Fatal and hospitalized agricultural injuries among children and youth in Canada

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This report from *The Canadian Agricultural Injury Surveillance Program* describes the occurrence of fatal and hospitalized agricultural injuries in Canada among persons aged one to nineteen. In this report, the surveillance period for fatal injuries is 1990-2003. For hospitalizations, the surveillance period is April 1, 1990 to March 31, 2000.

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Acknowledgements

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CASA (formerly called the Canadian Coalition for Agricultural Safety and Rural Health) was established in 1993 by a coalition of agencies from across Canada. These agencies joined together to address problems of illness, injury, and accidental death in farmers and ranchers and their families, agricultural workers and other issues related to rural health. www.casa-acsa.ca

Agriculture and Agri-Food Canada

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Participants and Sponsors

Project Sponsor	Canadian Agricultural Injury Surveillance Program
Project Co-Directors	Rob Brison MD, MPH, FRCPC Kathy Belton MEd
Report Writer	Louise Hagel BScN, MSc and Catherine Isaacs MSc
Data Manager and Editor	Catherine Isaacs MSc

Individuals and agencies integral to CAISP

British Columbia

Dr. Helen Ward, Respiratory Division, Department of Medicine, University of British Columbia
Tej Sidhu, Chief Coroner's Office, Province of British Columbia
Dr. Shaun Peck, Deputy Provincial Officer, B.C. Ministry of Health
Anne DyBuncio, University of British Columbia

Alberta

Kathy Belton, Co-Director, Alberta Centre for Injury Control and Research
Dr. Don Voaklander, Associate Professor, Alberta Centre for Injury Control and Research, School of Public Health, University of Alberta

Saskatchewan

Louise Hagel, Institute of Agricultural, Rural and Environmental Health, University of Saskatchewan
Dr. Neils Koehncke, Institute of Agricultural, Rural and Environmental Health, University of Saskatchewan
Allan Walker, Occupational Health and Safety Branch, Saskatchewan Labour
Lorna Nystuen, Office of the Provincial Coroner, Saskatchewan Justice
Dr. Mary Rose Stang, Research Consultant, Population Health Branch, Saskatchewan Health

Manitoba

Dr. Ted Redekop, Manitoba Department of Labour and Immigration, Workplace Safety and Health Division, Occupational Health Branch, Manitoba Health
The Office of the Chief Medical Examiner

Ontario

Dr. Robert Brison, Department of Emergency Medicine, Kingston General Hospital and Queen's University
Dr. William Pickett, Faculty of Health Sciences, Kingston General Hospital and Queen's University
Deborah Emerton, Department of Emergency Medicine, Kingston General Hospital and Queen's University
Catherine Isaacs, Department of Emergency Medicine, Kingston General Hospital and Queen's University

Québec

Bureau du coroner du Québec
Ministère de la santé et des services sociaux du Québec

New Brunswick

Dr. B. Christofer Balram, Director, Provincial Epidemiology Service, Provincial Epidemiologist, Department of Health and Community Services
Elizabeth Bastin, Department of Health and Community Services

Nova Scotia

Dr. Judy Guernsey, Department of Community Health and Epidemiology, Dalhousie University

Prince Edward Island

Marilyn Affleck, P.E.I. Federation of Agriculture

Newfoundland and Labrador

Billy Woods, NL Farmers with Disabilities

Website: www.caisp.ca

Foreword and Executive Summary

Fatal and Hospitalized Agricultural Injuries among Children and Youth in Canada includes an analysis of Canadian Agricultural Surveillance Program (CAISP) fatal agricultural injury data for the fourteen calendar years from 1990 to 2003 and hospitalized agricultural injury data for the ten fiscal years from April 1, 1990 to March 31, 2000. The purpose of this report is to describe the magnitude of the agricultural injury problem among children and youth in Canada and to determine age-related patterns of injury. A main objective of CAISP is to identify agricultural injury problems 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 quickly identify patterns of injury associated with new equipment and new farming techniques.

CAISP data show that agricultural injuries are not random or isolated "accidents". There are many recurrent patterns of injury. In the fourteen years from 1990-2003, 274 children and youth from one to nineteen years old were killed in agricultural injury events. This number represents 17.4% of all agricultural fatalities during the surveillance period. 82.5% of the children and youth who were killed were male. 69.7% of the fatalities involved agricultural work and 30.3% were due to hazards of the farm or ranch environment. The average annual age specific fatality rate per 100,000 agricultural population, per year, was 7.0.

