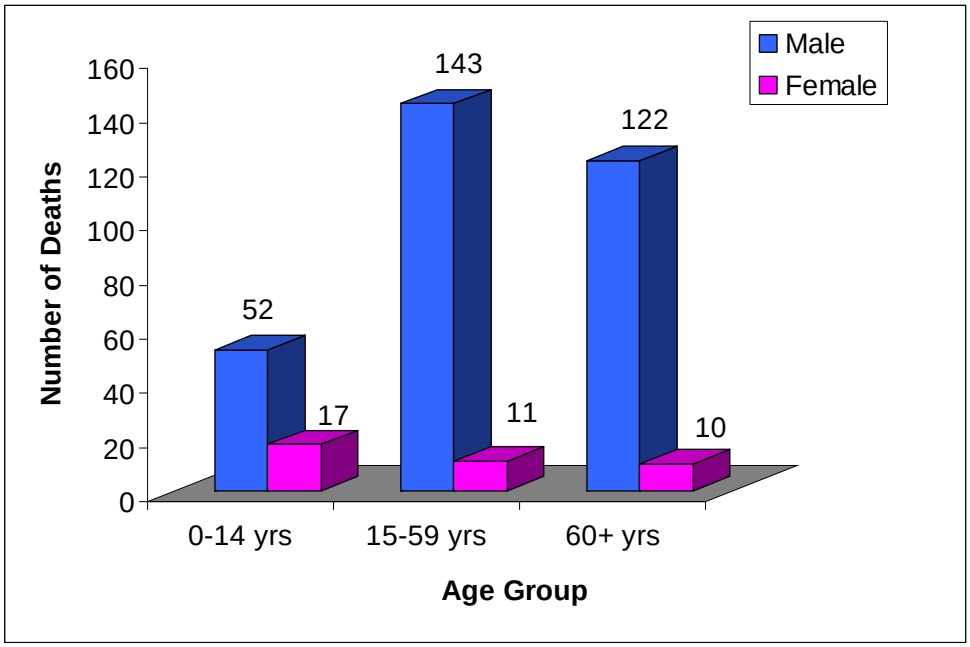
Machine runovers were either the leading cause or second leading cause of death in every season. Runovers accounted for 16 per cent of agriculture-related injury deaths.

Machine rollovers were the leading cause of agriculture-related injury deaths in the summer months (June to August).

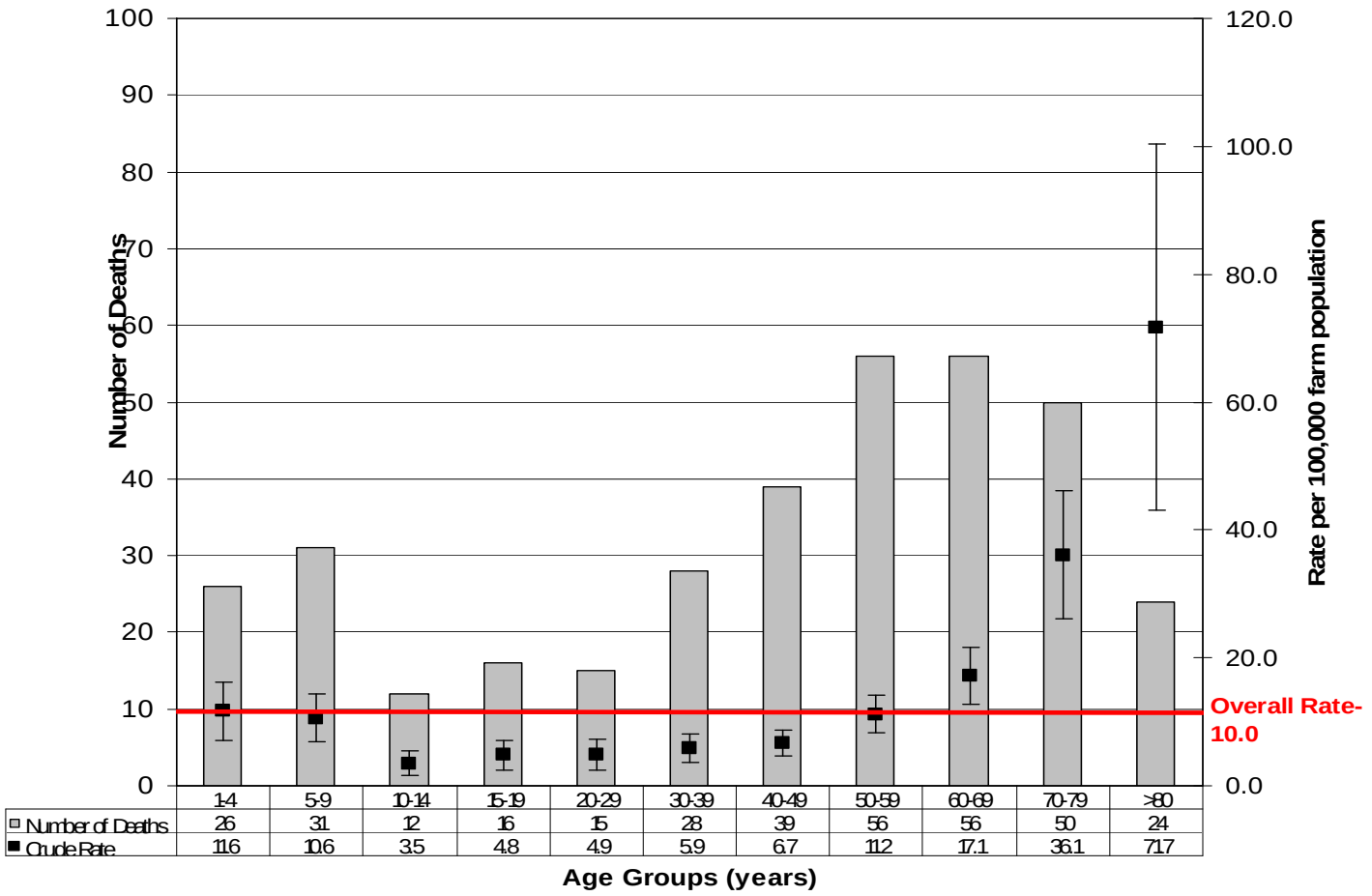
Spring	Summer	Fall	Winter
Mar-May	Jun-Aug	Sep-Nov	Dec-Feb
Machinery runovers (18%)	Machinery rollovers (25%)	Machinery runovers (18%)	Entanglement in moving machinery parts (22%)
Pinned/struck by machine component (16%)	Machinery runovers (13%)	Pinned/struck by machine component (15%)	Machinery runovers (13%)
Machinery rollovers (13%)	Animal-related (14%)	Machinery rollovers (14%)	Drownings (11%)
Animal-related (11%)	Pinned/struck by machine component (9%)	Entanglement in moving machinery parts (8%)	Pinned/struck by machine component (9%)
Entanglement in moving machinery parts (5%)	Entanglement in moving machinery parts (4%)	Drownings (7%)	Machinery rollovers (7%)
Machinery-related traffic collisions (3%)	Drownings (4%)	Animal-related (4%)	Animal-related (5%)
Drownings (3%)	Machinery-related traffic collisions (4%)	Machinery-related traffic collisions (2%)	Machinery-related traffic collisions (4%)
Other Injuries (32%)	Other Injuries (27%)	Other Injuries (32%)	Other Injuries (29%)

Agricultural Deaths by Age Group and Sex, Alberta, 1990-2009

89 per cent of the Albertans who died in agriculture injury events were males. The ratio of males to females was highest for the those 15 to 59 years of age (13:1), followed by those 60 years of age and older with a ratio of 8.3:1 and then those 0-14 years with a ratio of 3.1:1.



Agricultural Death Number and Rates by Age Group, Alberta, 1990-2009



	1-4	5-9	10-14	15-19	20-29	30-39	40-49	50-59	60-69	70-79	>80
Number of Deaths	26	31	12	16	15	28	39	56	56	50	24
Crude Rate	11.6	10.6	3.5	4.8	4.9	5.9	6.7	11.2	17.1	36.1	71.7

In Alberta, from 1990 to 2009 there were 355 deaths as a result of an agricultural injury (includes machine and non-machine-related deaths). This equates to an average of 18 deaths each year.

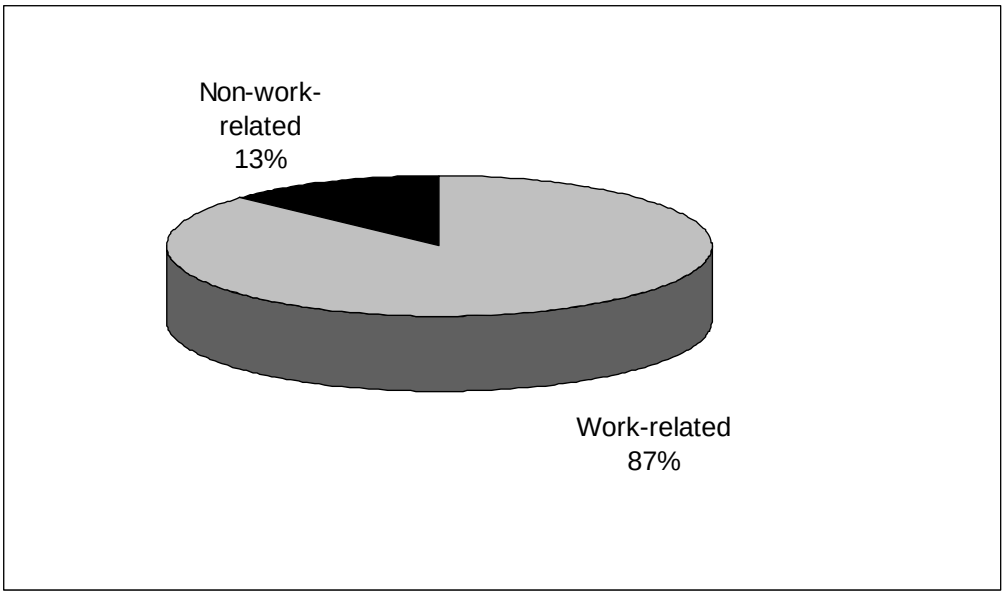
When analyzing the rate and number of deaths by age group, the age group which had the highest rate did not have the highest number of deaths. Residents 80 years of age and older had the highest death rate with 71.7 deaths per 100,000 farm population (24 deaths). Residents between 50 and 59 years of age and those between 60 and 69 years of age had the highest number of deaths with 56 deaths each. The death rate for these age groups was 11.2 deaths per 100,000 farm population and 17.1 deaths per 100,000 farm population, respectively.

The overall crude death rate for Alberta was 10.0 deaths per 100,000 farm population. The pattern of death rates by age group in Alberta is similar to Canadian rates.

Agricultural Deaths by the Relationship to Agricultural Work, Alberta, 1990-2009

87 per cent of the agriculture deaths in Alberta were work-related. The 13 per cent which were non-work-related were due to hazards of the farm environment.

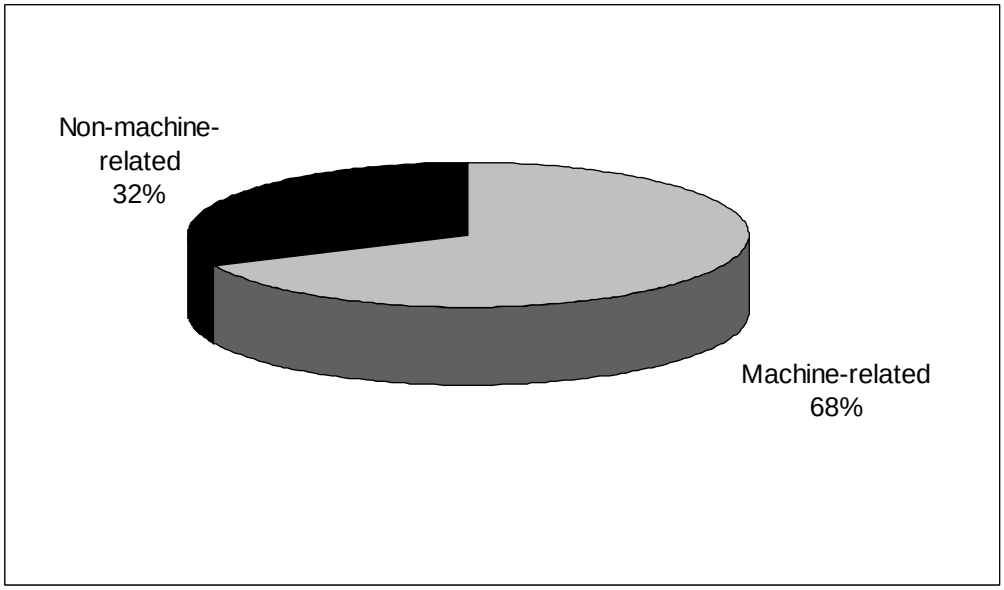
The majority of the non-work-related deaths were of children and youth (0-14 years).



Agricultural Deaths by Major Cause, Alberta, 1990-2009

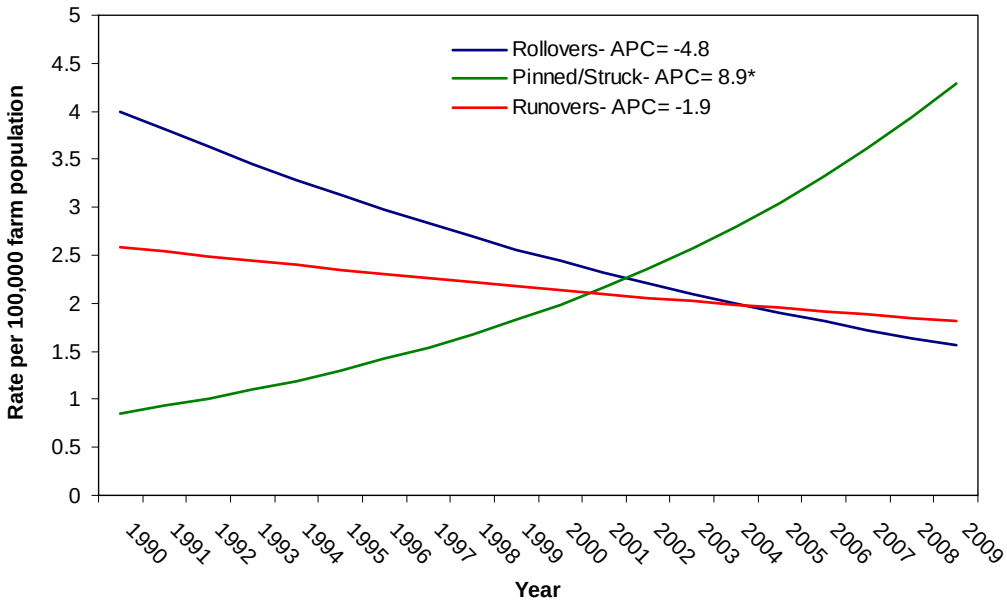
68 per cent of the agriculture-related deaths were machine-related (242 deaths). The leading machine-related mechanisms of death were machine rollovers, machine runovers, and being pinned or struck by a machine.

Of the 113 non-machine-related deaths the leading causes include: being struck by an animal, drowning and asphyxiation in grain or soil.



Comparison of Agriculture Machine-Related Deaths, Alberta, 1990-2009

When analyzing the leading causes of machine-related mechanisms of injuries over time, injury rates due to rollovers experienced a decrease on average of 4.8 per cent annually. Injury rates due to being pinned or struck by a machine increased an average of 8.9 per cent annually, runovers experienced an average decrease of 1.9 per cent annually. This follows a national trend.



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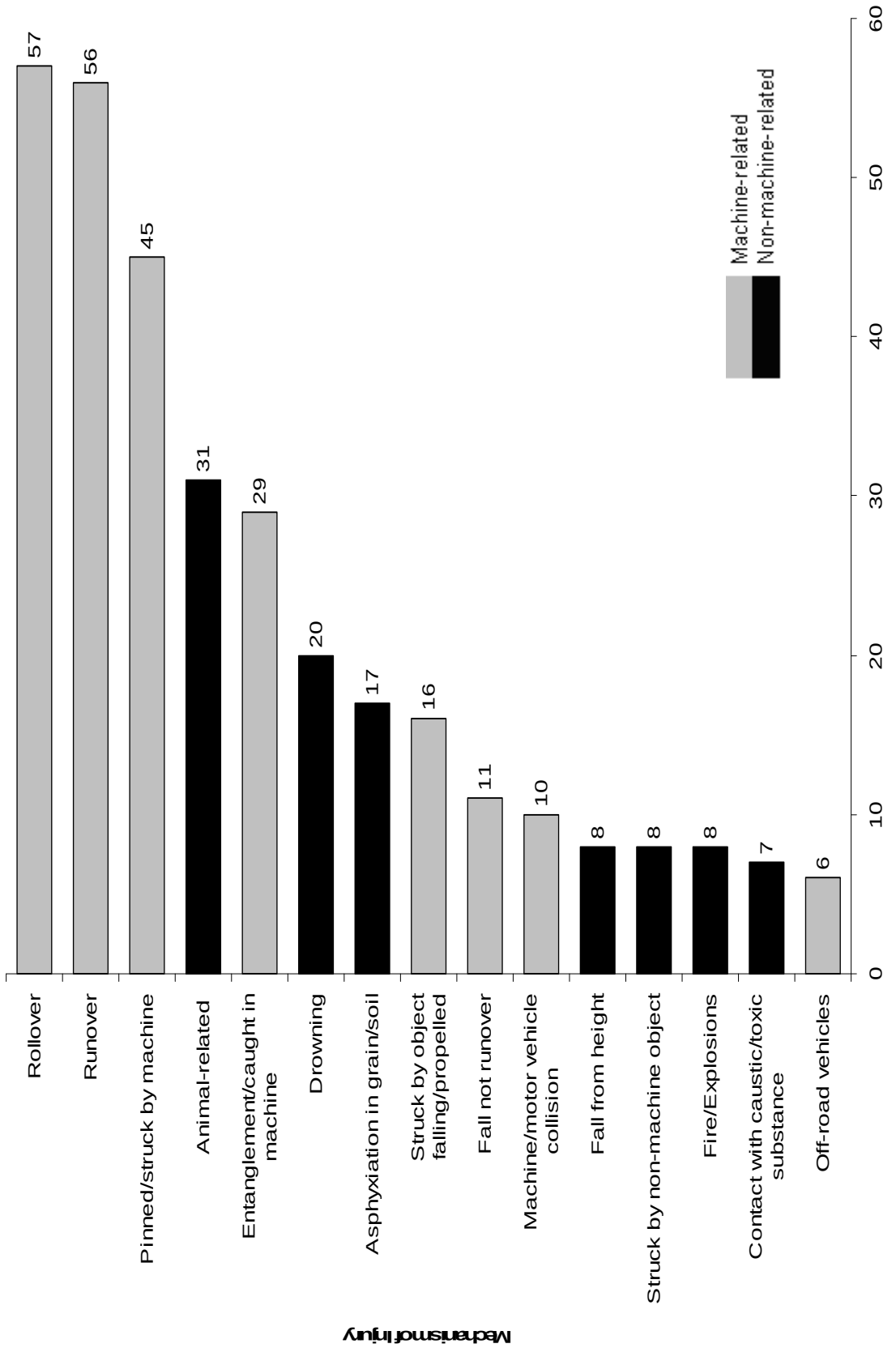
Agriculture-Related Deaths by Mechanism of Injury, Alberta, 1990-2009



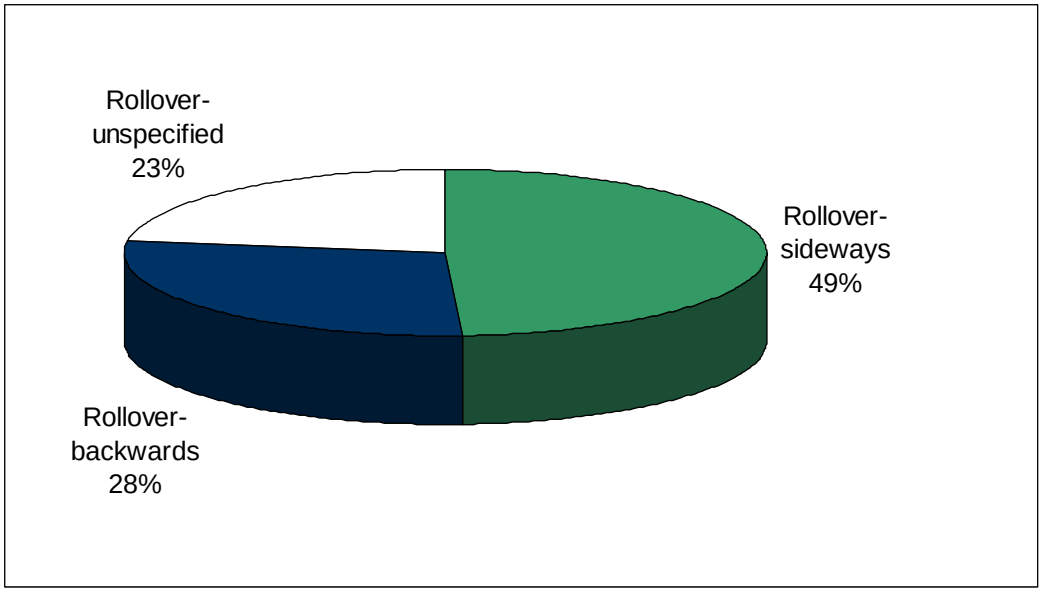
Almost half (45 per cent) of all agriculture-related deaths were due to three machine-related causes: machine rollovers, machine runovers, and being pinned or struck by a machine (158 deaths).

