

Foreword and Executive Summary

Agricultural Fatalities in Canada For 1990-2005 includes an analysis of Canadian Agricultural Surveillance Program (CAISP) fatal agricultural injury data in Canada for the sixteen calendar years from 1990 to 2005. The purpose of this report is to describe the magnitude of the agricultural fatality problem in Canada and to determine age-related patterns of injury. A main objective of CAISP 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, CAISP is able to monitor the effectiveness of prevention programs and to identify patterns of injury arising from new equipment and changes in farming practices.

CAISP data show that agricultural injuries are not due to random or isolated “accidents”. There are many recurrent patterns of injury. In the sixteen years from 1990-2005, 1,769 people were killed in agricultural injury events in Canada. Agricultural machines were involved in 70.9% of the fatalities. Adults aged 60 and over had the highest percentage of machine related deaths (74.1%), whereas children aged 1 to 14 had the lowest percentage of deaths involving agricultural machines (64.1%). Overall, more than half of the agricultural fatalities were due to four machine-related causes: machine rollovers, machine runovers, machine entanglements and traffic collisions. The top five causes of agricultural fatalities in Canada were machine rollovers (20.5%), machine runovers (18.6%), machine entanglements (8.3%), traffic collisions (7.3%), and being pinned or struck by a machine (7.0%).

Of those fatally injured as a result of agricultural work, 91.6% were male. The percentage of males killed was highest for adults aged sixty and over (95.2%) and lowest for children under age fifteen (79.3%). From 1990 to 2005, Canada’s average agricultural fatality rate¹ was 13.7 per 100,000 agricultural population, per year (including non-workers). Fatality rates were highest for adults aged 50 and over and extraordinarily high for adults aged 80 and over (94.3/100,000/year). Children under age five had an extremely high age specific fatality rate (14.3/100,000/year). The child fatality rate was much higher if only male children were considered (21.7/100,000/year). From 1990 to 2005, 99 children under age five were killed on Canadian farms. Fatality rates were lowest for adults of normal working age, though they should have had the greatest exposure to the hazards of agricultural work.

The most common causes of fatalities varied greatly among age groups. For children aged fourteen and under, machine runovers were the predominant cause of death (41.9%), followed by drownings (15.2%), machine rollovers (11.1%), animal-related injuries (6.5%), and being caught in or under a non-machine object (5.1%). In children, three mechanisms of injury (machine runovers, drownings and machine rollovers) were associated with two thirds of all deaths. Runovers and drownings were most common among young children. Older children and teenagers were more frequently killed in machine rollovers and runovers. In adults aged 15 to 59, the top five causes of fatal injuries were machine rollovers (20.7%), machine entanglements (11.3%), traffic collisions (10.3%), machine runovers (10.2%) and being pinned or struck by a machine (8.2%). In adults aged 60 and over, machine rollovers (23.7%) and runovers (22.6%) were the leading causes of death. The next most frequent mechanisms of fatal injury in older adults were being struck by an animal (8.3%), being pinned or struck by a machine (6.9%) and machine entanglement (5.9%).

The most frequent types of machine runovers and rollovers also varied among age groups. Overall, unmanned runovers were most common (37.4%), followed by bystander runovers (27.4%), fallen operator runovers (18.5%), and extra rider runovers (15.2%). Most adults aged 15 to 59 were runover by unmanned machines (45.7%). In 22.8% of the runovers for that age group, the victim was struck by a machine he/she had fallen from. Bystander (18.5%) and extra rider runovers (8.7%) were the least frequent fatal runover mechanisms in younger adults. In contrast, 54.9% of all runover deaths in children were due to bystander runovers. Another 40.7% of child victims fell from a machine where they had been an extra rider and were then runover by it. In 4.4% of the cases, children were runover by machines that they had been operating themselves. In adults aged 60 and over, most runovers involved unmanned machines (55.9%). The next most frequent mechanisms were fallen operator runovers (24.8%), bystander runovers (15.2%) and extra rider runovers (3.4%). This pattern was similar to that seen in

Foreword and Executive Summary

younger adults, but older adults were involved in higher proportions of both unmanned and fallen operator runovers. The most frequent types of machine rollovers differed slightly between younger and older adults. In adults aged 15 to 59, 62.0% of the machine rollovers were sideways in direction and 26.7% were backwards. In adults aged 60 and over, 59.9% of the rollovers were sideways and 34.9% were backwards. Most backwards rollovers took place in woodlots during wood harvesting activities, whereas most sideways rollovers occurred next to roads or fields when a machine or vehicle traveled too close to the edge of a steep surface like a ditch or swale.