Almost two thirds (66.1%) of all fatal agricultural injury events among children and youth involved agricultural machines. Children aged 1 to 4 had the largest percentage of both machine-related and non-machine deaths as well as the highest fatality rate (15.8, per 100,000, per year). 70.1% of the children and youth aged 1-19 who died in agricultural injury events were children or other relatives of the owner/operator. Machine-related fatalities occurred most frequently from April to October, with the peak incidence during August. Non-machine fatalities occurred in every month of the year, with highest frequency during June, July and August.

In the ten fiscal years from April 1, 1990 to March 31, 2000, 2,828 children and youth 19 years and under were admitted to hospital for at least one day for the treatment of agricultural injuries. This represents 19.0% of all agricultural hospitalizations during the surveillance period. The overall rate of hospitalization for agricultural injuries was 98.3, per 100,000 agricultural population, per year. The highest rate of hospitalization was among youth aged 15 to 19 years (116.8, per 100,000, per year). This pattern differed from that seen for fatal injuries where the youngest age group, children 1 to 4 years old, had the highest fatality rate.

Overall, 53.3% of the hospitalized injuries were machine-related; however youth aged 15 to 19 were the only age group where the number of machine-related injuries exceeded the number of non machine injuries. There was an increase in the frequency of hospital admissions during the crop production season from April to October. Distinct peaks occurred during the school holiday months of July and August.

The top five causes of agricultural fatalities in children and youth aged 1 to 19 were bystander/alighted passenger runovers (17.2%), machine rollovers (15%), extra rider runovers (14.2%), drownings (12.4%), and machine entanglements (5.5%). Machine runovers and machine rollovers accounted almost half of all agricultural deaths (48.6%) in children and youth aged 1 to 19. Drowning was a very important fatality mechanism for children aged 1 to 9, accounting for 35.6% of the deaths in that age range.

The top five causes of hospitalized injuries in children and youth 19 and under were animal events (17.8%), machine entanglements (15.7%), falls from height (14.8%), machine runovers (8.5%), and being pinned or struck by a machine (8.1%). Animal-related injuries ranked first overall and first for the 0-4 and 10-14 age categories. The most common mechanism for hospitalized injuries in children aged 5 to 9 was a fall from height, usually from a barn loft. Youth aged 15-19 were most frequently injured in machine entanglements. 20% of these injuries resulted in permanently disabling amputations.

Highlights: all children and youth

	Fatal Injuries	*Hospitalizations***
Surveillance period	**1990-2003**	**April 1, 1990-March 31, 2000**
Age range	**1-19**	**0-19**
Children and youth injured	**274**	**2,828**
Annual rate/100,000 children/year	**7.0**	**98.3**
Percentage of injuries for < age 20	**100.0**	**100.0**
Percentage of all injuries for all ages	**17.4**	**19.0**
Percentage of farm population*	**33.1**	**33.8**
Percentage of machine injuries	**66.1**	**46.7**
Percentage of male victims	**82.5**	**76.0**
Top three machine mechanisms (% of the total)	**1 Bystander or alighted passenger runover (17.2%)**	**1 Entanglement (15.7%)**
	2 Machine rollover (15.0%)	**2 All runovers (8.5%)**
	3 Extra rider runover (14.2%)	**3 Pinned/struck (8.1%)**
Top three non machine mechanisms (% of the total)	**1 Drowning (12.4%)**	**1 Animal-related (17.8%)**
	2 Animal-related (5.1%)	**2 Fall from height (14.8%)**
	3 Struck by object (4.0%)	**3 Struck by object (5.4%)**
**Age 0 included for hospitalizations only.*		***Admitted for at least a day.*