Another 12 machine-related and non-machine-related mechanisms of injury categories with 26 deaths composing of 7 per cent of the injury total were not included in the above graph.

Machine Rollover Deaths by Rollover Type, Alberta, 1990-2009

Overall 49 per cent of the agriculture-related machine rollovers in Alberta were sideways in direction. Another 28 per cent were backwards, and in 23 per cent of the deaths the direction of the rollovers could not be determined or was not documented.

The majority of the rollovers involved a tractor (72 per cent) another 17 per cent (10 deaths) involved all-terrain vehicles.



Machine Rollover Deaths by Activity Prior to Rollover and Immediate Cause of Rollover, Alberta, 1990-2009

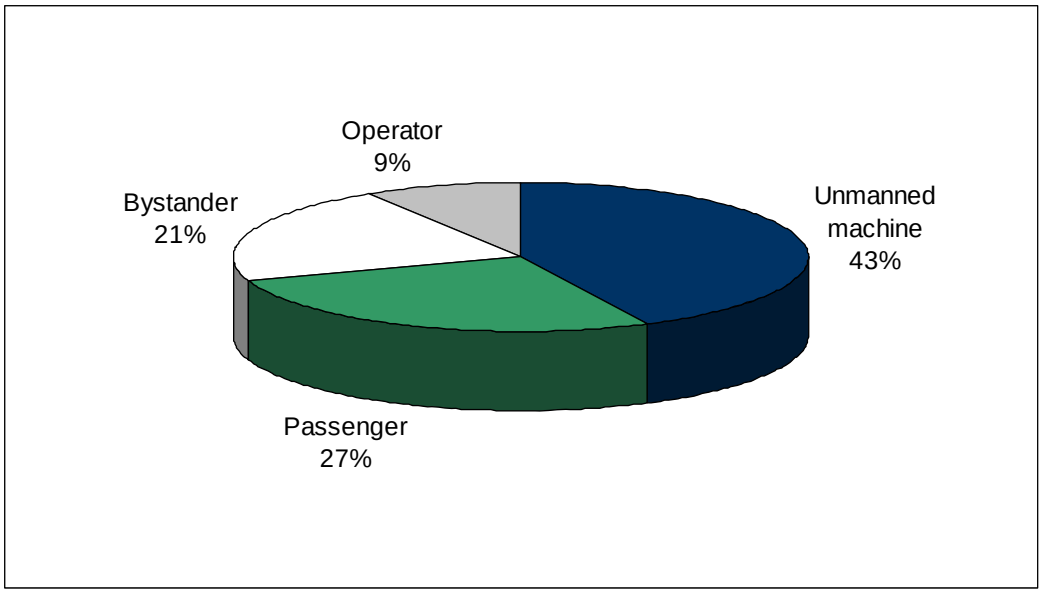
Due to the small numbers of deaths, graph presentations will not be provided.

Activity Prior to Rollover
Based on the circumstance text description, 30 per cent of the rollover deaths (17 deaths) involved field work activities, 25 per cent (14 deaths) involved transportation.

Immediate Cause of Rollover
Based on the circumstance text description, 28 per cent of the rollover deaths (16 deaths) were due to a machine or vehicle travelling on an incline, 25 per cent (14 deaths) werer due to travelling too close to the edge of a ditch or other steep slope.

Machine Runover Deaths by Runover Type, Alberta, 1990-2009

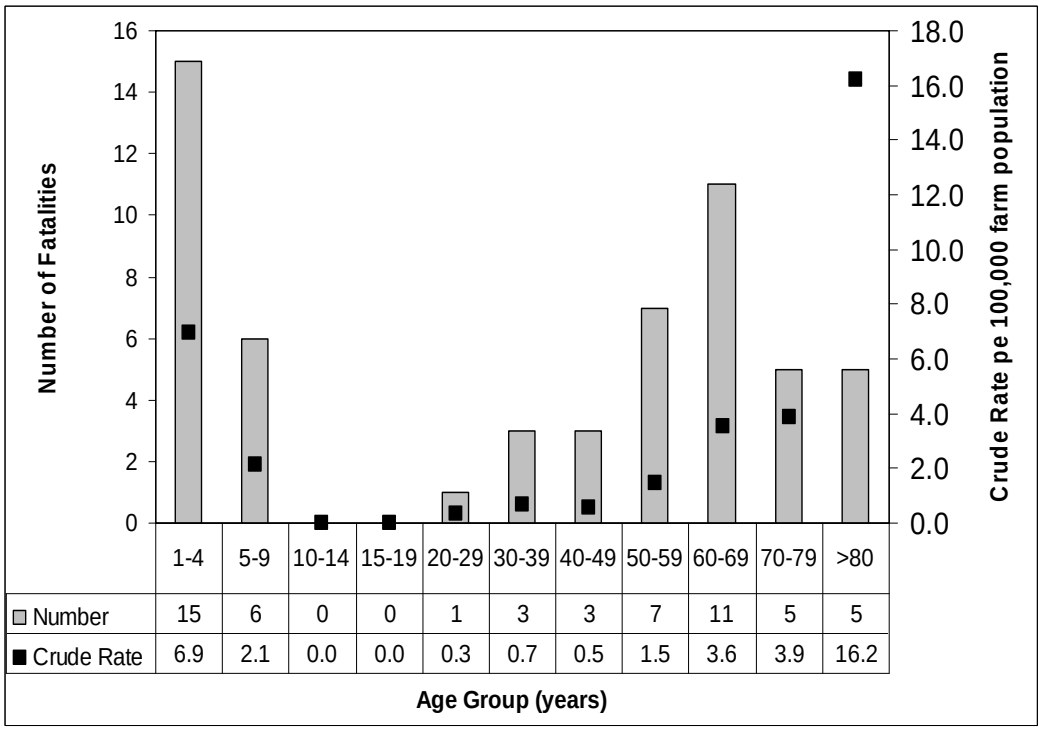
There were 56 agriculture runover deaths from 1990 to 2009. Alighted operator resulting in an unmanned machine were the most frequent type of fatal runover with 43 per cent (24 deaths). In this kind of injury event, the victim is runover by a machine they had left running or unblocked on a slope. Passenger who fell from a machine were the second most common cause with 27 per cent (15 deaths), followed by bystander runovers accounting for 21 per cent (12 deaths) and operator having fallen off the machine and then subsequently runover accounting for 9 per cent (5 deaths).



Machine Runover Deaths by Age Group, Alberta, 1990-2009

Of the 56 runover deaths, children between 1 and 4 years of age had the highest number of deaths with 15 deaths and the second highest rate with 6.9 deaths per 100,000 farm population. Of the children who died as a result of a runover, 50 per cent (7 deaths) were a result of the child being a passenger on a machine and the remaining 8 deaths were as a result of the child being a bystander.

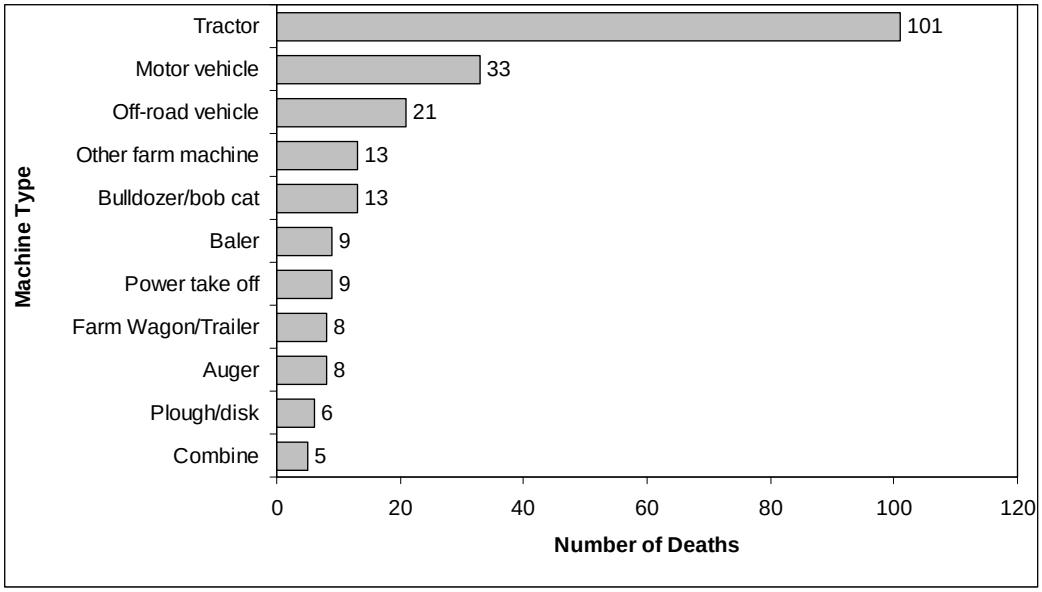
All 5 deaths of those 80 years of age and older were as a result of an alighted operator being runover by an unmanned machine.



	1-4	5-9	10-14	15-19	20-29	30-39	40-49	50-59	60-69	70-79	>80
Number	15	6	0	0	1	3	3	7	11	5	5
Crude Rate	6.9	2.1	0.0	0.0	0.3	0.7	0.5	1.5	3.6	3.9	16.2

Agricultural Deaths by Machine Type, Alberta, 1990-2009

Of the 242 machine-related deaths, the majority, 42 per cent (101 deaths) involved a tractor, 14 per cent (33 deaths) involved a motor vehicle. Of the motor vehicle deaths, the deceased was either a driver of a motor vehicle which was struck by farm machinery, was the driver of farm machinery struck by a vehicle, was working or repairing a motor vehicle (truck) and the hydraulic jack slipped, or was a child runover by a truck.



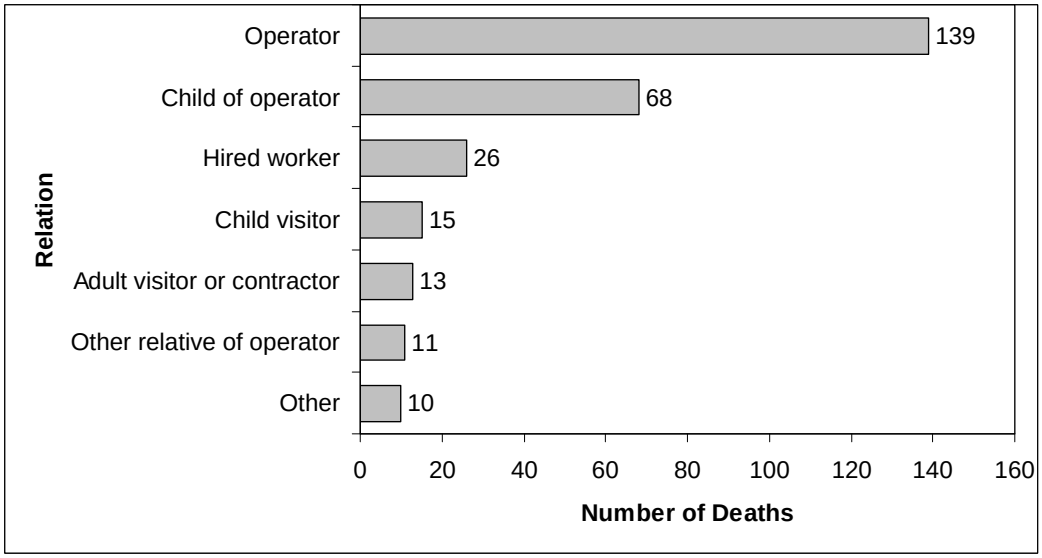
16 additional deaths involving 7 other machine types were not included in the above graph.

Agricultural Deaths by Relationship to Farm Operator, Alberta, 1990-2009

Of the deaths where the relationship between the victim and the farm operator was known, 47 per cent (139 deaths) were the farm owner/operator, 23 per cent (68 deaths) of the victims were the child of the farm owner/operator, 9 per cent (26 deaths) were hired workers.

Of the "other relative of operator" the majority of them were identified as being the father of the operator.

Of the "other" the majority of the 10 deaths were neighbors.



There were 60 deaths where the relationship was not identified.

Agricultural Deaths by Various Topics, 1990-2009

Due to the small number of deaths, graphic presentations will not be provided.

Agricultural Deaths Due to Being Pinned or Struck By Machine by Machine Type, Alberta, 1990-2009

- Of the 45 deaths due to being pinned/struck by a machine or part of machine, almost half of the deaths were as result of the hydraulics, jacks or hoist being released.

Agricultural Deaths Due to Being Entangled in a Machine by Machine Type, Alberta, 1990-2009

- Of the 29 deaths due to being entangled in a piece of machinery the most common type was a power-take-off (PTO) with 9 deaths. There were 6 deaths due to entanglement in an auger and other 5 deaths due to entanglement in a baler.

Agricultural Deaths by Animal Type

- Of the 31 agricultural animal-related deaths, 68 per cent (21 deaths) involved horses/stallions/colts, the remaining 32 per cent (10 deaths) involved cows/steers/calves.

Horses/stallions/colts

- Of the 21 deaths, 33 per cent (7 deaths) were female, the majority of them involved a fall from a horse. Of the 67 per cent (14 deaths) males deaths, the majority of the deaths were as a result of being kicked by the horse.

Cows/steers/calves

- Of the 10 deaths, 7 deaths were males the remaining 3 deaths were females.

Agricultural Drowning Deaths by Location

- Of the 20 drowning deaths
  - 11 deaths occurred in a dugout.
  - 17 were males.
  - 14 were of children less than 9 years of age (12 boys and 2 girls).

Asphyxiation

- Of the 17 deaths due to asphyxiation
  - All males
  - 7 were as a result of a collapsing soil trench, the remaining 10 deaths involved asphyxiation due to grain.

AGRICULTURE FATALITIES IN ALBERTA
CHILDREN (0-14 YRS)

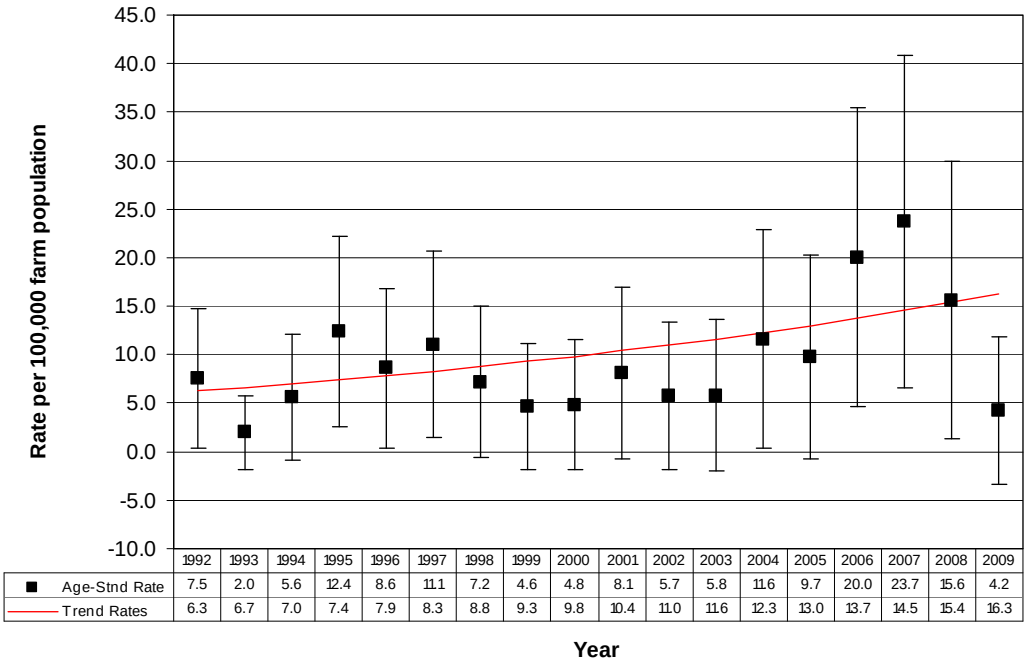
Due to the small number of deaths, analysis and reporting will be limited.

Agricultural Injury Death Rates by Year (age-stand), Alberta, 1992-2009

Over the 18 year period from 1992 to 2009 the overall agricultural-related death rate of children in Alberta increased an average of 5.8 per cent annually.

When analyzing the death rate based on machine-related and non-machine-related, the non-machine-related deaths increased more than the machine-related deaths.

Note: 1990 and 1991 were not included as the Joinpoint calculation of the trending rates requires a value in each year and in 1991 there were no deaths of Alberta children due to agriculture injuries.



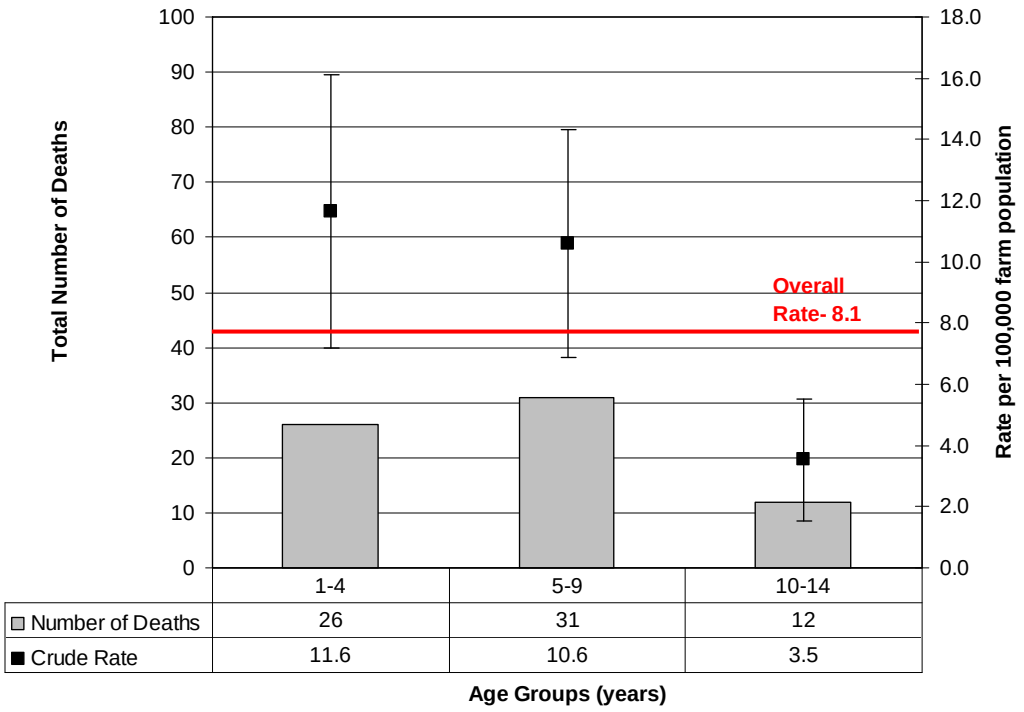
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Age-Stnd Rate	7.5	2.0	5.6	12.4	8.6	11.1	7.2	4.6	4.8	8.1	5.7	5.8	11.6	9.7	20.0	23.7	15.6	4.2
Trend Rates	6.3	6.7	7.0	7.4	7.9	8.3	8.8	9.3	9.8	10.4	11.0	11.6	12.3	13.0	13.7	14.5	15.4	16.3

AGRICULTURE FATALITIES IN ALBERTA
CHILDREN (0-14 YRS)

Agricultural Injury Death Number and Rates by Age Group, Alberta, 1990-2009

When analyzing the rate and number of deaths by age group of the child and youth population, the age group which had the highest number of deaths didn't have the highest rate. Children between 5 and 9 years of age had the highest number of deaths with 31 over the time period and a rate of 10.6 deaths per 100,000 farm population. However, children between 1 and 4 year of age had the highest rate with 11.6 deaths per 100,000 farm population and 26 deaths.