*Average agricultural fatality rates for 1990 to 2005 were calculated using *Canada Census of Agriculture* 1996 agricultural population data. Since the Canadian farm population declined by 19.6% from 1990 to 2006, the fatality rates given in this report will be lower than the actual fatality rates.



Highlights

1990 to 2005	All age groups	Children 1-14	Adults 15-59	Adults 60+
<i>Age range</i>	1-99	1-14	15-59	60-99
<i>Number killed*</i>	1,769	217	904	642
<i>Percentage of all fatalities for all ages</i>	100	12.3	51.1	36.3
<i>Percentage of machine injuries</i>	70.9	64.1	70.5	74.1
<i>Percentage of non-machine injuries</i>	29.1	35.9	29.5	25.9
<i>Number and percentage of males</i>	1,621 (91.6)	172 (79.3)	832 (92.0)	611 (95.2)
<i>Number and percentage of females</i>	148 (8.4)	45 (20.7)	72 (8.0)	31 (4.8)

*Age was not known in six cases.

LEADING CAUSES OF AGRICULTURAL FATALITIES IN CANADA, 1990 TO 2005, OVER ALL AGE GROUPS

Rank	Mechanism of injury	Number	Percent
1	Machine rollover	363	20.5
2	Machine runover	329	18.6
3	Machine entanglement	147	8.3
4	Traffic collision	130	7.3
5	Pinned/struck by machine	124	7.0
6	Animal-related	104	5.9
7	Struck by object (non-machine)	93	5.3
8	Drowned	56	3.2
9	Fall from height	55	3.1
10	Struck by object (machine)	50	2.8
11	Toxic substance	47	2.7
12	Suffocated in grain or soil	37	2.1
13	Fall from machine	33	1.9
14	Fire/explosion	30	1.7
15	Exposure to electric current	23	1.3