Highlights: preschool children

	Fatal Injuries	*Hospitalizations***
Surveillance period	**1990-2003**	**April 1, 1990-March 31, 2000**
Age range	**1-4**	**0-4**
Children injured	**96**	**471**
Annual rate/100,000 children/year	**15.8**	**90.4**
Percentage of injuries for < age 20	**35.0**	**16.7**
Percentage of all injuries for all ages	**6.1**	**3.2**
Percentage of farm population*	**5.1**	**6.1**
Percentage of machine injuries	**63.5**	**45.2**
Percentage of male victims	**79.2**	**72.8**
Top three machine mechanisms (% of the total for this age group)	**1 Bystander runover (35.4%)**	**1 Entanglement (15.5%)**
	2 Extra rider runover (19.8%)	**2 All runovers (13.0%)**
	3 Machine rollover (3.1%)	**3 Pinned/struck (8.1%)**
Top three non machine mechanisms (% of the total for this age group)	**1 Drowning (20.8%)**	**1 Animal related (17.6%)**
	2 Caught under (5.2%) Struck by object (5.2%)	**2 Fall from height (15.3%)**
	3 Animal related (4.2%)	**3 Toxic substance (8.7%)**
**Age 0 included for hospitalizations only.*		***Admitted for at least a day.*

Recommendations:

- 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.

Highlights: young school children

	Fatal Injuries	*Hospitalizations**
Surveillance period	**1990-2003**	**April 1, 1990-March 31, 2000**
Age range	**5-9**	**5-9**
Children injured	**54**	**675**
Annual rate/100,000 children/year	**5.4**	**95.0**
Percentage of injuries for < age 20	**19.7**	**23.9**
Percentage of all injuries for all ages	**3.4**	**4.5**
Percentage of farm population*	**8.4**	**8.3**
Percentage machine injuries	**57.4**	**43.7**
Percentage male victims	**75.9**	**69.6**
Top three machine mechanisms (% of the total for this age group)	**1 Bystander or alighted passenger runover (18.5%)**	**1 Entangled (12.6%)**
	2 Extra rider runover (18.5%)	**2 All runovers (10.8%)**
	3 Machine rollover (9.3%)	**3 Fall from machine (7.8%)**
Top three non machine mechanisms (% of the total for this age group)	**1 Drowning (14.8%)**	**1 Fall from height** (24.0%)**
	2 Animal-related (9.3%)	**2 Animal-related (15.4%)**
	3 Caught under object (9.3%)	**3 Struck by object (4.0%)**
		**Admitted for at least a day.* ***45.7% occurred in a barn.*

Recommendations:

- 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*

Highlights: older school children

	Fatal Injuries	*Hospitalizations**
Surveillance period	**1990-2003**	**April 1, 1990-March 31, 2000**
Age range	**10-14**	**10-14**
Children injured	**45**	**742**
Annual rate/100,000 children/year	**3.8**	**88.3**
Percentage of injuries for < age 20	**16.4**	**26.2**
Percentage of all injuries for all ages	**2.9**	**5.0**
Percentage of farm population*	**10.0**	**9.9**
Percentage of machine injuries	**75.6**	**73.3**
Percentage of male victims	**86.7**	**43.1**
Top three machine mechanisms (% of the total for this age group)	**1 Rollover (33.3%)**	**1 Entangled (15.6%)**
	2 Extra rider runover (13.3%)	**2 Machine-related fall (7.7%)**
	3 Entangled (6.7%)	**3 Runover, all types (6.3%)**
Top three non machine mechanisms (% of the total for this age group)	**1 Animal-related (6.7%)**	**1 Animal-related (20.2%)**
	2 Struck by object (4.4%) Drowned (4.4%)	**2 Fall from height** (15.9%)**
	3 Asphyxiated in grain (2.2%) Fall from height (2.2%)	**3 Struck by object (5.5%)**
		**Admitted for at least a day.* ***62.7% occurred in a barn.*

Recommendations:

- 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 aged 12 to 14.
- 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 only be driven at low speeds. They should not be operated on steep slopes or used to perform stunts.
- 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*