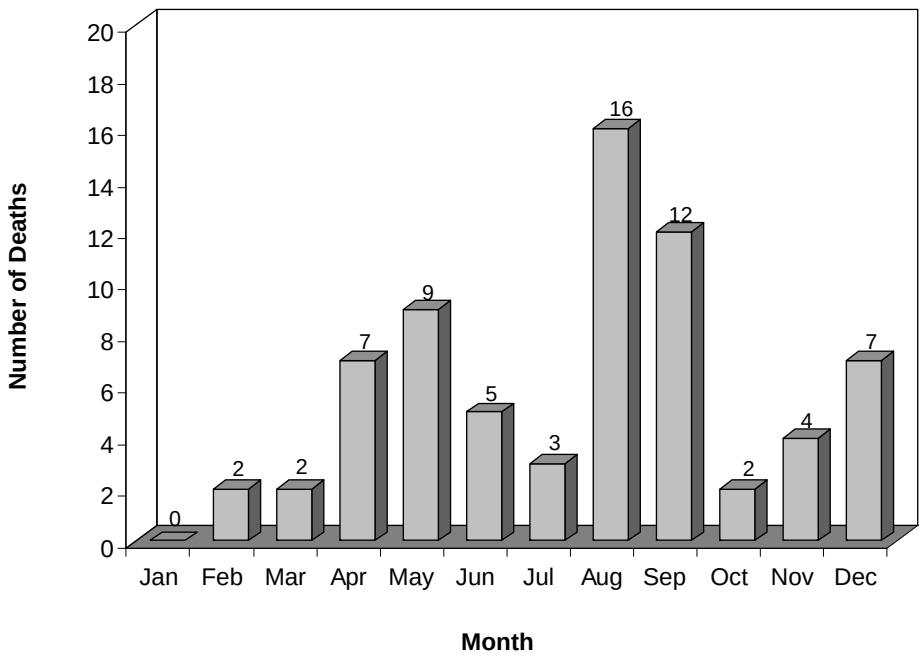
The overall crude death rate for children and youth was 8.1 deaths per 100,000 farm population.



	1-4	5-9	10-14
Number of Deaths	26	31	12
Crude Rate	11.6	10.6	3.5

Agricultural Injury Deaths by Month, Alberta, 1990-2009

The months with the highest number of deaths occurred in the fall during harvest, accounting for 41 per cent of the deaths.



AGRICULTURE FATALITIES IN ALBERTA
CHILDREN (0-14 YRS)

Due to the small numbers of deaths, graphic presentations will not be provided.

Agricultural Deaths by calendar year, Alberta, 1990-2009

Over the 20 year period from 1990 to 2009 there 69 children who died as a result of an agricultural injury. This equates to an average of 4 deaths each year.

Agricultural Deaths by Mechanism of Injury, Alberta, 1990-2009

Runover
Runovers were the leading cause of agricultural-related death of Alberta children. Over the reported time period there were 21 runover deaths. The majority of the deaths (57 per cent) were as a result of the child being a passenger on a piece of equipment (12 deaths). The remaining 9 deaths (43 per cent) were as a result of the child being a bystander. The tractor was the most common piece of equipment in which the child was runover (52 per cent). This was followed by 5 runover deaths involving a motor vehicle.

Drowning
Drowning was the second leading cause of agricultural-related death of Alberta children. There were 14 deaths over the reported time period. Of the 14 deaths, all the children were less than 9 years of age; 8 children less than 4 years of age. The dugout was the most common location of drownings accounting for 57 per cent of the deaths.

Rollover
There were 6 rollover deaths in the reported time period. Of the rollover deaths, 50 per cent involved a tractor, the remaining 50 per cent involved an all-terrain vehicle rollover.

Animal-Related
There were 6 animal-related deaths of Alberta children. All the deaths involved horses. There were 4 girls. Of the 6 children who died involving a horse, 4 of them were 9 year olds.

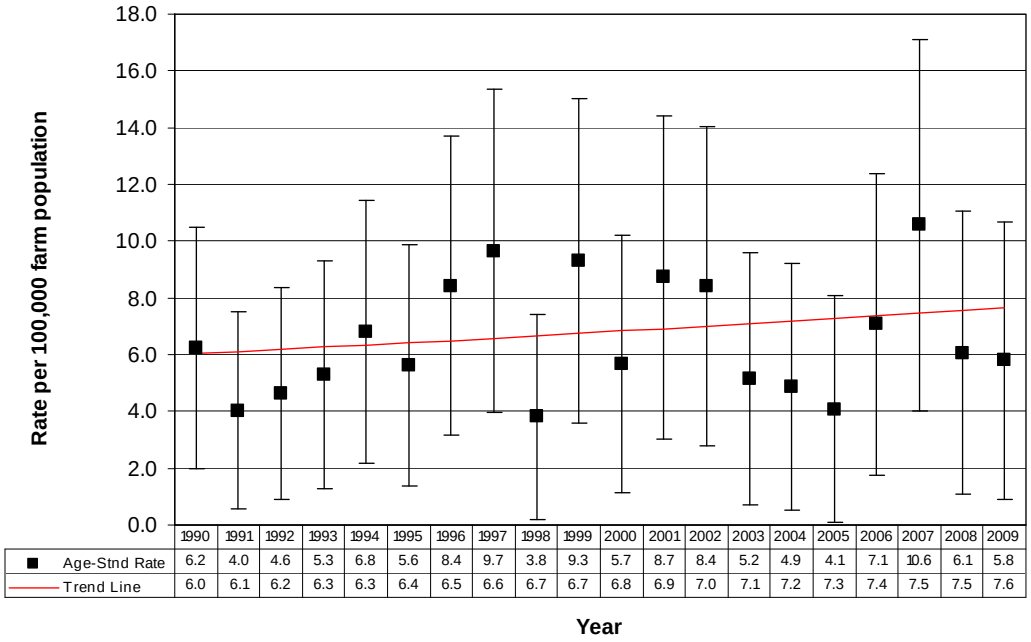
Deaths by Machine Type, Alberta, 1990-2009
Forty-three per cent of all machine-related deaths involved a tractor (14 deaths). Another 22 per cent (7 deaths) involved all-terrain vehicles.

AGRICULTURE FATALITIES IN ALBERTA
ADULTS (15-59 YRS)

Due to the small number of deaths, analysis and reporting will be limited.

Agricultural Injury Death Rates by Year (age-stand), Alberta, 1990-2009

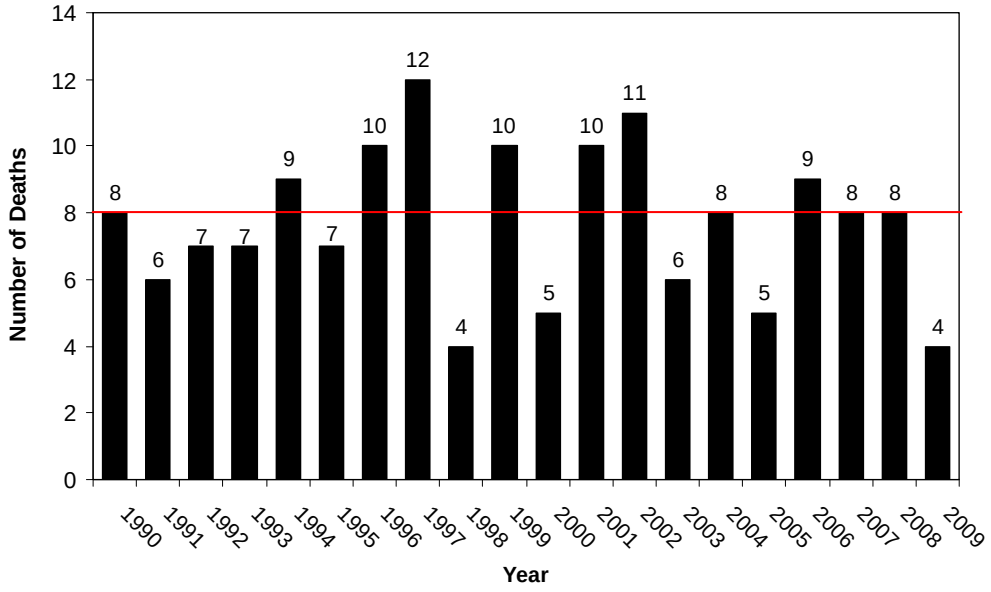
Over the 20 year period from 1990 to 2009 the overall agricultural-related death rate of adults in Alberta increased an average of 1.3 per cent annually.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Age-Stnd Rate	6.2	4.0	4.6	5.3	6.8	5.6	8.4	9.7	3.8	9.3	5.7	8.7	8.4	5.2	4.9	4.1	7.1	10.6	6.1	5.8
Trend Line	6.0	6.1	6.2	6.3	6.3	6.4	6.5	6.6	6.7	6.7	6.8	6.9	7.0	7.1	7.2	7.3	7.4	7.5	7.5	7.6

Agricultural Deaths by Calendar Year, Alberta, 1990-2009

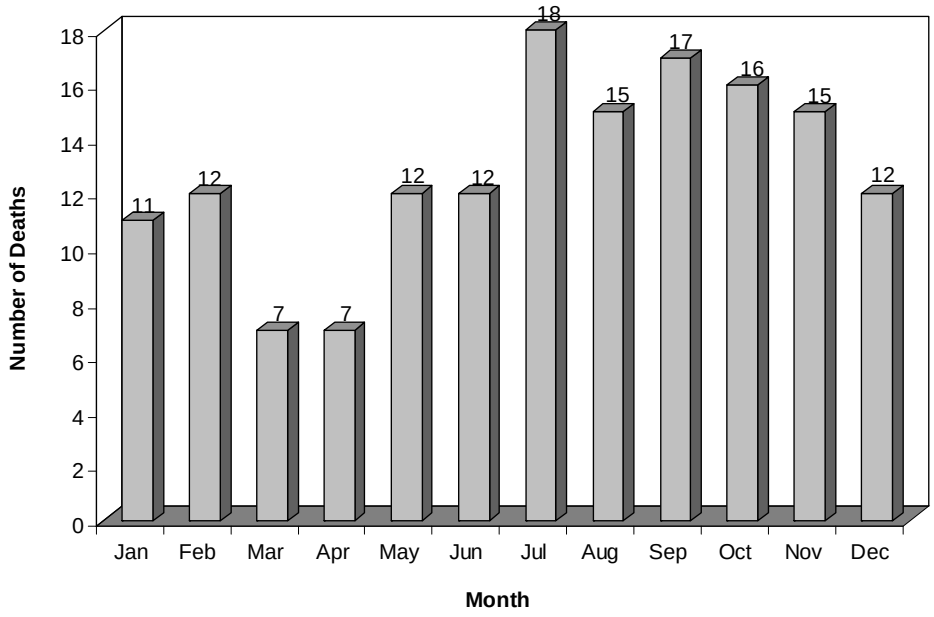
Over the 20 year period from 1990 to 2009 there were 154 adults who died as a result of an agricultural injury. This equates to an average of 8 deaths each year.



AGRICULTURE FATALITIES IN ALBERTA
ADULTS (15-59 YRS)

Agricultural Deaths by Month, Alberta, 1990-2009

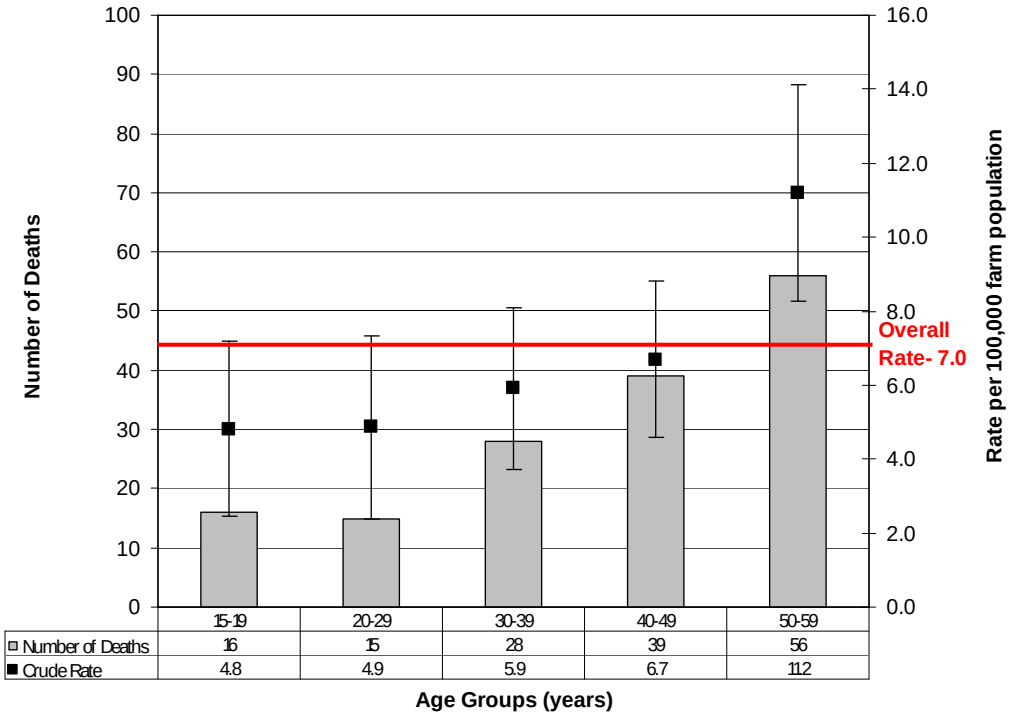
53 per cent of all agriculture deaths in Alberta occurred from July to November.



Agricultural Death Number and Rates by Age Group, Alberta, 1990-2009

When analyzing the rate and number of deaths by age group of the adult population, the age group which had the highest rate had the highest number of deaths. Residents 50 to 59 years of age had the highest death rate with 11.2 deaths per 100,000 farm population (56 deaths).

The overall crude death rate for adults was 7.0 deaths per 100,000 farm population.

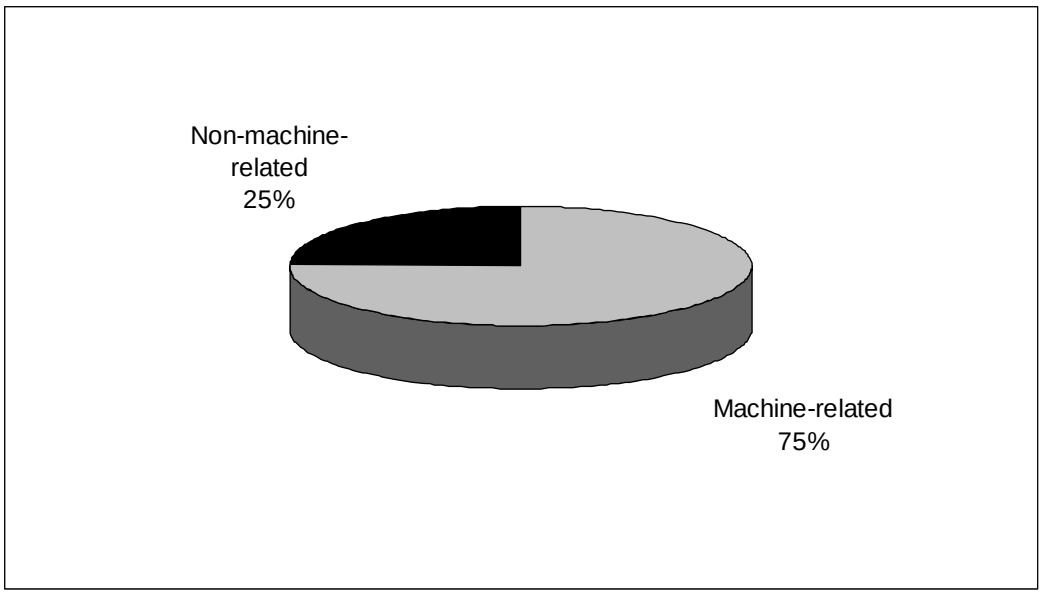


AGRICULTURE FATALITIES IN ALBERTA
ADULTS (15-59 YRS)

Agricultural Deaths by Major Cause, Alberta, 1990-2009

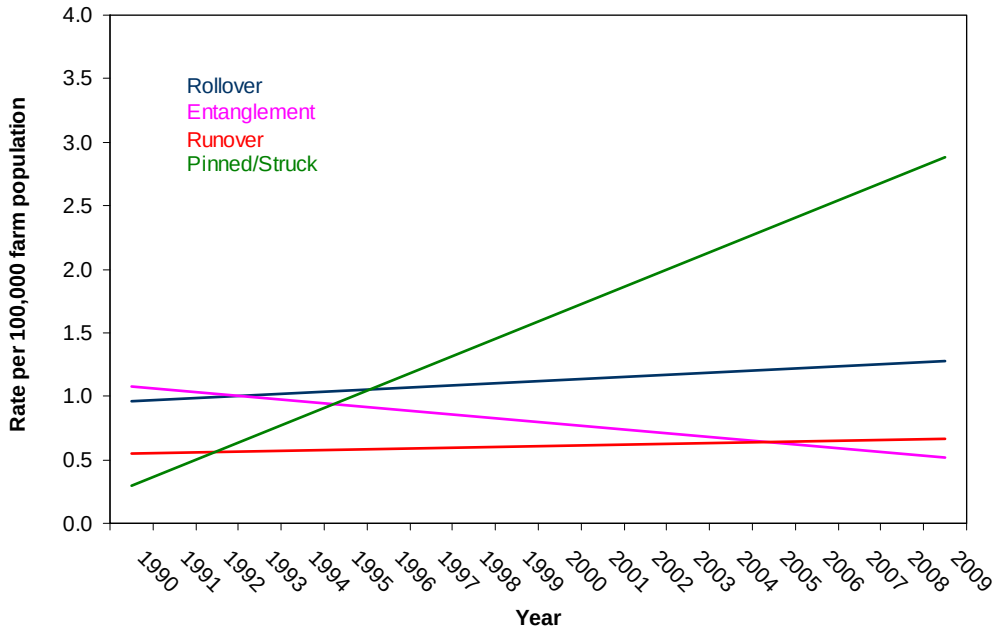
75 per cent of the agriculture-related deaths were machine-related (116 deaths). The leading machine-related mechanisms of death were machine rollovers, being pinned or struck by a machine and entanglement or being caught in a machine.

The 38 non-machine-related deaths include drowning and asphyxiation in grain or soil, animal-related deaths and deaths due to contact with a toxic substance.