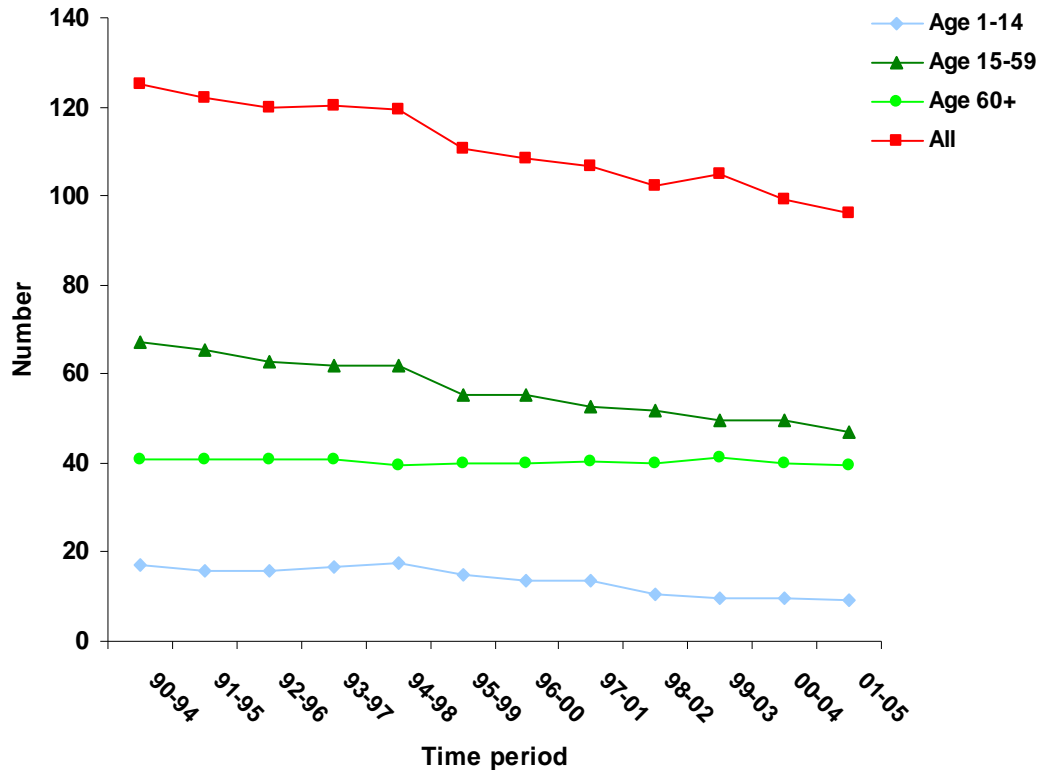


LEADING CAUSES OF AGRICULTURAL FATALITIES IN CANADA, 1990 TO 2005, BY AGE GROUP



Children 1 to 14				Adults 15 to 59				Adults 60+			
Rank	Mechanism of injury	#	%	Rank	Mechanism of injury	#	%	Rank	Mechanism of injury	#	%
1	Runover	91	41.9	1	Rollover	187	20.7	1	Rollover	152	23.7
2	Drowned	33	15.2	2	Entanglement	102	11.3	2	Runover	145	22.6
3	Rollover	24	11.1	3	Traffic collision	93	10.3	3	Animal-related	53	8.3
4	Animal related	14	6.5	4	Runover	92	10.2	4	Pinned/struck (machine)	44	6.9
5	Caught in/under	11	5.1	5	Pinned/struck by machine	74	8.2	5	Entangled	38	5.9
6	Struck by object	9	4.1	6	Struck by object	50	5.5	6	Traffic collision	33	5.1
7	Entangled	7	3.2	7	Toxic substances	42	4.6	7	Struck by object	32	5.0
8	Pinned/struck (machine)	6	2.8	8	Animal-related	37	4.1	8	Struck by object (machine)	22	3.4
9	Traffic collision	4	1.8	9	Fall from height	31	3.4	8	Fall from height	22	3.4
10	Fall from machine	3	1.4	10	Asphyxiation in grain or soil	29	3.2	9	Fall from machine	18	2.8
								10	Fire/explosions	13	2.0

Rolling five year averages of fatal agricultural injuries by age group, 1990 to 2005