Highlights: youth

	Fatal Injuries	*Hospitalizations**
Surveillance period	**1990-2003**	**April 1, 1990-March 31, 2000**
Age range	**15-19**	**15-19**
Youth injured	**79**	**940**
Annual rate/100,000 children/year	**7.0**	**116.8**
Percentage of injuries for < age 20	**28.8**	**33.2**
Percentage of all injuries for all ages	**5.0**	**6.3**
Percentage of farm population*	**9.5**	**9.4**
Percentage of machine injuries	**69.6**	**52.3**
Percentage of male victims	**88.6**	**84.3**
Top three machine mechanisms (% of the total for this age group)	**1 Rollover (22.8%)**	**1 Entangled (17.9%)**
	2 Collision (11.4%)	**2 Pinned/struck (11.8%)**
	3 Entangled (10.1%)	**3 Runover, all types (6.5%)**
Top three non machine mechanisms (% of the total for this age group)	**1 Toxic substance (8.9%)**	**1 Animal-related (17.9%)**
	2 Drowning (5.1%) **Fire (5.1%)**	**2 Fall from height (7.0%)**
	3 Struck by object (3.8%)	**3 Struck by object (6.8%)**
		**Admitted for at least a day.*

Recommendations:

- Work tasks assigned to youth should be in accordance with the North American Guidelines for Children's Agricultural tasks (NAGCAT^).
- All tractors should be equipped with seatbelts and rollover protection structures. Youth who are not licensed drivers must not operate tractors on public roads.
- Youth should be provided with adequate training and close supervision.
- Manufacturer-approved guards should be present on any machinery that may pose an entanglement hazard. Tightly-fitting clothing must be worn and long hair should be tied up when working with machinery. Machinery must be shut down completely before performing any maintenance, unblocking or cleaning tasks.
- Youth should be supervised closely when carrying out tasks near confined spaces such as silos, tanks and manure storage and handling facilities, which may be oxygen deficient or contain toxic gases.
- When handling large animals, youth should not work inside an animal holding pen or chute system unless they are protected by secure panels or gates which would prevent them from being crushed.

^ *http://www.nagcat.org/nagcat/pages/default.aspx*

1 INTRODUCTION

1.1 GENERAL INTRODUCTION

The Canadian Agricultural Injury Surveillance Program (CAISP) was established in 1995 in response to the need for better information about fatal and hospitalized agricultural injuries in Canada. CAISP is a national program with collaborators in each of the ten provinces of Canada. ***Fatal and hospitalized agricultural injuries among children and youth in Canada*** examines agricultural fatality data for the fourteen calendar years from 1990-2003, and hospitalized injuries for the ten fiscal years from April 1, 1990 to March 31, 2000. In Canada, from 1990 to 2003, there were 274 agricultural fatalities among persons aged 19 years and younger. This age group accounted for 17.4% of all agricultural deaths and 19.0% of all hospitalized agricultural injuries.

Previously published CAISP reports, including *Agricultural injuries in Canada for 1990-2000*, support the observation that children and youth on Canadian farms and ranches are at high risk for fatal and serious agricultural injuries. The presence of children in a hazardous work place is a condition unique to the family farm environment. Young children, while not engaged in farm work, are still present in the farm or ranch work place and are consequently exposed to hazardous conditions. Older children and youth actively participate in daily and seasonal work tasks on their own family farms and as hired workers. This report presents a detailed analysis of the child and youth agricultural injury problem in Canada. It is hoped that the report will lead to the identification of specific and targeted injury prevention methods for farm and ranch families, safety organizations and the agricultural community.

1.2 HISTORY OF AGRICULTURAL INJURY SURVEILLANCE IN CANADA

Agricultural injuries have been recognized as an important rural health issue since the 1960s, when the problem was first recognized in the medical literature. At that time, some provincial groups began to monitor agricultural injuries, but only recently have substantial national resources been committed to the study of agricultural injuries.

When compared with other Canadian industrial sectors, agriculture is a dangerous occupation. Agriculture ranks as the third most hazardous industry in Canada with respect to rates of fatal injury. In terms of absolute numbers of fatalities, there is no more dangerous occupation (Pickett et al., 1999). Economic costs associated with agricultural injuries are also substantial. In the United States, when one factors in the costs of treatment, rehabilitation and losses in productivity, agricultural injuries are responsible for over $10 billion in economic losses annually (Leigh et al., 2001). Canadian estimates of economic burden are in the hundreds of millions of dollars annually (Locker et al., 2003).

Until the establishment of CAISP, Canadian data on agricultural injuries were historically 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.

1.3 THE CANADIAN AGRICULTURAL INJURY SURVEILLANCE PROGRAM

The Canadian Agricultural Injury Surveillance Program (CAISP) is a national program that is funded by the Canadian Agricultural Safety Association (CASA). CAISP is a collaborative program run by organizations from across Canada. It is coordinated from a national office at Queen's University in Kingston, Ontario. The people and organizations that contribute to CAISP include researchers, government agencies and the agricultural industry.