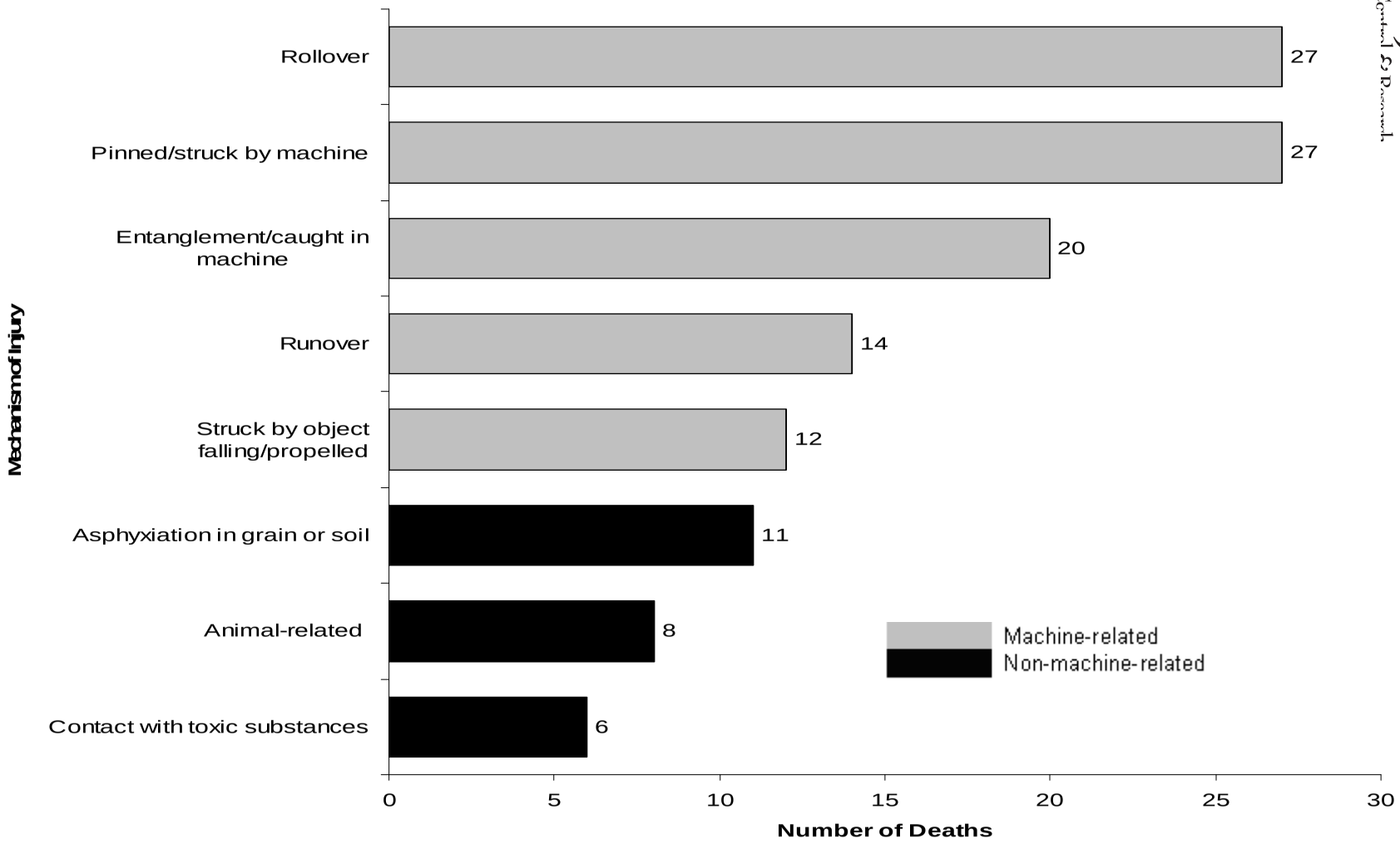
Comparison of Agriculture Machine-Related Deaths, Alberta, 1990-2009

When analyzing the leading causes of machine-related mechanisms of injuries over time, injury rates due to being pinned or struck by a machine experienced the largest increase whereas, injuries due to entanglements experienced a decrease.



AGRICULTURE FATALITIES IN ALBERTA
ADULTS (15-59 YRS)

Agriculture-Related Deaths by Mechanism of Injury, Alberta, 1990-2009



Almost half (49 per cent) of all agriculture-related deaths were due to three machine-related causes: machine rollovers, machine runovers, and being pinned/struck by a machine entanglements (74 deaths).

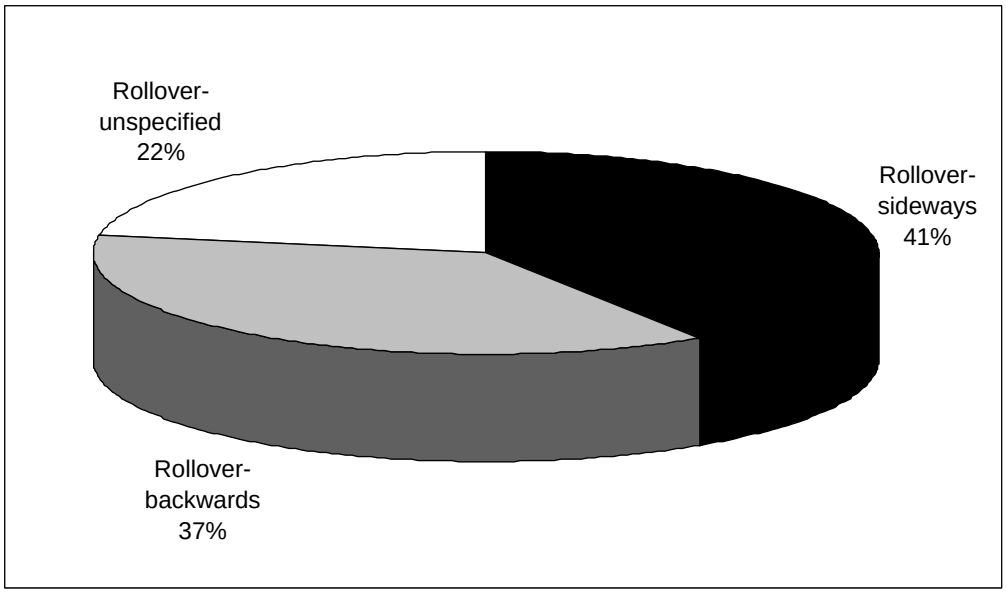
Another 16 machine-related and non-machine-related mechanisms of injury categories with 29 deaths composing accounting for 18 per cent of the injury total were not included in the above graph.

AGRICULTURE FATALITIES IN ALBERTA
ADULTS (15-59 YRS)

Machine Rollover Deaths by Rollover Type, Alberta, 1990-2009

Overall 41 per cent of the rollover deaths were sideways in direction. Another 37 per cent were backwards, and in 22 per cent of the deaths the direction of the rollover could not be determined or was not documented.

The majority of the rollovers involved a tractor (66 per cent) another 15 per cent (4 deaths) involved all-terrain vehicles.



Machine Rollover Deaths by Activity Prior to Rollover and Immediate Cause of Rollover, Alberta, 1990-2009

Due to the small numbers of deaths, graph presentations will not be provided.

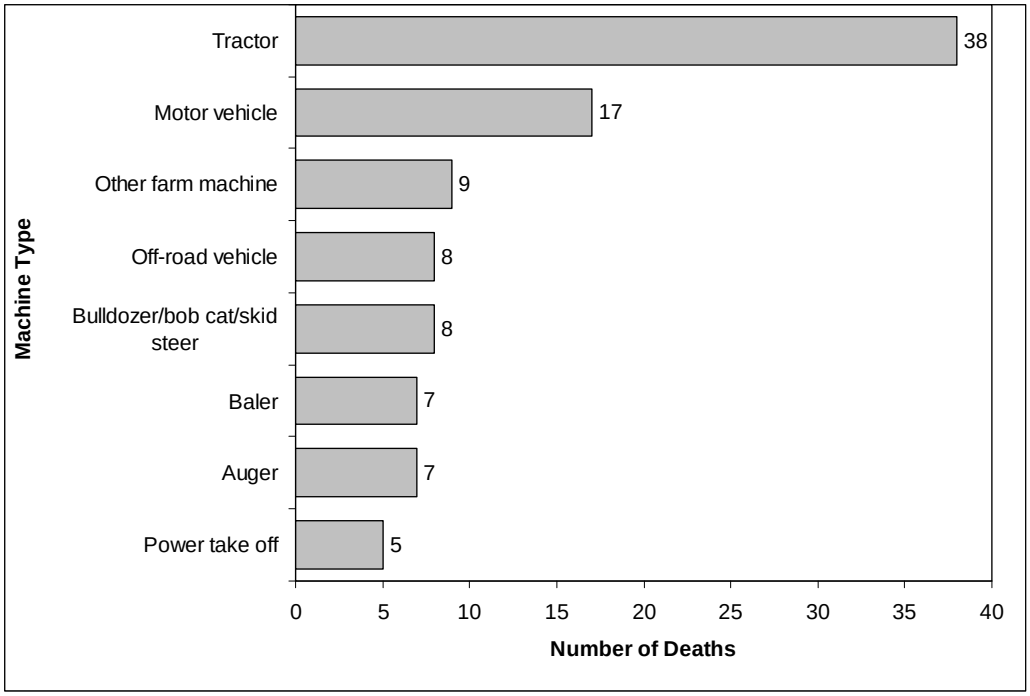
Activity Prior to Rollover
Of the rollover deaths, injury circumstance text descriptions showed that 37 per cent (10 deaths) involved work in/on the field and another 19 per cent (5 deaths) involved transportation.

Immediate Cause of Rollover
Based on the circumstance text description, the main reasons for the rollover were traveling on an incline which accounted for 44 per cent (12 deaths), followed by towing or extracting of an object which accounted for another 15 per cent (4 deaths).

AGRICULTURE FATALITIES IN ALBERTA
ADULTS (15-59 YRS)

Agricultural Deaths by Machine Type, Alberta, 1990-2009

Of the 116 machine-related deaths, 33 per cent (38 deaths) involved a tractor, 15 per cent (17 deaths) involved a motor vehicle. Of the motor vehicle deaths, the deceased was either a driver of a motor vehicle which was struck by farm machinery, was the driver of farm machinery struck by a vehicle, was working or repairing a motor vehicle (truck) and the hydraulic jack slipped, or was a child runover by a truck.

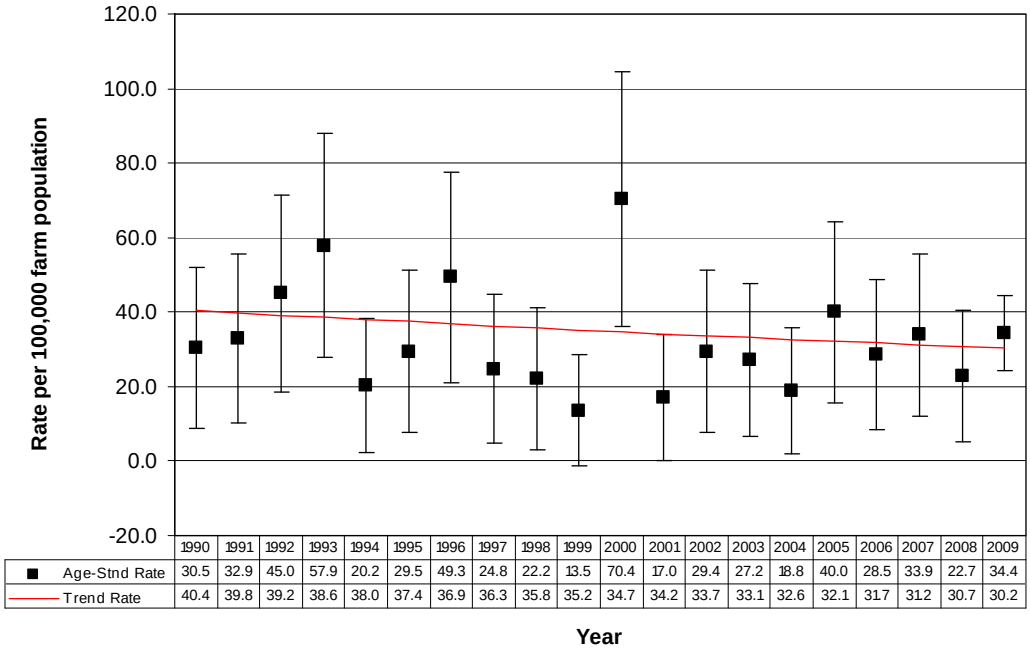


AGRICULTURE FATALITIES IN ALBERTA
OLDER ADULTS (60+ YRS)

Due to the small number of deaths, analysis and reporting will be limited.

Agricultural Injury Death Rates by Year (age-stand), Alberta, 1990-2009

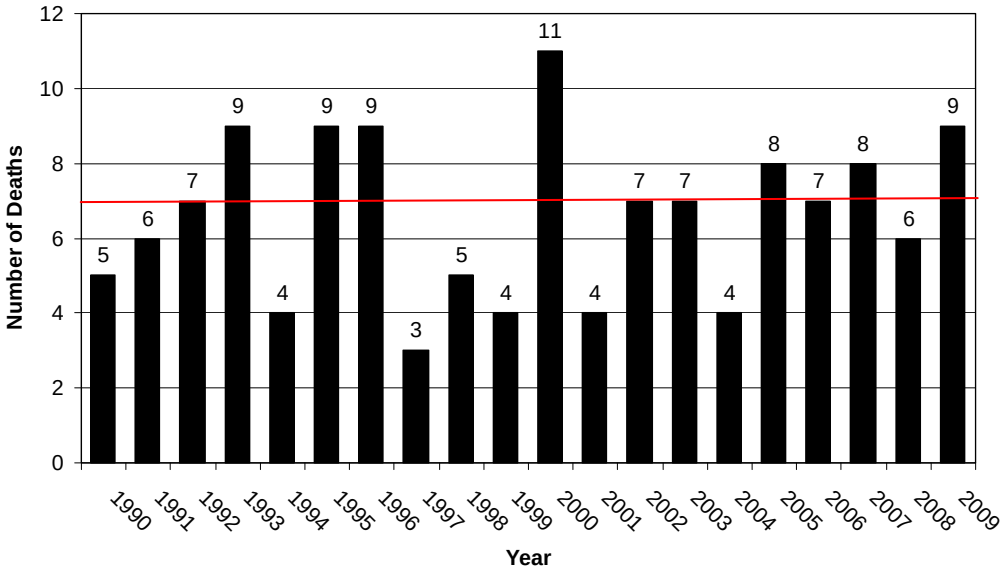
Over the 20 year period from 1990 to 2009 the overall agricultural-related death rate of older adults in Alberta decreased an average of 1.5 per cent annually.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Age-Stnd Rate	30.5	32.9	45.0	57.9	20.2	29.5	49.3	24.8	22.2	13.5	70.4	17.0	29.4	27.2	18.8	40.0	28.5	33.9	22.7	34.4
Trend Rate	40.4	39.8	39.2	38.6	38.0	37.4	36.9	36.3	35.8	35.2	34.7	34.2	33.7	33.1	32.6	32.1	31.7	31.2	30.7	30.2

Agricultural Deaths by Calendar Year, Alberta, 1990-2009

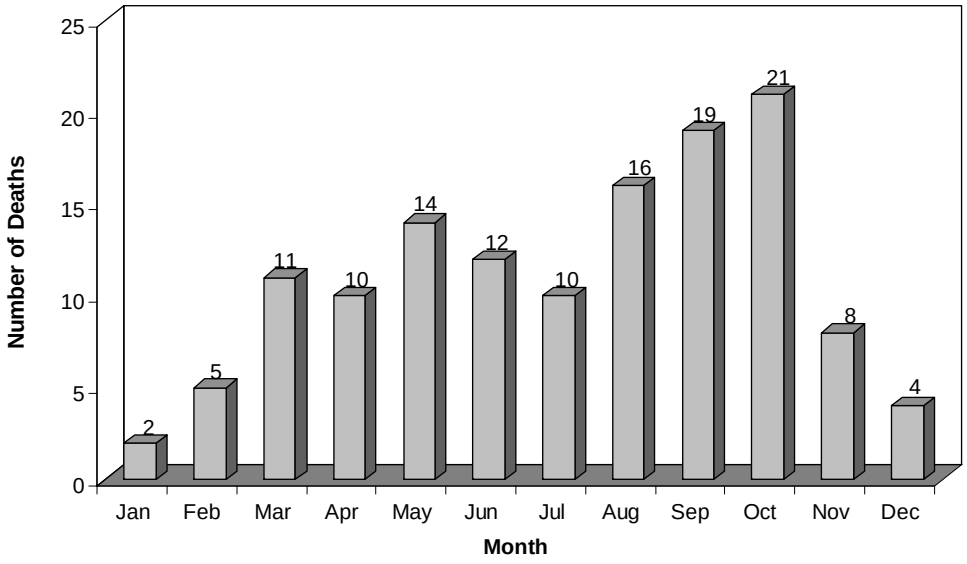
Over the 20 year period from 1990 to 2009 there were 132 older adults who died as a result of an agricultural injury. This equates to an average of 7 deaths each year.



AGRICULTURE FATALITIES IN ALBERTA OLDER ADULTS (60+ YRS)

Agricultural Deaths by Month, Alberta, 1990-2009

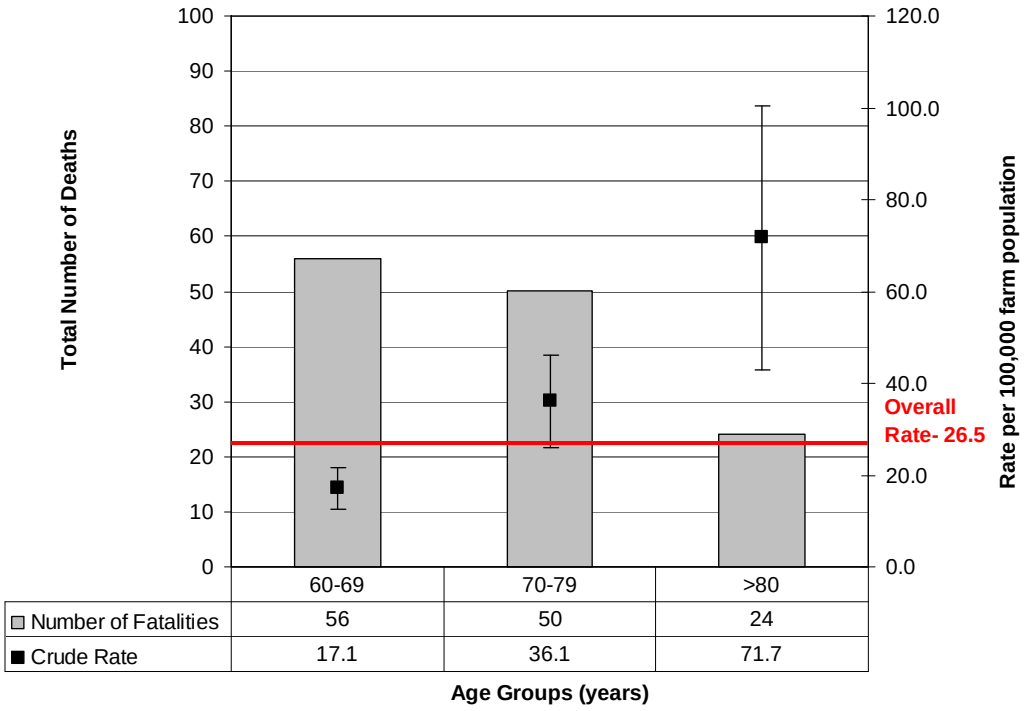
70 per cent of all agriculture deaths in Alberta occurred from May to October.



Agricultural Death Number and Rates by Age Group, Alberta, 1990-2009

When analyzing the rate and number of deaths by age group of the older adult population, the age group which had the highest number of deaths didn't have the highest rate. Residents 60 to 69 years of age had the highest number of deaths but the lowest death rate of older adults with 56 deaths and a rate of 17.1 deaths per 100,000 farm population. Residents 80 years of age and older had the fewest deaths of older adults with 24, but had the highest rate of 71.7 deaths per 100,000 farm population.

The overall crude death rate for older adults was 26.5 deaths per 100,000 farm population.