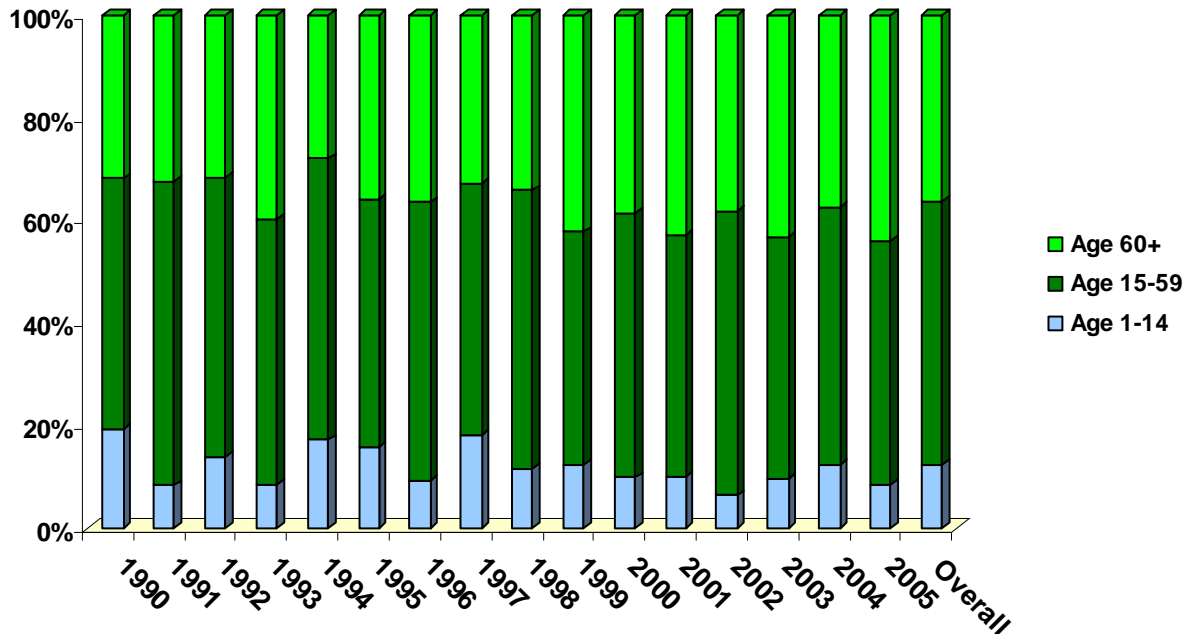


From 1990 to 2005, there was a reduction in the five-year rolling average of fatal injuries over all age groups. During the 16-year surveillance period there was also a decline in the five year rolling average of fatal injuries among adults aged 15 to 59 and children aged 1 to 14. From 1990 to 2005 there was no significant change in the five-year rolling average of fatal injuries in adults aged 60 and over.

Although the average annual number of fatal agricultural injuries has declined over the surveillance period for younger adults and for children under fifteen, part of the decline must be attributed to a reduction in the Canadian farm population. From the 1996 to the 2006 Canada Census of Agriculture, the number of people living on Canadian farms and ranches declined by 19.6%.

In spite of the fall in farm population, the average annual number of fatal agricultural injuries among adults aged 60 and over remained relatively constant over the surveillance period. This indicates that older adults may face an increasing risk of being killed as a result of agricultural work.

Proportion of agricultural fatalities in each age group by year, 1990 to 2005



Proportions of the 1996 and 2001 agricultural populations and numbers of agricultural injuries from 1990 to 2005 by age group

Age group:		<15	15-59	60+
Population* 2001	Number	164,585	457,595	104,940
	Percent	22.6	62.9	14.4
Population* 1996	Number	207,185	532,025	112,195
	Percent	24.3	62.5	13.2
1990 to 2005 Injuries	Number [^]	217	904	642
	Percent	12.3	51.3	36.4

* From Canada Census of Agriculture 1996 and 2001.

[^] The ages of six victims were not known.

Fatal agricultural injuries continue to be a serious occupational health and safety concern for older adults. Far more adults aged 60 and over were killed in agricultural injury events than would be expected given their representation in the farm population. From 1990 to 2005, 36.4% of the 1,769 people killed in agricultural injury events were older adults who represented only 13.2% to 14.5% of the agricultural population. In contrast, children under 15, who were 22.6% to 24.3% of the agricultural population, sustained 12.3% of the fatal agricultural injuries. Youth and adults aged 15 to 59 represented 62.5% to 62.9% of the agricultural population, but only 51.3% of those fatally injured over the surveillance period.

Age-Specific Recommendations

Ages 1-4:

- Preschool children should not be permitted in the farm or ranch work site, which includes the farm yard and driveway where most bystander runovers occur.
- Children of any age should not be taken as extra riders on tractors or other farm machines.
- Preschool children should be supervised closely and constantly by an adult whenever they are outside of the farm home or a safe, fenced-in play area.
- Drowning hazards, such as manure pits, should be fenced off.
- Heavy objects such as machine parts, large tires, fence panels, gates and steel dividers should be stored securely or left lying flat on the ground so they do not fall and crush young children.

Ages 5-9:

- Children of any age should not be taken as extra riders on tractors or other farm machines.
- Young school children should not be permitted in areas of the farm or ranch work site where machinery is kept or used.
- According to the North American Guidelines for Children's Agricultural tasks (NAGCAT[^]), 5 to 7 year old children should not be assigned work tasks.
- 8 and 9 year old children can be assigned age-appropriate work tasks, as defined by NAGCAT. Adequate training and close, continuous supervision should be provided.
- Tasks involving machinery are not appropriate for children in this age group.
- Barn lofts should be recognized as hazardous areas where many falls from height occur, causing serious injury or death.

[^]<http://www.nagcat.org/nagcat/pages/default.aspx>

Ages 10-14:

- Work tasks assigned to children aged 10 to 14 should be in accordance with the North American Guidelines for Children's Agricultural tasks (NAGCAT[^]). Adequate training and close, continuous supervision should be provided.
- According to NAGCAT, children under 12 should not operate tractors of any size, including lawn tractors.
- Tractors over 70HP should not be operated by children under 15.
- Tractors should be equipped with seatbelts and rollover protection structures.
- Children should not be permitted to ride in the cargo areas of trucks, on bumpers or on running boards.
- CSA-approved helmets should be worn when riding horses and when operating any off road vehicle.
- Off road vehicles, such as ATVs, should not be operated by children.