1.4 OBJECTIVES OF CAISP

The objectives of CAISP are:

1. **To develop a coordinated system for the assembly of national agricultural injury surveillance data**. CAISP's fatality and hospitalized injury data are collected, compiled, and analyzed in a standard manner by all provinces.

2. **To ensure that the collected information is interpreted and communicated in forms that are useful to potential data users in the agricultural industry**. The CAISP collaborators are committed to ensuring that the data are disseminated in an appropriate and useful manner. Our primary audience is individuals within the agricultural industry who need to make informed decisions about safety programs and policy. Our reports represent one approach to making these data accessible to this audience. Other dissemination formats include articles in scientific journals, presentations at national conferences, our website at www.caisp.ca, and press releases.

1.5 USES OF CAISP DATA

CAISP has developed a surveillance system for Canada that describes the occurrence and patterns of agricultural injuries at a higher level of detail than was available previously. At both national and provincial levels, CAISP has provided evidence that has assisted in the development of priorities for health and safety programs as well as strategies for the targeting of these initiatives. CAISP data have also facilitated the post-implementation assessment of injury-prevention programs.

Agricultural safety specialists and others require objective evidence so that they can promote awareness of agricultural injury issues and advocate the allocation of additional resources to injury prevention and research programs. CAISP information has been used repeatedly to assist in advocacy efforts. This has contributed to the development of informed safety policy in the agricultural industry and to the funding of safety programs at international, national and provincial levels.

CAISP has provided baseline evidence to support several applied research projects. These projects include focused investigations aimed at the prevention of agricultural injuries in children and the elderly, studies of agricultural machinery injuries and their causes, and two studies examining the economic burden of agricultural injuries.

1.6 THE CHALLENGES OF INJURY CONTROL IN AGRICULTURE

In other industries, victims of occupational injuries are usually adult workers. Agricultural injuries are unique in that children and youth sustain significant numbers of severe work-related injuries. This is partly because farms and ranches are not only work sites, but also places where people of all ages live, play and participate in recreational activities.

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 is also geographically diverse. This diversity adds to the difficulty in enforcement of safety standards. Also, there has traditionally been reliance upon voluntary rather than regulatory safety standards; however, the effectiveness of voluntary safety standards has not been well evaluated.

2 METHODS

2.1 Identification of Agricultural Fatalities

A detailed review of CAISP's data collection and analysis methods is available in CAISP's national report *Agricultural Injuries in Canada for 1990-2000*. The process used in the identification of agricultural fatalities varies by province. This is a general description of the process:

1. Potential sources of agricultural fatality data are identified. These are kept by a variety of agencies that vary by province. Examples of these agencies include: offices of the provincial coroner or chief medical examiner, occupational health agencies, departments of vital statistics, ministries of transportation and provincial agricultural safety associations.

2. A comprehensive list of all potential agriculture-related fatalities is assembled within each province. These lists draw upon each available source of fatality data.

3. Once cases are identified, detailed case reports are sought for review and data abstraction. The main sources of information are coroners' investigation reports; occupational safety and health agency investigation reports; and RCMP/provincial police reports.

4. Data abstraction and entry are completed on each eligible fatality. This is done in a consistent manner using standard data abstraction forms (Appendix C). Data abstraction is generally completed on-site at the Provincial Chief Coroners' Offices by obtaining the relevant information from coroners' files. Data are then sent to the national site for verification, coding and analysis.

2.2 Key Definitions

Agricultural Fatalities: CAISP 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 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.*

Study Population: *For the purpose of this report, all persons aged 19 or younger who live, work on, or visit a Canadian farm or ranch (as defined below), as well as all persons in that age group who are injured in other locations (such as public highways) as a result of agricultural activity.*

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.