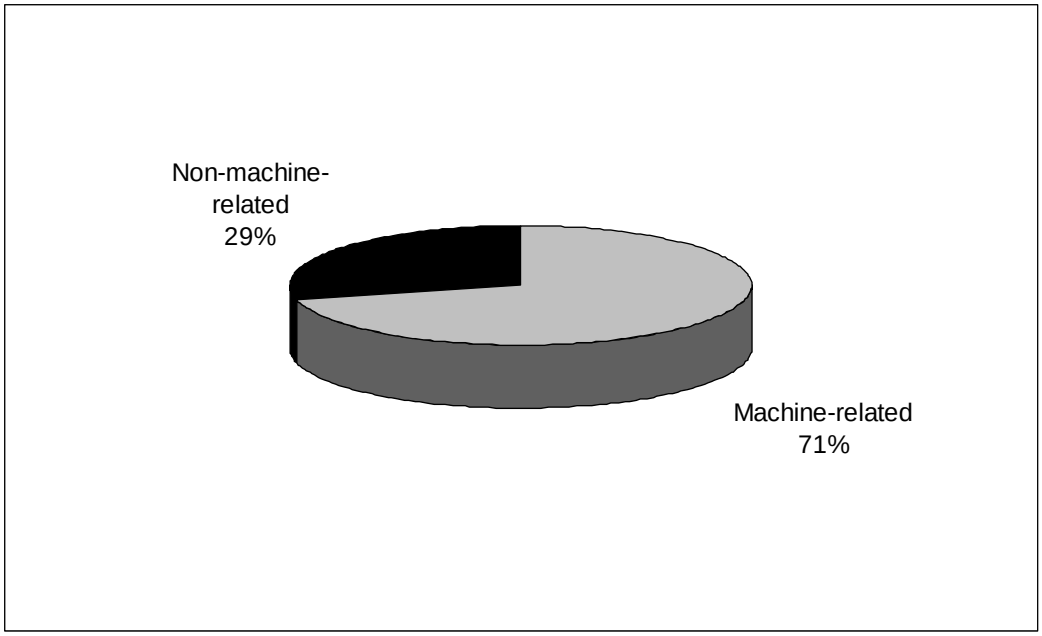


AGRICULTURE FATALITIES IN ALBERTA
OLDER ADULTS (60+ YRS)

Agricultural Deaths by Major Cause, Alberta, 1990-2009

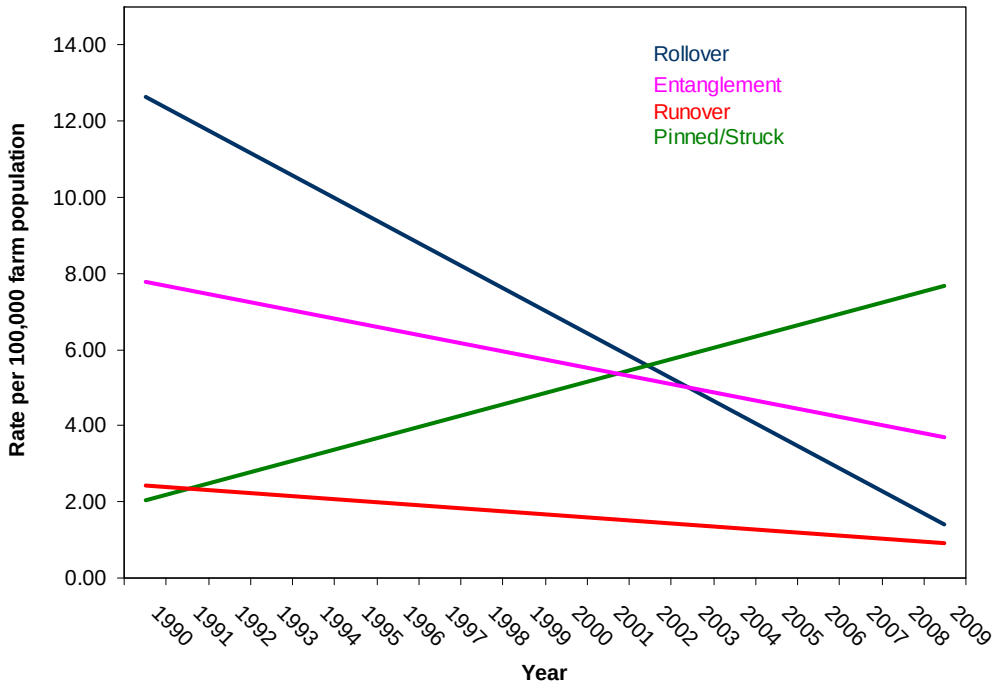
71 per cent of the agriculture-related deaths were machine-related (94 deaths). The leading machine-related mechanisms of death were machine rollovers, machine runovers and being pinned or struck by a machine.

29 per cent (38 deaths) were non-machine-related deaths. The leading causes of non-machine-related deaths were animal-related deaths and being struck by an object (not machine).



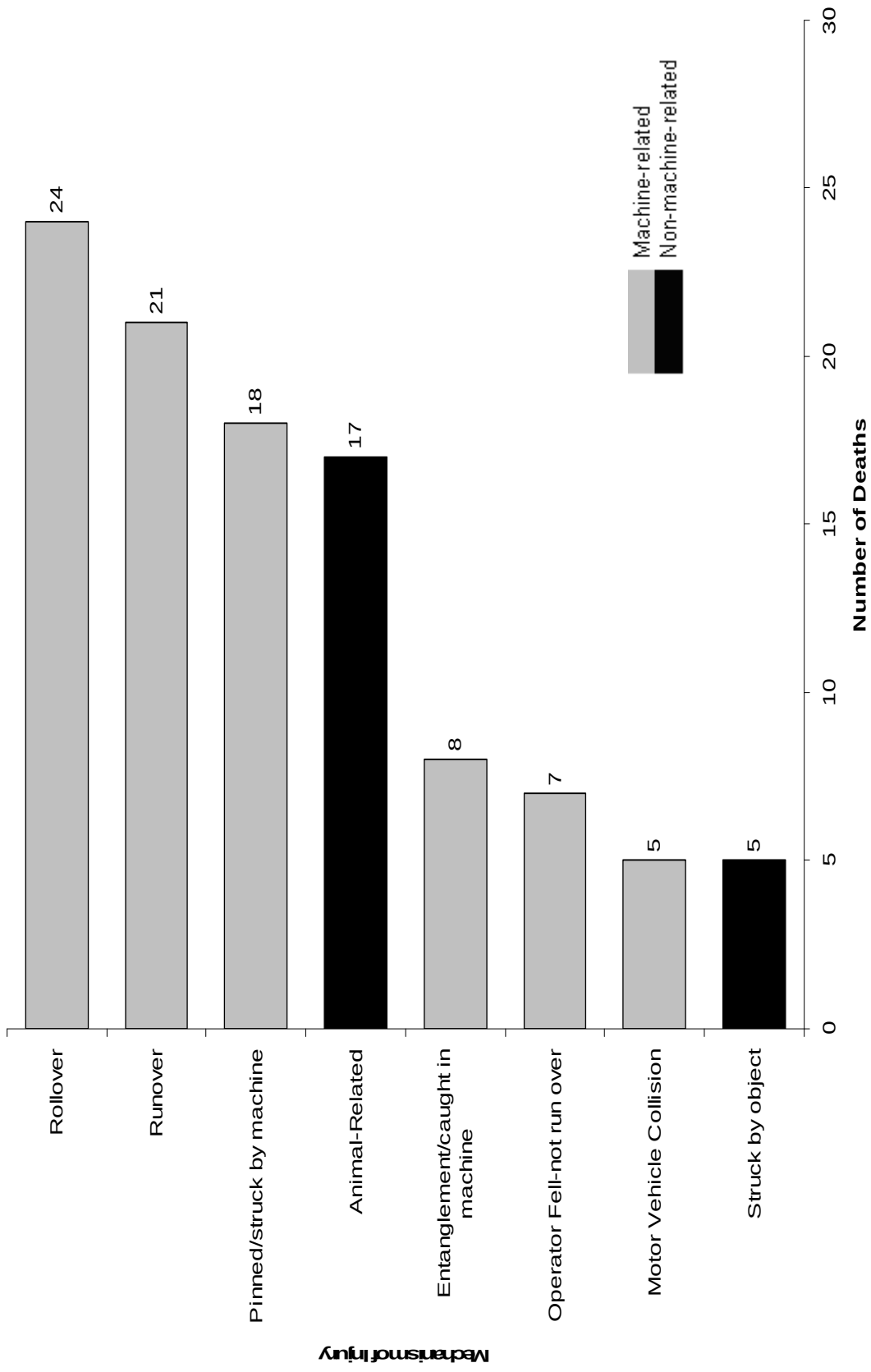
Comparison of Agriculture Machine-Related Deaths, Alberta, 1990-2009

When analyzing the leading causes of machine-related mechanisms of injuries over time, injury death rates due to rollovers, entanglements and runovers all experienced a decline. However, injury deaths due to being pinned or struck by a machine increased over the time period.



AGRICULTURE FATALITIES IN ALBERTA OLDER ADULTS (60+ YRS)

Agriculture-Related Deaths by Mechanism of Injury, Alberta, 1990-2009



Almost half (48 per cent) of all agriculture-related deaths were due to three machine-related causes: machine rollovers, machine runovers, and being pinned or struck by a machine (63 deaths).

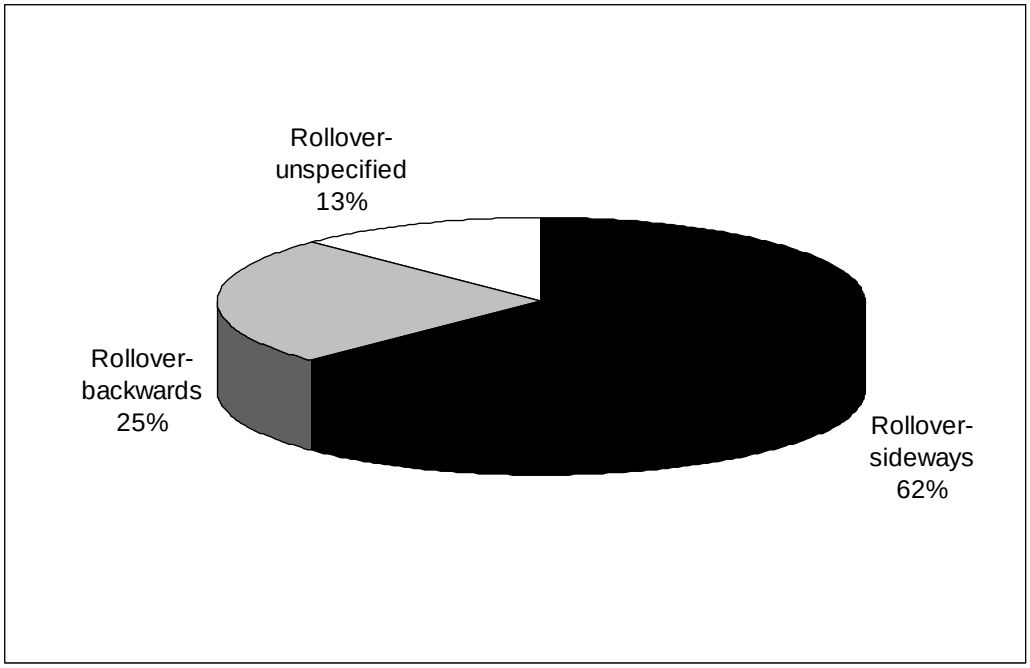
Animal-related injury deaths accounted for 13 per cent (17 deaths). Another 13 machine-related and non-machine-related mechanisms of injury categories with 26 deaths composing of 13 per cent of the injury total were not include in the above graph.

AGRICULTURE FATALITIES IN ALBERTA
OLDER ADULTS (60+ YRS)

Machine Rollover Deaths by Rollover Type, Alberta, 1990-2009

Overall 61 per cent (15 deaths) of the agriculture-related machine rollovers of older adults in Alberta were sideways in direction. Another 25 per cent were backwards, and in 13 per cent of the deaths the direction of the rollovers could not be determined or was not documented.

The majority, 83 per cent of the rollovers involved a tractor (20 deaths).



Machine Rollover Deaths by Activity Prior to Rollover, Immediate Cause of Rollover and Type of Machine, Alberta, 1990-2009

Due to the small numbers of deaths, graph presentations will not be provided.

Activity Prior to Rollover
Of the rollover deaths, injury circumstance text descriptions showed that 33 per cent (8 deaths) involved transportation of agriculture product. Another 25 per cent involved field work.

Immediate Cause of Rollover
Based on the circumstance text description, the main reasons for the rollover were traveling too close to an edge which accounted for 46 per cent (11 deaths), followed by traveling on an incline which accounted for another 13 per cent (3 deaths).

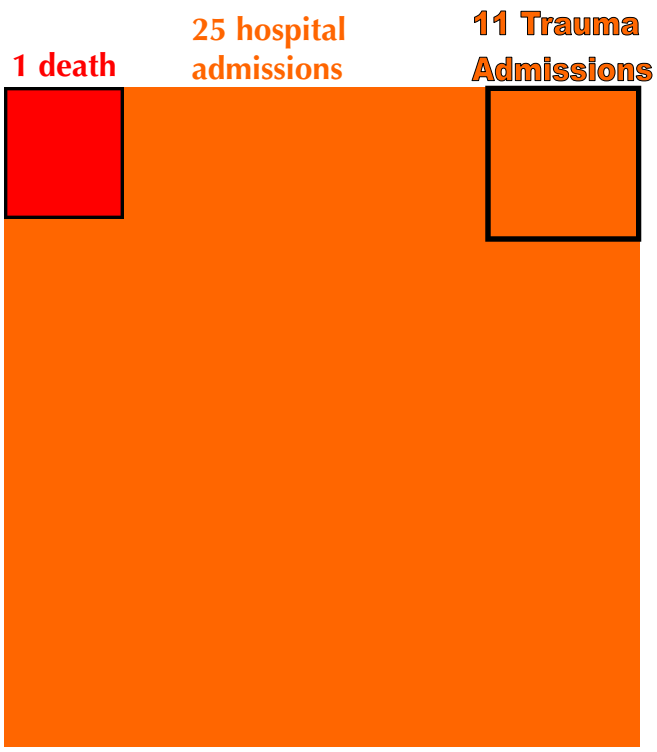
Type of Machine
The majority (52 per cent) of the deaths of older farmers involved a tractor (49 deaths). This was followed by motor vehicles with 12 per cent (11 deaths).

Agriculture Major Trauma Hospital Admissions, Yearly Trend (age-standardized), Alberta, 1996-2009

The data presented in the next section of the report focuses on agricultural major trauma hospital admissions. This dataset is a subset of all hospital admissions and emergency department visits. This dataset includes patients who presented to an emergency department with an Injury Severity Score (ISS) ≥12 and had a cause of injury code defined as trauma. See appendix D.

For every agriculture injury death, there were 25 injury hospital admissions, and of the 25 hospital admissions, there were 11 major trauma injury admissions. Agriculture injury major trauma admissions accounted for 11 per cent of all agriculture injury related admissions.

See appendix D for definitions.

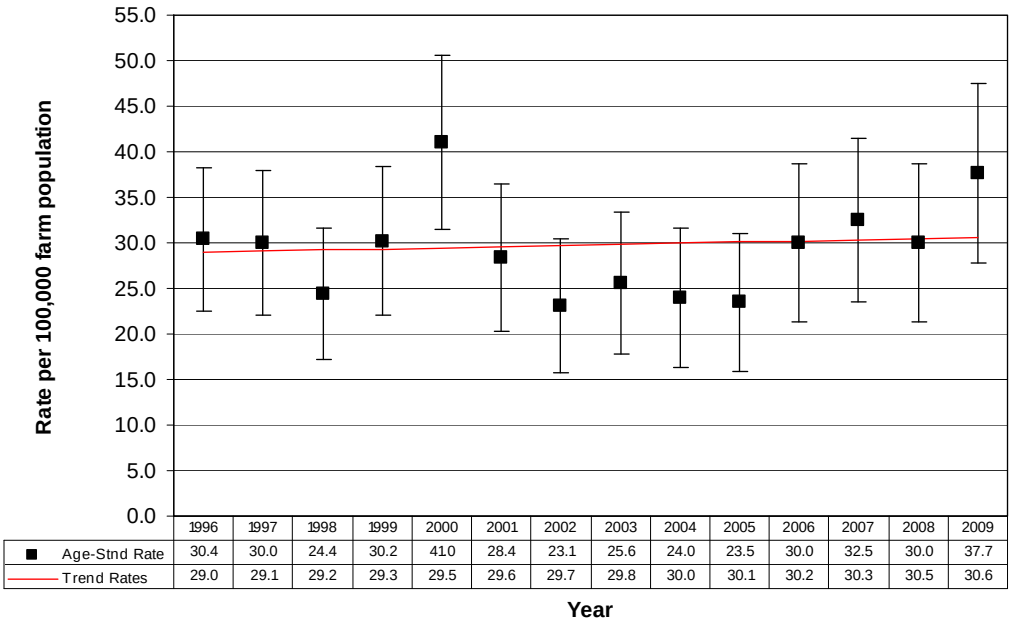


Deaths 1990-2009
Hospital Admissions 1991-2001
Major Trauma Admissions 1996-2009

Agriculture Major Trauma Hospital Admissions by Year (age-standardized), Alberta, 1996-2009

In Alberta, over the fourteen year period from 1996 to 2009 there was a slight increase in the agriculture injury major trauma admissions with an average of 0.42 per cent each year (trend year of 29.0 admissions per 100,000 farm population in 1996 to 30.6 admissions per 100,000 farm population in 2009).

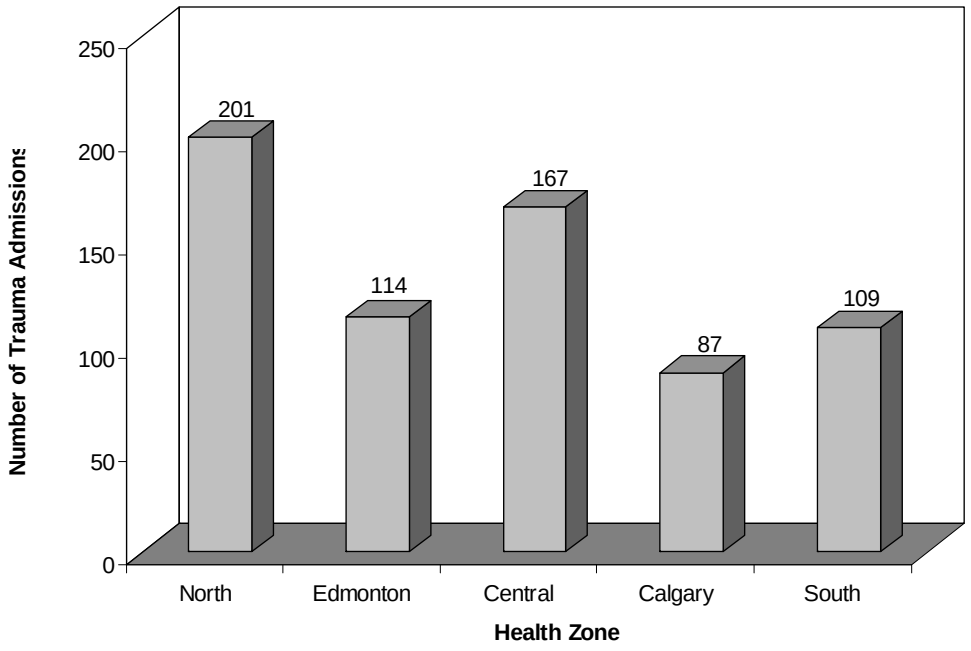
The yearly rates varied throughout the time period with the lowest rate of 23.1 admissions per 100,000 farm population in 2002 and the highest rate of 41.0 admissions per 100,000 farm population two years previously in 2000.