[^]<http://www.nagcat.org/nagcat/pages/default.aspx>

Age 15 and over:

All Rollovers

- The use of Roll Over Protection Structures (ROPS) and seatbelts by all operators would reduce the number of rollover fatalities.
- ROPs and seat belts should be retrofitted on older tractors. In Victoria Province Australia, the retrofitting of ROPs (only) on tractors was estimated to have lowered the rate of tractor rollover fatalities by 67.5% (Day and Rechnitzer 2006).
- Most farm machines are not designed to seat passengers. Extra riders should not be taken on farm machines as they are very likely to be killed or seriously injured in a rollover event.

Sideways Rollovers

- Machine operators should stay well away from ditches bordering fields and at the sides of roads.
- Operating machines on steep slopes should be avoided, if possible.
- When required to work in the vicinity of slopes or embankments, operators should use machines that are equipped with ROPs and seat belts.
- Operators should always assess their work areas to determine the slopes that may be encountered as well as the stability of their equipment.
- Operators should not corner at excessive speeds.

Backwards Rollovers

- Operators should adhere to manufacturers' recommendations concerning maximum towing capacity and appropriate hitching points. Failure to follow these recommendations may alter a tractor's centre of gravity causing it to overturn suddenly.
- A tow rope or chain should never be attached anywhere above the level of the draw pin.
- Poor terrain conditions such as thick mud, ice, and steep slopes adversely affect a tractor's normal towing capacity and could lead to a backwards rollover.
- Dragging a tree, log, or other object can lead to a backwards rollover if the object becomes caught while the tractor continues to drive forward.

Unmanned Machine Runovers

- Tractors and other farm machines should not be parked on slopes. If parking on a slope is absolutely necessary, operators should not work in the potential path of the tractor.
- If an unmanned tractor's engine must be left running, the tractor and any attached equipment should be immobilized to prevent unintentional movement.
- Before commencing repairs to a vehicle or machine, operators should ensure that the transmission is in neutral or park and that the engine is turned off. Blocking can also be used on smaller tractors/machines.
- Children should never be allowed to play in or around a vehicle or machine as they may inadvertently activate controls.
- Brakes and electrical systems on tractors, farm trucks and other vehicles should be maintained properly.
- The practice of bypass starting a tractor by short circuiting its ignition system is associated with a very high incidence of fatal unmanned machine runovers.

Fallen Operator Events

- Seat belts should be worn when operating a tractor or other farm machine.
- Tractor operators should remain seated at all times. It is a dangerous practice to stand while operating a tractor or other farm machine.

Animal-Related Events

- Handlers of large animals should not work on foot inside an animal holding pen or chute system unless they are protected by secure panels or gates which would prevent them from being crushed.
- Escape routes should be planned and farmers should avoid being trapped in small areas with large animals, especially horses and bulls.

Age 60 and over:

- Older farmers tend to operate older machinery. The much higher fatal rollover rate in this age group may, in part, reflect a relatively lower availability of ROPs and seat belts due to the age of the tractors used.
- As individuals age, physiological and cognitive changes can occur that may affect their ability to perform some tasks. It is therefore important that an older farmer and his/her fellow workers assess the skills required to perform particular tasks and determine whether he/she can safely perform the tasks.
- The types of agricultural tasks attempted and the methods used to accomplish the tasks should be adjusted to fit the changing abilities and limitations of older farmers.
- Older farmers should not work alone around unpredictable large animals, especially bulls and horses.
- In situations where an older farmer must work alone, a geographic positioning system should be used to ensure that the farmer's exact location can easily be established. An effective two-way communications system should also be available.
- Communication devices should be kept securely attached to clothing.
- For farmers of any age, long hours spent operating machinery should be avoided.
- Falls are a problem for all older persons. Care should be taken when completing any tasks where dynamic balance or static strength is required. Heavy objects should not be carried when climbing ladders or working at elevated heights.
- More research is required to determine older farmers' levels of exposure to machine and non-machine hazards. It is not known how older farmers' work tasks differ in type and in quantity from those of younger farmers.
- Prevention programs should be targeted at older males, since older females are at relatively low risk for fatal injuries.