Children and Youth: *For the purpose of this report, persons 19 years of age or younger.*

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

2.3 Identification of Hospitalized Agricultural Injuries

2.3.1 Basic Hospital Separation Data

A detailed review of CAISP's data collection and analysis methods is available in CAISP's national report *Agricultural Injuries in Canada for 1990-2000.* In summary, hospital separation data are obtained by CAISP collaborators through agreements with their provincial Departments of Health. Agricultural machinery-related injuries are identified using a systematic computer search of these hospital separation databases. Cases are considered for inclusion if the location of injury occurrence is a farm or ranch, or if the external cause of injury code (International Classification of Diseases – version 9, World Health Organization E-code) is E919.0: *Accidents Caused by Agricultural Machines*. The surveillance period covered by this report does not include any cases coded under ICD 10. Only cases where a patient has been admitted to hospital for at least one day are included in the hospital separation databases.

2.3.2 Enhanced Hospital Data

The patient identifier and institution code in the basic hospital separation data set are used to identify individual cases and the institutions to which they were admitted. The Chief Executive Officer (or equivalent) from each hospital or health district is approached for permission to request chart data from his/her medical records department. Once permission is granted, information is requested using a mail survey format. A standardized data abstraction form (Appendix C) for each case is mailed to the medical records personnel at the appropriate institution. Medical records personnel abstract specific information from the individual patient charts. Regular mail and telephone follow-ups are conducted following the initial mailing in order to ensure a very high response rate.

The information from the computerized hospital record, combined with that obtained from the mail survey abstraction form, constitutes the enhanced CAISP data set. This data set includes variables in addition to those in the basic data set that can be used to better describe injury patterns. For instance, there is information describing what happened to cause each of the injuries, and whether a tractor or other agricultural machine was involved.

2.4 Confidentiality of CAISP Data

Data are maintained in an electronic database that is managed centrally by the national coordinator under the supervision of the program co-directors. The provincial collaborators retain the complete data set for their own provinces.

Access to the national dataset is strictly limited to CAISP collaborators for the following activities:

1. CAISP provincial collaborators assigned the task of producing special technical reports for Canada.
2. CAISP collaborators who have permission from the CAISP group to conduct special analyses for the purpose of producing scientific reports for submission to peer-reviewed journals.
3. The national program co-coordinator and program co-directors for the purpose of maintaining the database and producing periodic comprehensive reports for Canada.
4. To support agricultural injury prevention initiatives by others through analyses presented as tabular data.

2.5 Analysis

The analysis presented in this report is descriptive. It has two main objectives, to describe the magnitude of the agricultural fatality problem in children and youth and to identify emerging patterns of injuries.

The statistics used include simple counts and frequencies as well as cross-tabulations. Where appropriate, injury rates were calculated. Formal hypothesis-testing methods were not employed in comparisons.

Selected rates of agricultural injuries are presented in this report. The numerators used in calculating these rates are the numbers of agricultural fatalities or hospitalized injuries for particular age categories and mechanisms of injury. These include injuries to farm residents, hired agricultural workers, persons traveling on public highways and a small number of visitors to farms. Denominators for these rates are taken from the 1996 Canada Census of Agriculture. The 1996 census data were used in the denominators for rate calculations because they were collected roughly halfway through the surveillance period.

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 as well as hired 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.

3 FATAL AGRICULTURAL INJURIES IN CHILDREN AND YOUTH: OVERVIEW

3.1 AGE

Fatal agricultural injuries associated with agricultural work and hazards of the agricultural environment occurred in all age categories. Table 3.1 shows that a disproportionately high number of fatal injuries occurred among children 1 to 4 years of age considering the percentage of the agricultural population that they represent. There were no fatal agricultural injuries among children who were less than a year old.

TABLE 3.1 Fatal agricultural injuries by age category, 1990-2003 (274 cases)