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Age-Stnd Rate	30.4	30.0	24.4	30.2	410	28.4	23.1	25.6	24.0	23.5	30.0	32.5	30.0	37.7
Trend Rates	29.0	29.1	29.2	29.3	29.5	29.6	29.7	29.8	30.0	30.1	30.2	30.3	30.5	30.6

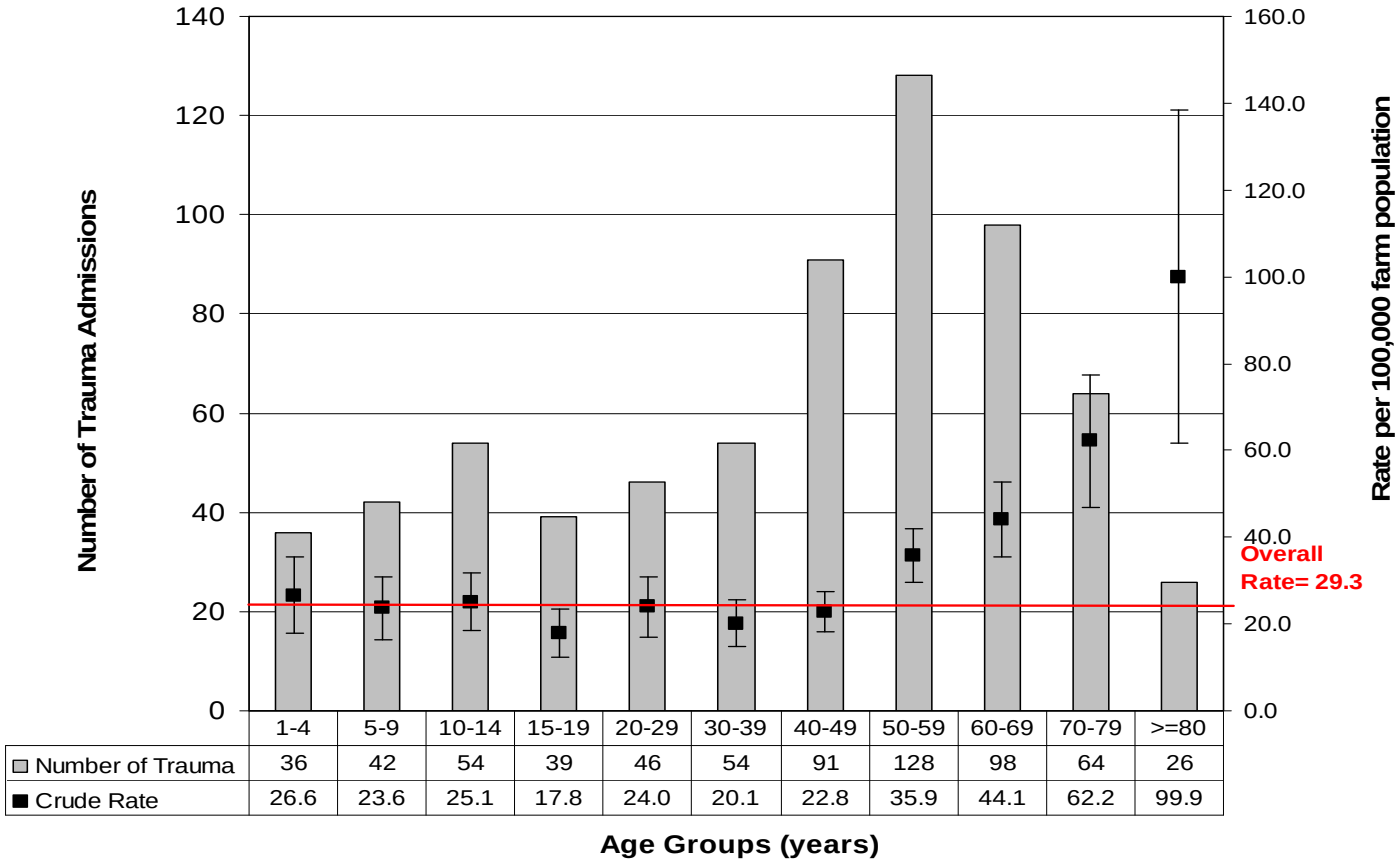
Agriculture Major Trauma Hospital Admissions, Health Zone of Injury, Alberta, 1996-2009

From January 1, 1996 to December 31, 2009, there were 678 patients who were seriously injured and treated at an Alberta Health Services trauma centre due to an agricultural-related injury. The highest number of injuries occurred in the Alberta Health Services North Zone with 30 per cent. The second and third highest injury zones accounted for 25 per cent and 17 per cent and were the Central Zone and Edmonton Zone respectively.



The Regional Health Authority zones in Alberta have changed several times from 1996-2010. In order to standardize the data the 2010 Alberta Health Services (AHS) zones are being used for this report. For a graphical representation of the current AHS zones see Appendix E.

Agriculture Major Trauma Hospital Admissions by Age Group, Alberta 1996-2009



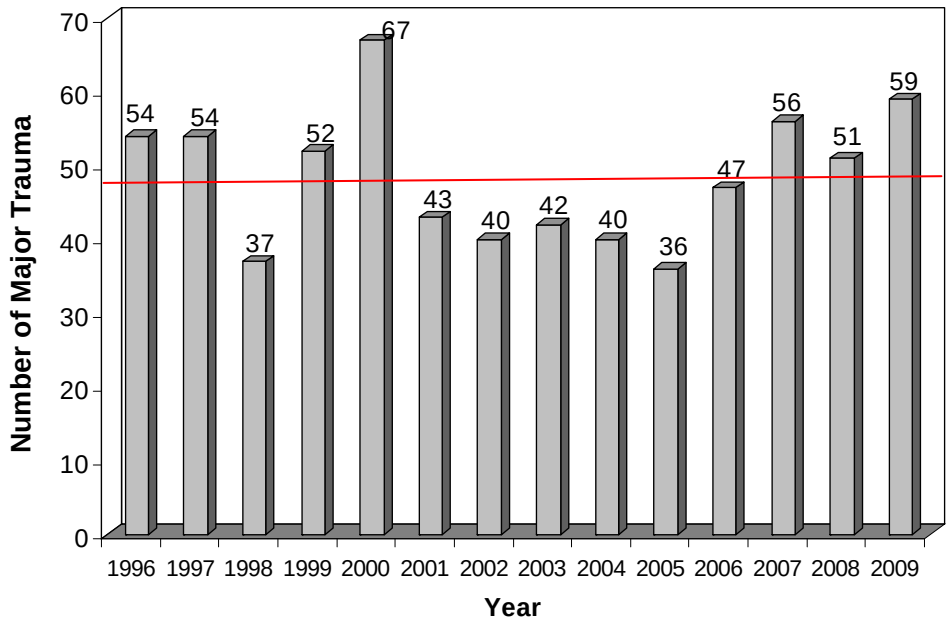
	1-4	5-9	10-14	15-19	20-29	30-39	40-49	50-59	60-69	70-79	>=80
Number of Trauma	36	42	54	39	46	54	91	128	98	64	26
Crude Rate	26.6	23.6	25.1	17.8	24.0	20.1	22.8	35.9	44.1	62.2	99.9

Over the fourteen year period from 1996 to 2009 there were 678 major trauma patients admitted (ISS >=12) due to an agricultural-related injury. Seventy-eight per cent of the admissions were males (529 admissions), the remaining 22 per cent were females (149 admissions).

When analyzing the major trauma admission rates and number, the age group which had the highest number of admissions did not have the highest admission rate. Those between 50 and 59 years of age had the highest number admissions with 128 over the 14 years but an admission rate of 35.9 admissions per 100,000 farm population. Residents 80 years of age and older had the highest admission rate with a rate more than twice that of those 50 to 59 years of age with a rate of 99.9 admissions per 100,000 farm population (26 major trauma admissions).

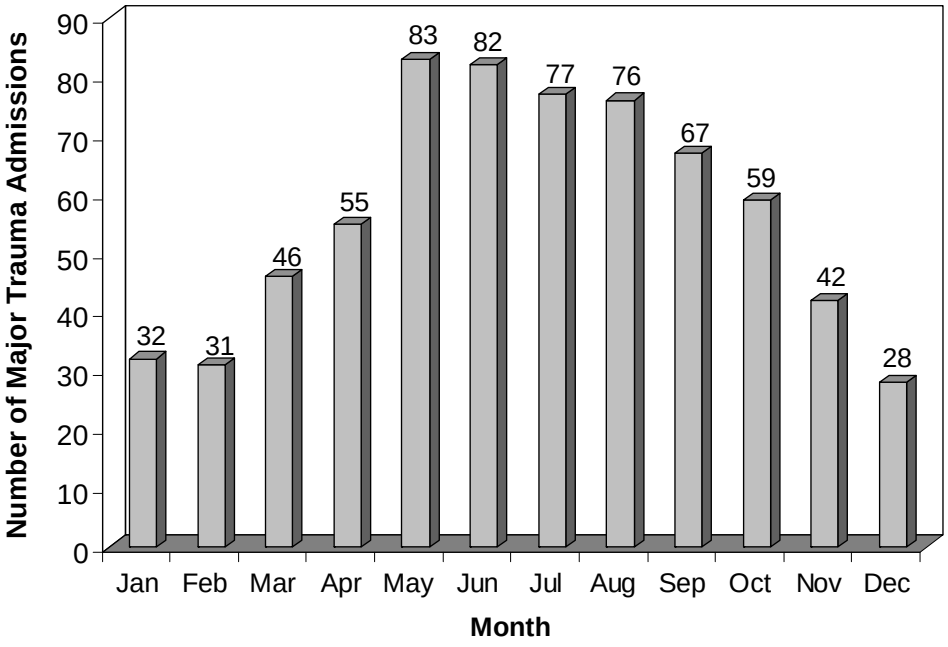
Agriculture Major Trauma Hospital Admissions by Year, Alberta 1996-2009

Over the fourteen year period from 1996 to 2009 there were 678 major trauma admissions. This equates to an average of 48 admissions each year. The highest number of admissions was in 2000 with 67, and the lowest number of admissions was in 1998 with 37 admissions.



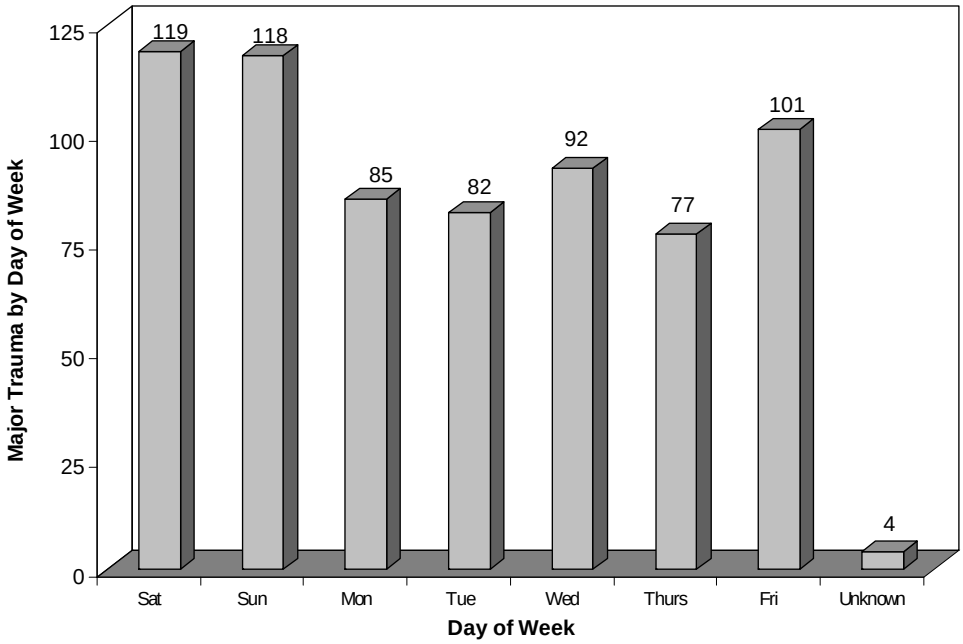
Agriculture Major Trauma Hospital Admissions by Month, Alberta 1996-2009

The distribution of agriculture- related major trauma admissions reflects season activity with more than half (56 per cent) occurring from May to September .



Agriculture Major Trauma Hospital Admissions by Day of the Week, Alberta 1996-2009

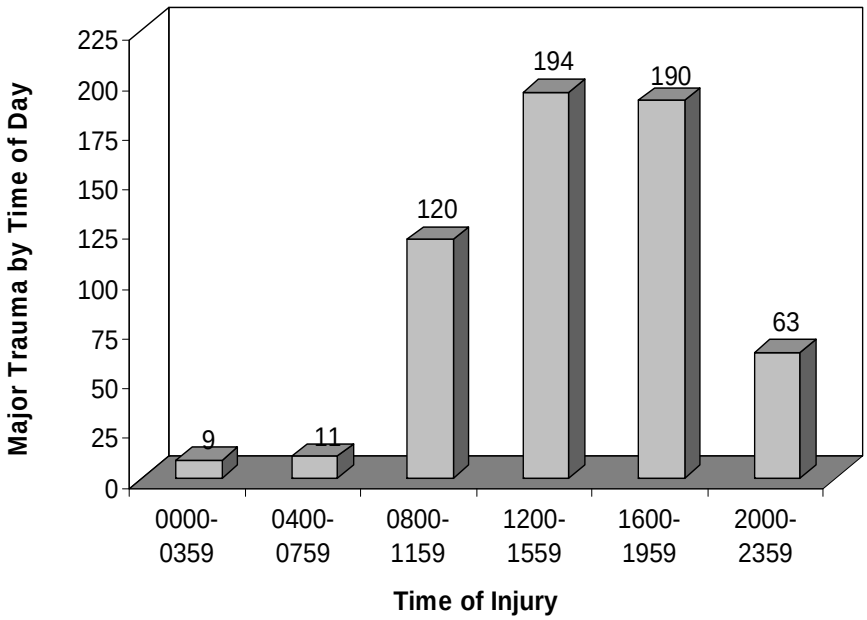
From 1996-2009 agricultural-related injuries occurred most frequently on Saturdays and Sundays at 18 per cent and 17 per cent respectively.



Agriculture Major Trauma Hospital Admissions by Time of Day, Alberta 1996-2009

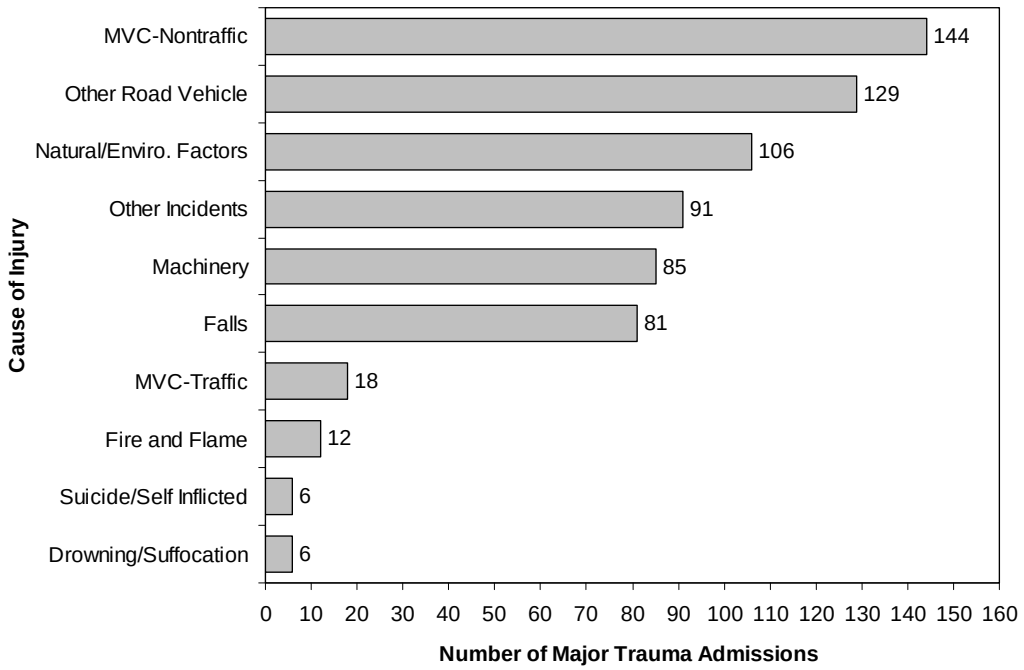
As expected most agricultural major trauma injuries occurred in the late afternoon and early evening. Between 1200-1559 hours (12 noon to 3:59 pm) there were 194 major trauma injuries accounting for 39 per cent. Between 1600-1959 hours (4:00 pm to 7:59 pm) there were 190 major trauma injuries accounting for 28 per cent.

There were 91 records with an unknown time of injury.



Agriculture Major Trauma Admissions by Cause, Alberta, 1996-2009

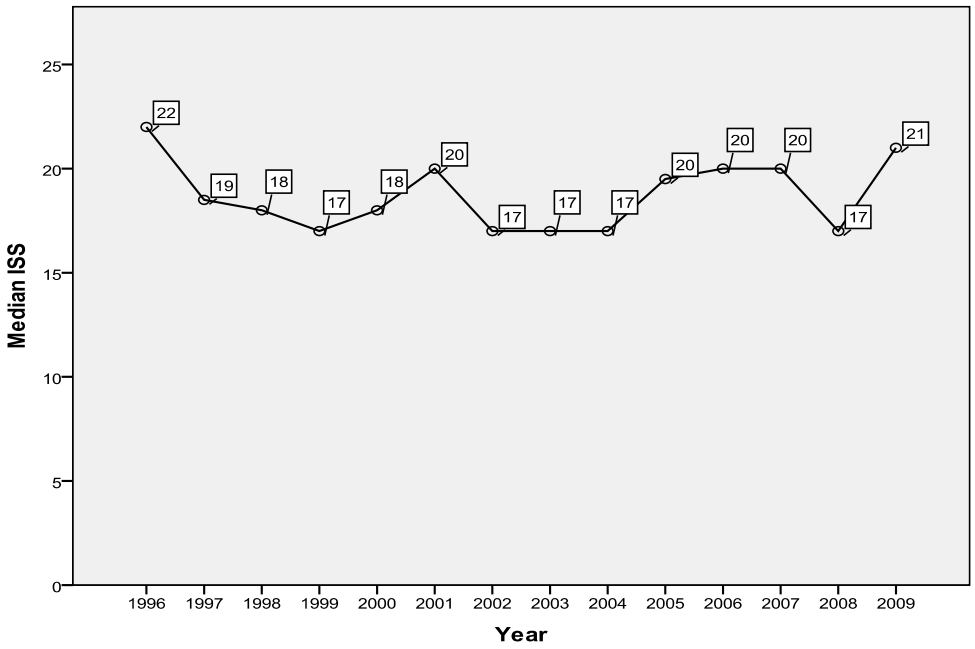
The leading cause of agriculture-related major trauma admissions was motor vehicle non-traffic incidents, incidents occurring any place other than public highways or roads accounted for the highest number of agricultural major trauma injuries with 21 per cent (144 trauma admissions) and typically includes all-terrain vehicles, motorcycles, farm equipment and snowmobiles. The second leading cause of agriculture-related major trauma admissions was other road vehicle accounting for 19 per cent (129 trauma admissions).



See appendix D for definitions.

Agriculture Major Trauma Hospital Admissions by Patient Outcomes Injury Severity Score (ISS), Alberta 1996-2009

The Injury Severity Score is an internationally recognized scoring system developed to assign a level of severity to an injury. As an extension of the Abbreviated Injury Scale (AIS); it is the sum of squares of the highest AIS score in each of the three most severely injured body regions. The ISS is scored 1 (minor) to 75 (major) with a higher score indicating increased severity and mortality. From 1996-2009 the median ISS for agricultural- related injuries was 18 (± 8.6). The ISS median trend from 1996-2009 occurs over a range of an ISS of 17-22.



Agriculture Major Trauma Admissions by Body Region Injured, Alberta, 1996-2009

The most frequent place of injury according to body region is the chest followed by the head. From 1996-2009, there were 335 chest injuries and 329 head injuries. Of those 329 head injuries 190 (58%) were classified as severe.

From 1996-2009 there was a total of 1418 injuries sustained across 678 agriculturally related major trauma patients, approximately 2 per patient.

Body Region	Number of Injuries	Percent n = 678
Chest/ T Spine	335	49.4%
Head/ C Spine	329	48.5%
Extremities	253	37.3%
Abdomen/ L Spine	219	32.3%
External	183	27.0%
Face	99	14.6%

*Note: The total number of injuries will not add up to the 678 patients injured agriculturally from 1996-2009. This is due to the fact that one patient may have sustained more than one injury per body region as well multiple injuries to multiple body regions.