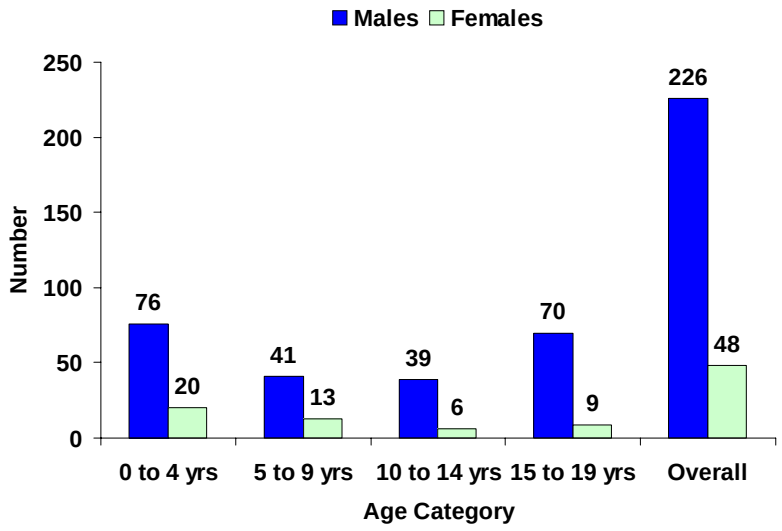
Age Group	Fatal Agricultural Injuries		Agricultural Population aged 1-19		Crude rate per 100,000/yr†
	No.	%	No.	%	
1 - 4	96	35.0	43,315	15.5	**15.8**
5 - 9	54	19.7	71,035	25.5	**5.4**
10 - 14	45	16.4	84,025	30.1	**3.8**
15 - 19	79	28.8	80,455	28.9	**7.0**
Total	274	100	278,830	100	**7.0**

* 1996 Census of Agriculture and Population Census, Statistics Canada.
† Average annual age specific rate per 100,000 agricultural population per year.

3.2 AGE AND GENDER

82.5% of the children and youth who sustained fatal agricultural injuries were male. The lowest male to female ratio was in the 5 to 9 year age category (3.2:1). The highest male to female ratio was in the 15 to 19 age category (7.8:1).

FIGURE 3.2 Fatal agricultural injuries by age category and gender, 1990-2003 (274 cases)

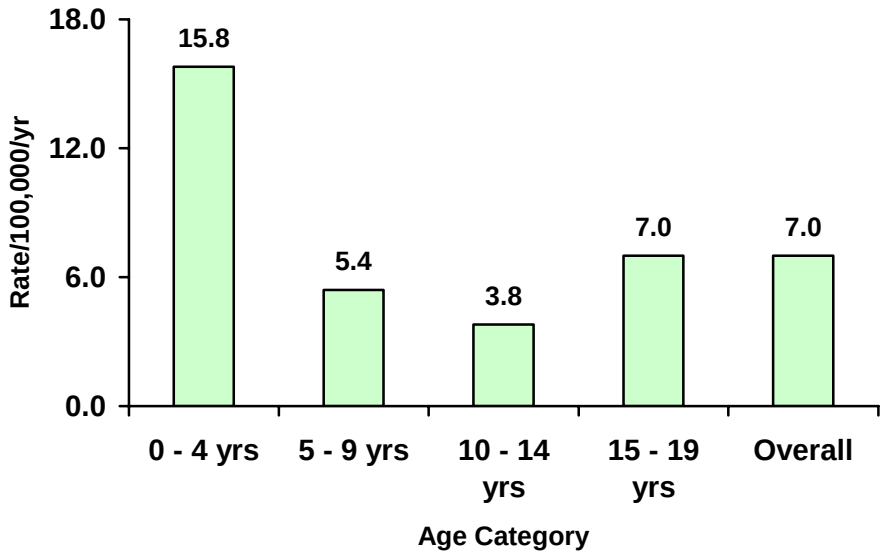


Source: Canadian Agricultural Injury Surveillance Program (CAISP)

3.3 RATE

The highest rate of fatal agricultural injuries was among children 1 to 4 years old. The lowest was among children 10 to 14 years old.

FIGURE 3.3 **Age specific rates of fatal injuries per 100,000 agricultural population, 1990-2003 (274 cases)**



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

3.4 ACTIVITY

Table 3.4 shows the distribution of fatal agricultural injuries by major cause. Almost two thirds (66.1%) of all fatal agricultural injury events among children and youth involved agricultural machines. 88.4% of machine-related deaths and 51.6% of non-machine related deaths were work-related. (Agricultural work was being done at the time of the death.) Among all children and youth, children aged 1 to 4 had the largest percentage of both machine-related and non-machine deaths.