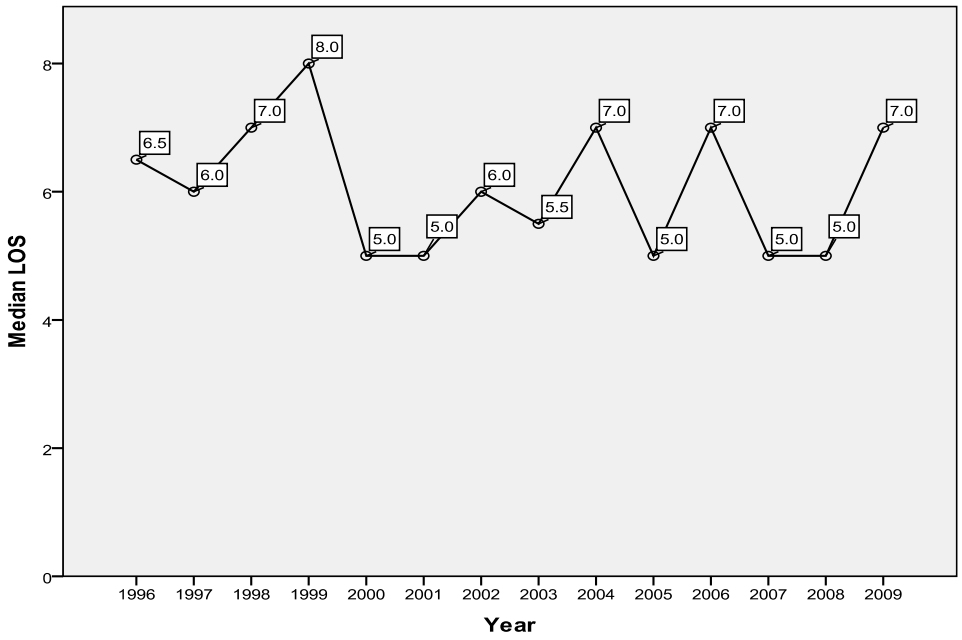
Agriculture Major Trauma Admissions by Surgical Service, Alberta, 1996-2009

From 1996-2009 there was a total of 410 (61%) major trauma patients brought to the operating room requiring a total of 994 hours of surgery over 458 operating room visits. There were 3 deaths in the operating room from 1996-2009.

Physician Service	Number of Cases N=410	Number of Procedures N=758
Ears, Nose, Throat	4	8
General Surgery	65	114
Neurosurgery	82	117
Ophthalmology	2	3
Orthopedics	135	258
Pediatric Surgery	11	14
Plastics	74	181
Urology	14	29
Cardiovascular	4	7
Thoracic	8	13
Other	11	14

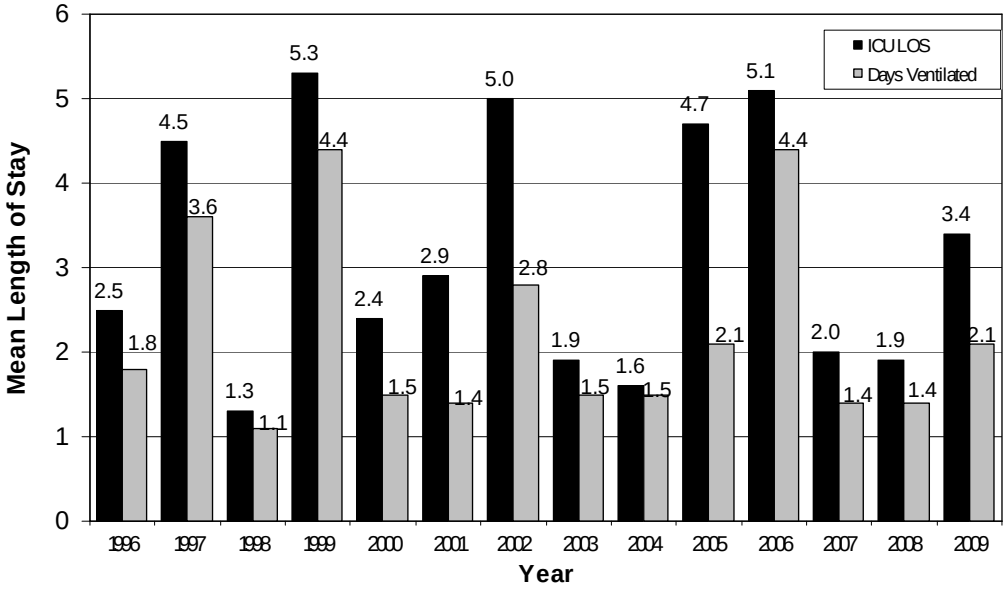
Agriculture Major Trauma Admissions by Length of Stay, Alberta, 1996-2009

The amount of time spent in hospital varies slightly each year for those admitted to hospital with an agricultural related major trauma. Median length of stay from 1996-2009 was 6.0 (±9.3) days and ranged from 5 – 8 days.



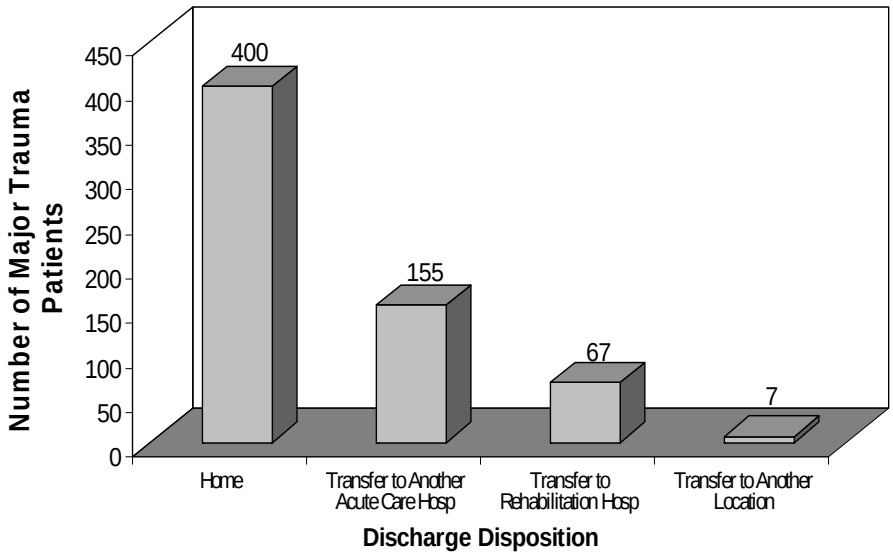
Agriculture Major Trauma Admissions by Intensive Care Unit Length of Stay, Alberta, 1996-2009

Some individuals were injured severely enough to require a stay in the Intensive Care Unit (ICU) following an agricultural injury from 1996-2009, the mean ICU length of stay is 3.2 ± 9.2 days with a range from 0-102 days. While staying in the ICU many patients needed to be ventilated, the mean number of ventilated days was 2.2 ± 7.6 days and ranged from 0 days ventilated to 100 days ventilated.



Agriculture Major Trauma Admissions by Discharge Disposition, Alberta, 1996-2009

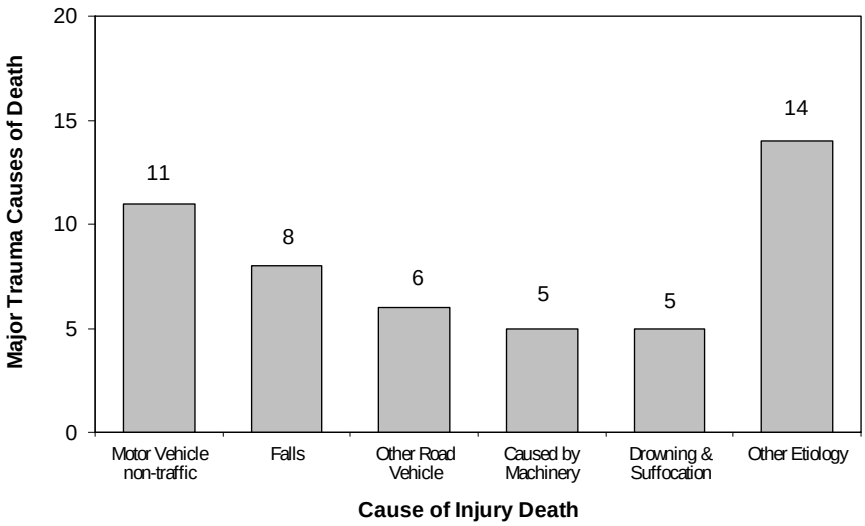
Patients' discharge dispositions are determined by the patients' outcomes. In Alberta, patients leave a tertiary trauma centre by various means. Of the 93 per cent of the patients who survived (629 patients) an agricultural-related injury, 59 per cent (400 patients) returned home with or without supports, while the remaining went to either another acute care facility (23%, n=155), to a rehabilitation facility (10%, n=67) or another location (1% n=7).



Agriculture Major Trauma Admissions by Cause, Alberta, 1996-2009

Of the 678 agricultural-related major trauma incidents in Alberta from 1996-2009, 7 per cent (49 deaths) of the patients died while in hospital.

The leading cause of in hospital deaths were as result of a motor vehicle non-traffic.



Data Limitations

The data has been collected in accordance to the definition of agriculture fatalities. However, there are limitations to this data collection if the injury has not been identified as having occurred on the on the farm or involving agriculture machinery or agriculture activities, these incidents are not captured. See appendix C.

Data abstraction is completed on-site at provincial chief coroners' or medical examiners' offices. The quality of the data is reflective of the detailed documentation available in the records at the provincial chief coroners' or medical examiners' offices. Data is collected in a consistent manner using a standard data abstraction form (Appendix C). Data are then sent to the national site for verification, coding and analysis.

There is also limitation identifying migrant workers. The numbers of migrant workers included in the denominator for calculating of rates only accounted for those workers who participated in the seasonal agricultural workers program from Citizenship & Immigration Canada.

Appendices

Alberta Centre for INJURY Control & Research

Appendix A
Death Data Abstraction Form

Please complete all fields. For fields where information is recorded as **.m**, please enter **99** in the database, with the exception of date fields – these should be left blank.
All responses that require additional details are followed by a (specify) in red. All specification fields (for example, SPPOLICE following POLICE) are in blue, for ease of use.

FILE #: _____-_____ ID: _____-_____-_____
year no. prov. year no.

Agricultural Fatalities: 1) Any unintentional injury resulting in death that occurred during activities related to the operation of a farm (as defined below) or ranch and/or 2) Any unintentional injury resulting in death that involved any hazard of a farm or ranch environment in Canada (excluding fatal non work-related injuries that took place in the farm residence). This includes deaths that occurred away from agricultural work locations if agricultural work was being done; e.g., transporting livestock or harvested crops on public highways. Deaths where victims were killed because a third party was engaged in agricultural work are also included.
Age: _____ Birthdate: ____ / ____ / ____ Birthdate missing (circle)? Yes No
mo dy yr
Sex (circle): M F Province: _____ County/Regional Municipality: _____

Region: _____ Date of Injury: ____ / ____ / ____ Weekday of Injury (circle): S M T W T F S
mo dy yr
Time of Injury _____ (24:00) Date of Death: ____ / ____ / ____
mo dy yr
Source of data for case identification (circle all that apply):
1 Coroner 2 Medical Examiner 3 Media (specify): _____

4 RCMP / police 5 Registrar General 6 Other (specify): _____

What sources were used during data abstraction from fatality files (circle all that apply):
1 Coroner 2 Medical Examiner 3 Media (specify): _____

4 RCMP / police 5 Registrar General 6 Other (specify): _____

A. DESCRIPTION OF INJURY EVENT
Circumstances - describe with as much detail as possible the circumstances surrounding the injury event. Please include as many details as possible about 1) activity at time of incident; 2) task; and 3)machinery involved in incident.

Appendix A
Death Data Abstraction Form

If injury was not machinery or vehicle related, complete Section B and then proceed to Section E.
If injury was machinery or vehicle related, begin with Section C and continue.

B. CAUSE OF INJURY NOT MACHINERY OR VEHICLE RELATED (Circle appropriate number) 1 crushed by animal (specify type of animal: _____) 2 struck by animal (specify: _____) 3 fall from animal (specify: _____) 4 struck by object 5 struck against object 6 caught in, under or between objects 7 fall from height 8 fall on same level 9 jumped to lower level 10 overexertion 11 drowning 12 exposure to fire / explosion 13 contact with temperature extremes 14 contact with electric current 16 contact with radiations, caustics, toxics or noxious substances: by (circle): inhalation ingestion absorption specify agent: _____ 18 asphyxiation (specify): _____ 19 firearm 77 other (specify): _____ 88 unknown	**C. CAUSE OF INJURY MACHINERY OR VEHICLE RELATED** (Circle appropriate number) 1 sideways rollover 2 backwards rollover 3 unspecified rollover 4 entangled/caught in machinery 5 pinned or struck by machine 6 collision 7 operator fell from machine, not runover 8 operator fell from machine, then runover 9 passenger fell from machine, not runover 10 passenger fell from machine, then runover 11 runover of operator 12 runover of passenger 13 runover of bystander 77 other (specify): _____	**D. TYPE OF MACHINERY** (Circle all numbers that apply if injury event was machinery or vehicle related) 1 tractor 2 auger (specify): _____ 3 mower 4 power take off (specify machinery PTO attached to): _____ 5 baler 6 farm wagon (specify): _____ 7 combine 8 power tool (not chainsaw) 9 chainsaw 10 welder 11 harvester 12 plough/disk 13 hay elevator 14 manure spreader 15 bulldozer, bob cat, skid steer 16 motor vehicle (specify): _____ 17 off road vehicle (specify): _____ 18 swather 77 other farm implement (specify): _____ 88 unknown
E. IMMEDIATE LOCATION OF INJURY 1 Field 2 Barn 3 Silo / grain bin (specify: _____) 4 Shed 5 Farm Yard 6 Road/highway 7 Driveway 8 Farm House 9 Farm Road 11 Water source (e.g. ditch, dugout, pond, etc.) (specify: _____) 13 Corral/outdoor animal enclosure 77 Other (specify: _____) 88 Unknown	**F. RELATION OF INJURED PERSON TO FARM OWNER** 1 Operator 2 Spouse of farm operator 3 Child of farm operator 4 Other relative of farm operator (specify: _____) 5 Hired worker 6 Spouse of hired worker 7 Child of hired worker 8 Other relative of hired worker (specify: _____) 9 Other child 10 Visitor 77 Other (specify: _____) 88 Unknown	**G. LOCATION OF DEATH** 1 Found dead 2 Died en route 3 Died in hospital 7 Other (specify: _____) 8 Unknown

Appendix A
Death Data Abstraction Form

H. METHOD OF DISCOVERY

Who found deceased (i.e. relationship to deceased)? _____ *Check if information not available:*

Time last seen: _____ (24:00) Time found: _____ (24:00) >24 hrs? Y N

Witnessed? Not witnessed?

I. NATURE OF INJURY BY BODY PART e.g., crush injury, chest (List from most to least serious injury, where most serious injury refers to injury attributed to cause of death)

NATURE OF INJURY: _____BODY PART: _____
NATURE OF INJURY: _____BODY PART: _____
NATURE OF INJURY: _____BODY PART: _____

J. WAS E-CODING USED TO CODE THE EXTERNAL CAUSE OF INJURY?

1 Yes specify code used: _____
2 No how was cause of injury coded? _____

K. REVIEW FOR CONSENSUS? (please circle) Yes/No - If yes, please explain points needing consensus opinion.

Appendix B
Decision Rules

Inclusion of deaths and injuries in the fatality and hospitalization databases
Alcohol Involvement
Deaths and injuries where the victim was under the influence of alcohol are included in the databases if they involved agricultural work or an agricultural hazard.
Fires
Deaths and injuries due to fires in farm or ranch residences, where the source of the fire was not an agricultural hazard (e.g., stored gasoline) are excluded from the databases, because these data were not collected consistently for residential farms and ranches in all provinces. All injuries or deaths due to fires in agricultural machinery or in barns and other out-buildings associated with the agricultural operation are included in the databases.
Collisions on Highways
Deaths and injuries due to collisions on public highways that involved agricultural vehicles, agricultural machinery or farm animals were included in the databases; for example, collisions with other vehicles, trains, people, farm animals, objects and bodies of water.
Inclusion of deaths in the fatality database
Pre-existing Medical Conditions
Deaths attributed to pre-existing medical conditions (e.g., seizure, heart attack) are excluded from the fatality database. Deaths where an agricultural injury was immediately preceded by a significant medical event such as a stroke, seizure or heart attack, are also excluded.
Secondary Complications
Deaths that occurred in hospital from secondary complications of agricultural injuries (e.g., embolism, respiratory distress) are included in the fatality database. Note: New Brunswick does not identify these cases as farm-related if the death occurred more than two weeks after the agricultural injury.
Other Deaths in Farm Residences
Deaths in an agricultural residence (farm house) are excluded from the fatality database unless some aspect of agricultural work caused the death.
Suicides
Completed suicides are excluded from the fatality database, as are other deaths where the investigating coroner or medical examiner judged that the cause of death was probably suicide. Deaths where the possibility of suicide was mentioned on the death certificate or coroner's/medical examiner's report, but where the final cause of death was deemed accidental, were included in the fatality database.

Designation as work-related deaths in the fatality database
Vehicle Maintenance
Deaths that occurred during the maintenance of motor vehicles (e.g., cars, pick-up trucks and vans) were not designated as work-related in the fatality database because these data were not consistently collected in all provinces. Also, it was not possible to determine whether agricultural work was involved at the time of death. Deaths that occurred during the maintenance of tractors and other farm machinery were designated as work-related.
Exposure
Deaths due to exposure (heat exhaustion or hypothermia) were not designated as work-related in the fatality database unless the victim was injured during the course of agricultural work. Deaths due to exposure were not consistently identified in all provinces.
Firearms
Deaths due to firearm use on farms or ranch holdings were designated work-related if the death was ruled accidental and the gun was being used for agricultural work (shooting pests, sick livestock, etc.).
Aircraft
Deaths due to aircraft crashes during crop spraying and other agricultural activities were designated as work-related fatalities.
Recreational Vehicles
Deaths involving recreational vehicles such as all-terrain vehicles, dirt bikes and dune buggies were not designated as work-related fatalities unless the RV was being used for agricultural work at the time of the accident.
Children at Play
Deaths of children who were playing in the agricultural work place were designated as work-related if their deaths occurred because someone was engaged in agricultural work. This included cases where a person engaged in agricultural work was unable to supervise a child that he/she had taken to the agricultural work place (e.g. drownings) and cases where a child was killed as a direct result of someone engaged in an agricultural work activity (e.g., extra rider deaths, blind runovers).
Collisions on Highways
Deaths due to collisions on public highways were designated as work-related if an agricultural work activity was involved; e.g., transporting livestock, machinery or harvested crops; herding livestock.

Appendix C
Glossary– General Terms

Agricultural Fatalities
CAIR defines an agricultural injury fatality as: 1) Any unintentional injury resulting in death that occurred during activities related to the operation of a farm (as defined below) or ranch and/or 2) Any unintentional injury resulting in death that involved any hazard of a farm or ranch environment in Canada (excluding fatal non-work-related injuries that took place in the farm residence). This includes deaths that took place away from agricultural work locations if agricultural work was being done; e.g., transporting livestock or harvested crops on public highways. Deaths where victims were killed because a third party was engaged in agricultural work are also included. CAIR further sub-divides agricultural injury fatalities into two types: work-related agricultural fatalities and non-work-related agricultural fatalities.

Denominator data
Data used as denominator values in rate calculations. If presented as a fraction, the lower half of an injury or illness rate refers to the population exposed over a given period of time.

Farm
Any farm or other agricultural holding that produces at least one of the following agricultural products intended for sale: crops, livestock, poultry, animal products, greenhouse or nursery products, mushrooms, sod, honey, or maple syrup products. (*Census of Agriculture, Statistics Canada.)*

Non-work-related agricultural fatalities
Deaths that, while occurring on a farm or ranch, or caused by some aspect of the agricultural environment, were either not directly related to agricultural work or not collected in a consistent manner across the country. For the purposes of clarity, they are analyzed separately from work-related agricultural fatalities. Examples of these fatalities include deaths on agricultural vehicles being used for recreational purposes.

Numerator data
Data used as numerator values in rate calculations. If presented as a fraction, the top half of an injury or illness rate refers to the number of cases (events).

Rates
In the context of injuries or fatalities, this means the number of cases per time period or per population group over a given time period; for example, the number of persons injured per 100,000 agricultural workers per year.

Surveillance
The ongoing systematic collection, analysis, interpretation and dissemination of health data.

Work-related agricultural fatalities
Work-related agricultural fatalities are deaths that occurred during the course of agricultural work. This includes deaths that took place away from the farm or ranch if agricultural work was being done (e.g., transporting livestock or harvested crops on public highways.) Deaths where the victim(s) were killed while a third party was engaged in agricultural work are also included.

Appendix C
Glossary– General Terms

NON-MACHINE-RELATED

Crushed by/struck by animal* -Includes being crushed, kicked, gored or butted by an animal. Includes crush injuries sustained after a fall from an animal. Does not include bites.
Other animal injury* -Includes being bitten, mauled or dragged by an animal.
Fall from an animal* -Includes falls from animals that were not followed by a crush injury.
Struck by an object -Includes being struck by a falling, swinging, slipping, propelled, rolling or sliding object, or by a collapsing structure or structural element. Does not include being struck by an object falling or propelled from a machine. Does not include being caught or asphyxiated under an object or structure.
Struck against an object-Includes injuries where the victim was moving and struck against a non-machine object, or stepped on a stationary object. Does not include injuries where the victim struck the object after tripping, falling or stumbling.
Caught-in, under or between objects -Includes being caught in, under, or between non-machine objects; being compressed or pinched by rolling, sliding or shifting objects; being caught in, under or between a moving and a stationary object, or two or more moving objects; being trapped under collapsing structures; being asphyxiated due to being trapped in, under or between non-machine objects. Does not include being caught in grain or soil.
Falls from height -Includes falls from scaffolds, walkways, platforms, roofs, and piled or stacked materials; falls on stairs or steps; falls into shafts, excavations, floor openings, etc.; and falls from ground level to a lower level. Does not include falls from machines or falls on the same level.
Fall on the same level -Includes slipping, tripping or stumbling onto the surface the victim was standing on, or onto or against objects on that surface.
Jumped to a lower level-The abstraction source must include a statement of intent to jump. Includes jumps from scaffolding, platforms, loading docks, structures etc. Does not include jumps from machines.
Overexertion-Includes injuries sustained in lifting, pulling, pushing, holding, wielding or throwing objects. Does not include machine-related overexertion.
Drowning-Includes drowning in any liquid such as water, manure or sewage, in any location. Excludes asphyxiation in grain or soil.
Exposure to fire/explosion-Includes fires in farm buildings or other farm structures, such as bunk houses for hired workers; forest, brush, grass, or other outdoor fires, whether or not they were set deliberately; ignition of clothing; and explosions of any kind. Excludes machine-related fires and fires in the farm residence.
Contact with temperature extremes
Includes exposure to atmospheric or environmental heat, exposure to atmospheric or environmental cold, or contact with hot or cold objects or substances. Excludes contact with hot or cold objects or substances from machines (e.g., radiator fluid, oil).
Contact with electric current-Includes all contact with electric current except for electrocutions while sitting in or working with a machine and electrocutions due to lightening strikes.
Contact with radiation, caustic, toxic or noxious substances-Includes contact with, consumption or inhalation of pesticides, herbicides, fungicides, insecticides, rodenticides, or fertilizers; inhalation of silo gas, methane, hydrogen sulfide, carbon monoxide, mould, organic dust; exposure to venom (e.g, from insect stings or snake bites); accidental vaccinations; allergic reactions, including anaphylaxis, due to contact with any noxious substance. Excludes asphyxiations due to entrapment in grain, silage or soil.
Asphyxiation-Includes asphyxiation due to entrapment in flowing grain, silage, or soil; trench collapse. Excludes traumatic asphyxiations and drownings.
Firearms-Includes unintentional injuries due to being shot by any kind of gun.

*For the purpose of this report, the animal injury categories have been combined.

Appendix C
Glossary– General Terms

Cause of Machinery/Vehicle Injury

Definition: MACHINERY OR VEHICLE-RELATED-refers to injuries where the source of the energy that caused the injury was a machine or part of a machine, or where the location of the injury was from a machine (e.g. fall from a machine), or where a machine was directly involved in the injury event.

A machine is an implement or tool that contains moving parts that are powered mechanically or manually (excludes simple hand tools, e.g. screw drivers and crow bars).

MECHANISM OF INJURY means the most immediate cause (i.e. closest in time to the actual occurrence of the injury) of the transfer of energy that resulted in the injury.

If the cause of injury is machinery or vehicle-related but an appropriate description of the cause is not available enter "Other machinery-related" and specify in as much detail the event.

Machinery/motor vehicle traffic collision
When coding the machinery/vehicles which are involved in a collision on a public roadway, code the farm machinery/ vehicle. If more than two vehicles are involved, describe the other vehicle when describing the farm machinery/vehicle. e.g. "truck and car"
Includes:

- collision between farm machinery/vehicle
- collision between farm machinery/vehicle and other vehicles
- collision between farm truck and other vehicles
- collision between farm vehicle/machinery and a stationary object
- collision between farm vehicle and a pedestrian or an animal on a public roadway
- collision between non-farm vehicle and a farm animal or an agricultural worker on a public roadway

Excludes:

- non-traffic collision between farm vehicle and pedestrian

Cause of machinery/vehicle injuries are listed alphabetically by the action (entangled, fall, jump, other, overexertion, pinned, rollover, runover, struck, unknown).

Entangled/caught in machinery
Includes:
any part of the body becoming trapped in the moving parts of machinery.

Fall from machinery, not runover, operator
Fall from machinery, not runover, passenger
Fall from machinery, not runover, person unspecified
Applies when it cannot be inferred from the text description whether the victim was the operator of or a passenger on the machinery. Children less than age 10 should be assumed to be passengers unless otherwise specified.
Fall from machinery, then runover, operator
Fall from machinery, then runover, passenger
Fall from machinery, then runover, person unspecified
Applies when it cannot be inferred from the text description whether the victim was the operator of or a passenger on the machinery. Children less than age 10 should be assumed to be passengers unless otherwise specified.

Appendix C
Glossary– General Terms

Jump from machinery to lower level
Includes:
injuries that occurred when the victim intentionally jumped to a lower level from a machinery (e.g., jumped off a tractor, combine, truck, etc.)
Excludes:
injuries that occurred due a slip or trip while mounting/dismounting a machinery. Select "Fall from machinery…"

Not Applicable (not machinery-related)
Other Machinery-Related
Other machinery-related injury not specified in list provided. Provide details.
Overexertion- machinery-related
Includes:
- overexertion injuries caused while moving, pushing, pulling, repairing machinery (e.g., back strain that occurred while moving a grain auger)

Pinned/struck by machinery
Includes:
- being struck by machinery, but not runover
- being caught between two machines, but not runover
- being caught between machinery and another stationary object, but not runover e.g., as a result of blocking or jack collapse, hydraulic failure.

Excludes:
- being run over by machinery

Rollover- backwards
Includes:
- injuries caused by machinery rolling over backwards. (The front tires of the machinery rotate around its rear axle by 90-180°)

Excludes:
- injuries due to being runover by an upright machinery

Rollover- sideways
Includes:
- injuries caused by machinery/vehicle rolling over on its side and crushing the victim as it rolled. Usually the victim was operating or riding on the machinery.

Excludes:
- injuries caused by being runover by an upright machinery

Appendix C
Glossary– General Terms

Rollover- unspecified
Includes:
- machinery rollover events where the direction of the roll (sideways or backwards) cannot be inferred or where the vehicle rolled end over end.

Excludes:
- injuries due to being runover by an upright machinery

Runover of alighted operator by unmanned machinery
Runover of alighted passenger by machinery - dismounted
Runover of bystander
Runover of person unspecified
Applies when it cannot be inferred from the text description whether the victim was the dismounted operator of the machinery, a dismounted passenger, or a bystander.

Struck against machinery
Includes:
- injuries that occurred when the victim struck a body part against a machinery (e.g., while repairing a combine, the victim struck his leg against a sharp metal protrusion causing a laceration)

Struck by object propelled/falling off machinery
Includes:
- being struck by an object (e.g., bale or log) while hoisting it or unloading it from a machinery (e.g., tractor with front end loader or truck trailer/flat deck)
- being struck by an object that was propelled by a machinery (e.g., stone propelled from mower struck the victim; towing chain broke and struck the victim)
- being struck by a part broken from a machinery (e.g., the belt of a grain auger broke striking the victim; the pins of a front end loader broke and the front end loader fell off a tractor striking the victim)

Unknown the type of injury is unknown (not documented)

Appendix C
Glossary– General Terms

Cause of Injury (non-machinery of Injury)

Definition: NON-MACHINERY OR VEHICLE-RELATED. The most immediate cause (i.e. closest in time to the actual occurrence of the injury) of the transfer of energy that resulted in the injury.

Animal- Crushed by/struck by animal (select the animal from list)
Includes
- being kicked, gored, crushed or butted by an animal
- example: victim rides horses, falls off, and horse falls on him, crushing him
- example: victim was kicked by a bull

Excludes:
- being bitten

Animal- Fall from animal (select the animal from list)
Example: victim falls off horse, striking his head on the ground

Animal- Other type of Animal Injury (specify type of animal)
- example: victim bitten or mauled by dog
- example: victim caught in reins then dragged by horse

Caught in/under/between objects
Includes:
- compressed/pinched by rolling, sliding/shifting non-machinery objects
- compressed/pinched by moving and a stationary non-machinery objects
- compressed/pinched by two or more moving non-machinery objects
- compressed/pinched by objects falling during handing; if the object traps the victim
- caught in, under, or between, not elsewhere classified

Excludes:
- caught under an object (e.g. bale or log) that has fallen from a machinery (e.g., tractor with front end loader or truck trailer/flat deck) while hoisting or unloading the object
- crush asphyxiations that are machinery-related

Contact with electric current
Excludes:
- contact with overhead wires via a machinery or part of a machinery e.g. grain auger, crane boom FEL, overhead electrocution with grain auger. Select "Other non-machinery-related"
- Struck by lightening. Select "Other non-machinery-related"

Appendix C
Glossary– General Terms

Contact with radiation/caustic/toxic or noxious substances or environments

- Includes:
- pesticides (includes herbicides, fungicides, insecticides, rodenticides, etc.)
- silo gas (nitrous oxides)
- manure pit gases (methane, hydrogen sulfide gas)
- carbon monoxide
- insect stings;, venom
- allergic reactions including anaphylaxis
- other toxic or noxious substances, not elsewhere classified

Excludes:

- mechanical asphyxiation and asphyxiation due to entrapment in flowing grain, silage or soil

Specify the contacting agent

Contact Method:

Select from the drop down menu the contact method

- absorption
- ingestion
- inhalation
- not applicable
- unknown

Contact with temperature extremes

Includes:

- general heat – atmospheric or environmental
- general cold – atmospheric or environmental
- hot objects or substances
- cold objects or substances
- contact with temperature extremes, not elsewhere classified

Excludes:

- contact with hot objects or substances coming from machinery (e.g., radiator fluid). Select "Other machinery related"

Exposure to fire/explosions

Includes:

- fire in building or other structure including bunk house for hired workers
- forest, brush, grass, or other outdoor fire
- ignition of clothing from controlled heat source, explosion

Excludes:

- fire in farm residence except where caused by material (e.g. gasoline) stored for agricultural use, fires in machinery, explosions in machinery. Select "Other machinery-related"

Appendix C
Glossary– General Terms

Fall injuries - If it is not clear that the fall is from one height to a lower level, then code as "fall on same level".

Fall from height

Includes:

- from scaffolds, walkways, platforms, etc.
- from ladders
- from roof
- from piled or stacked materials
- on stairs or steps
- into shafts, excavations, floor openings, etc.
- through floor surface
- from ground level to lower level
- fall from elevation, not elsewhere classified

Excludes:

- falls from machinery

Fall on same level

Includes:

- fall to the walkway or working surface
- fall onto or against object
- fall on same level, not elsewhere classified

Firearms

Includes:

- injuries due to being shot by a gun, where the gun involved was a tool used in the course of farm work.

Jumped to lower level

This code is to be used only when the abstraction source documents contain a statement of intent (e.g. As the victim "jumped" down from the tractor…..)

- Includes:
- from scaffold, platform, loading dock
- from structure, structural element, not elsewhere classified
- from stationary vehicle; to lower level, not elsewhere classified

Excludes:

- jumps from stationary or moving machinery

Near Drowning

Includes:

- near drowning in manure pit, ditch, dugout, pond, other water bodies

Excludes:

- near drowning due to flowing grain, silage, soil. Select" Caught in, under or between objects"

Other non-machinery-related

This includes non-machinery-related injuries not provided in the list

Overexertion

Includes:

- lifting non-machinery objects
- pulling or pushing non-machinery objects
- holding non-machinery objects
- overexertion-not elsewhere classified

Appendix C
Glossary– General Terms

Struck against object
Includes:
- person was moving and struck against the object (not vehicle or machinery)
- struck against moving object
- step on stationary object
- struck against stationary object
- struck against, not elsewhere classified

Struck by object
Includes:
- moving object (not a vehicle) striking against a person
- flying object
- swinging or slipping object
- rolling, sliding object on floor
- falling object during handling
- falling object-not elsewhere classified
- struck by- not elsewhere classified

Excludes:
- being struck by an object (e.g. bale or log) while hoisting or unloading it from a machinery (e.g., tractor with front end loader or truck trailer/flat deck)
- falling object during handling, if the object traps the victim. Select "Caught in, under, or between objects"

Unknown (non-machinery-related) Specify

Alberta Centre for INJURY Control & Research

Appendix D
Glossary– Major Trauma

Definitions for Major Trauma Hospital Admissions

Abbreviated Injury Scale or Abbreviated Injury Score (AIS): A numerical scale ranging from 1 (minor injury) to 6 (virtually un-survivable injury). Scores are subjective assessments of the severity of injury, assigned to specific anatomical diagnosis by trauma experts.

Blunt Injury Type: Refers to the type of injury reflecting the cause of injury (i.e. a motor vehicle collision, a blow to the head). Blunt injury may include deep lacerations but does not include any injury in which a missile such as a knife or bullet enters the body.

Collector: Specialized software from Digital Innovation, Inc., used by all participating trauma registries to collect pre-hospital demographics, nature, and cause of injury, and follow up information on severely injured patients.

External Cause of Injury Codes (E-codes): Based on the International Classification of Diseases (ICD-9th revision). These codes allow for the classification and analysis of environmental events, circumstances, and conditions as the cause of injury. All reports are based on the first recorded E-code, unless otherwise specified.

Farm/ Agricultural Location Code: These include injuries that occurred in any farm building or any land being cultivated. It does not include injuries that occurred in the farm house. This would be accounted for under injuries that occurred in the home.

ICD (International Classification of Diseases): The International Classification of Diseases is a World Health Organizations (WHO) publication that classifies morbidity and mortality information for statistical purposes, and for the indexing of hospital records by disease and operations, for data storage and retrieval. ICD manuals may be found in hospital Health Record Departments or in public libraries.

In-Hospital Death: An admitted patient, who dies during their hospital stay after admission, includes those patients who are dead on arrival (DOA) or who die in the Emergency Department.

Injury Severity Scale or Injury Severity Score (ISS): The Injury Severity Score is an internationally recognized scoring system developed to assign a level of severity to an injury. As an extension of the Abbreviated Injury Scale (AIS); it is the sum of squares of the highest AIS score in each of the three most severely injured body regions. The ISS is scored 1 (minor) to 75 (major) with a higher score indicating increased severity and mortality.

Length of Stay (LOS): Total number of hospital days as calculated from the date of admission through to the date of discharge or death.

Major Trauma Patient: A person admitted to a trauma centre for treatment of an injury with an ISS $\geq$12.

Motor Vehicle: Any mechanical or electronically powered device, not operated on rails which any person or property may be transported or drawn, operating on a public roadway or highway.

Motor Vehicle Non-Traffic Incident: Any motor vehicle incident that occurs entirely in any place other than public highway or roadway.

Motor Vehicle Traffic Incident: Any motor vehicle incident that occurs entirely on a public highway or roadway.

Appendix D
Glossary– Major Trauma

Other Road Vehicle Incident: Any incident involving a transportation device, other than a motor vehicle, which can transport a person or property on a public roadway or highway (example: animal-drawn vehicles; animals carrying a person; pedal cycles, etc.)

Pedal Cycle Incident: An incident that involves a pedal cycle, but not a motor vehicle.

Penetrating Injury Type: Refers to an injury caused by a missile entering the body. Missiles include bullets, knives, and items such as pieces of sharp glass or metal.

Trauma: Injury resulting from the transfer of energy further defined in accordance to the Canadian National Trauma Registry parameters as blunt or penetrating injuries and burns included in the International Classification of Diseases (ICD 9-CM), external cause of injury codes (E-codes) 800-998.
Note: Poisonings, certain types of immersion, thermal, and exposure injuries are not included in this report as they fall outside the National Trauma Registry parameters for trauma.

Transport Incident: Any incident (E800-E848) involving a device designed primarily for, or being used at the time primarily for, conveying persons or goods from one place to another. In classifying incidents which involve more than one kind of transport, the following order of precedence of transport incidents should be used: aircraft and spacecraft, watercraft, motor vehicle, railway, other road vehicles.

Trauma Centre: Institution that is equipped and committed to providing specialized care to trauma patients.

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Appendix E
Denominator Data
Alberta Farm Population by Age Group and Year—extrapolated
Statistics Canada, Census of Agriculture 1996, 2001, 2006

Children	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1-4	16,091	15,545	14,999	14,453	13,907	13,361	12,815	12,269	11,723	11,177	10,631
5-9	20,633	20,000	19,367	18,734	18,101	17,468	16,835	16,202	15,569	14,936	14,303
10-14	22185	21605	21025	20445	19865	19285	18705	18125	17545	16965	16385
Total	58,909	57,150	55,391	53,632	51,873	50,114	48,355	46,596	44,837	43,078	41,319
Adults											
15-19	19,596	19,260	18,924	18,588	18,252	17,916	17,580	17,244	16,908	16,572	16,236
20-29	21,013	20,315	19,635	18,909	18,186	17,500	16,790	16,086	15,408	14,706	14,013
30-39	37,898	36,315	34,707	33,084	31,431	29,843	28,245	26,612	25,054	23,481	21,858
40-49	30,558	30,510	30,427	30,334	30,235	30,173	30,115	30,032	29,989	29,921	29,833
50-59	23,708	23,775	23,844	23,924	23,986	24,061	24,135	24,204	24,280	24,356	24,431
Total	132,773	130,175	127,537	124,839	122,090	119,493	116,865	114,178	111,639	109,036	106,371
Older Adults											
60-69	18,214	17,890	17,566	17,242	16,918	16,594	16,270	15,946	15,622	15,298	14,974
70-79	5,722	5,805	5,888	5,971	6,054	6,137	6,220	6,303	6,386	6,469	6,552
>80	1,147	1,185	1,223	1,261	1,299	1,337	1,375	1,413	1,451	1,489	1,527
Total	25,083	24,880	24,677	24,474	24,271	24,068	23,865	23,662	23,459	23,256	23,053

Children	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total	% Pop Change
1-4	10,085	9,688	9,291	8,894	8,497	8,100	7,703	7,306	6,909	223,444	-57.06
5-9	13,670	13,037	12,404	11,771	11,138	10,505	9,872	9,239	8,606	292,390	-58.29
10-14	15805	15388	14971	14554	14137	13720	13303	12886	12469	339368	-43.80
Total	39,560	38,113	36,666	35,219	33,772	32,325	30,878	29,431	27,984	855,202	-52.50
Adults											
15-19	15,900	15,671	15,442	15,213	14,984	14,755	14,531	14,307	14,078	331,957	-28.16
20-29	13,310	13,190	13,065	12,960	12,885	12,770	12,720	12,605	12,505	308,571	-40.49
30-39	20,255	19,210	18,170	17,120	16,120	15,120	14,095	13,120	12,170	473,908	-67.89
40-49	29,760	29,253	28,746	28,234	27,767	27,270	26,803	26,311	25,859	582,130	-15.38
50-59	24,503	24,925	25,345	25,765	26,202	26,627	27,053	27,481	27,909	500,514	17.72
Total	103,728	102,249	100,768	99,292	97,958	96,542	95,202	93,824	92,521	2,197,080	-30.32
Older Adults											
60-69	14,650	14,993	15,334	15,677	16,018	16,360	16,702	17,044	17,386	326,698	-4.55
70-79	6,635	6,948	7,261	7,574	7,887	8,200	8,513	8,826	9,139	138,490	59.72
>80	1,565	1,695	1,825	1,955	2,085	2,215	2,345	2,475	2,605	33,472	127.11
Total	22,850	23,636	24,420	25,206	25,990	26,775	27,560	28,345	29,130	498,660	16.13

Numbers from the 1996, 2001 and 2006 Canada Census of Agriculture (highlighted in yellow) were used to extrapolate the data for the years in which the census was not performed. In addition to the Canada Census of Agriculture population, temporary foreign workers under the seasonal agriculture workers program from Citizenship & Immigration Canada were included.

Source: Citizenship & Immigration Canada, RDM, Preliminary 2010 Data.

Appendix E
Map of Alberta Health Service Zones

Map of AHS Zones