TABLE 3.4 **Fatal agricultural injuries by major cause, 1990-2003 (274 cases)**

Age Group	Machine-related*		Not Machine-related**		Total	
	No.	%	No.	%	No.	%
1-4 years	61	33.7	35	37.6	96	35.0
5-9 years	31	17.1	23	24.7	54	19.7
10-14 years	34	18.8	11	11.8	45	16.4
15-19 years	55	30.4	24	25.8	79	28.8
Total	**181**	**100**	**93**	**100**	**274**	**100**

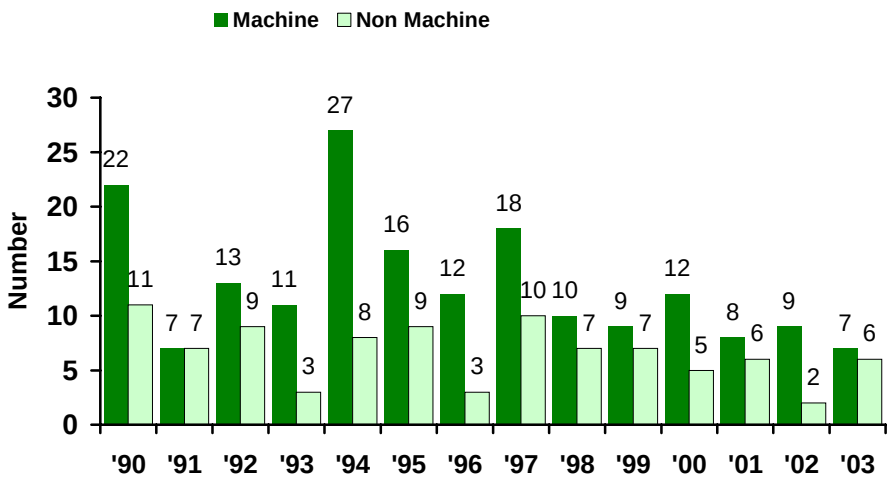
* 160 of 181 (88.4%) machine related fatalities occurred while agricultural work was being conducted.
** 48 of 93 (51.6%) non-machine related fatalities occurred while agricultural work was being conducted.

Source: Canadian Agricultural Injury Surveillance Program (CAISP)

3.5 YEAR

Figure 3.5 shows the number of agricultural deaths among children and youth in Canada by year of occurrence. There was no clear indication that these injuries were either increasing or decreasing over time.

FIGURE 3.5 **Distribution of fatal agricultural injuries by major activity and year, 1990-2003 (274 cases)**



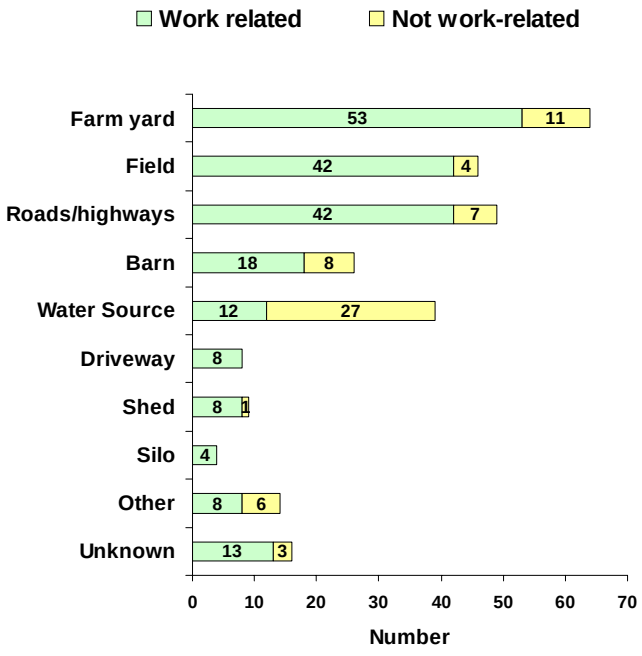
Source: Canadian Agricultural Injury Surveillance Program (CAISP)

3.6 LOCATION OF INJURY

Figure 3.6 shows the distribution of fatal agricultural injuries by location of injury. Overall, 24.8% of the fatal injuries, where location of occurrence was known, took place in the farmyard.

The most common location for work-related fatalities was the farm yard, followed by fields and farm roads/highways. The leading location for non work-related fatalities was a water source (such as a dugout, manure lagoon, creek, irrigation pond, etc). Non work-related fatalities also frequently occurred in the farmyard or barn.

FIGURE 3.6 **Fatal agricultural injuries by location of injury and main activity, 1990-2003 (274 cases)**

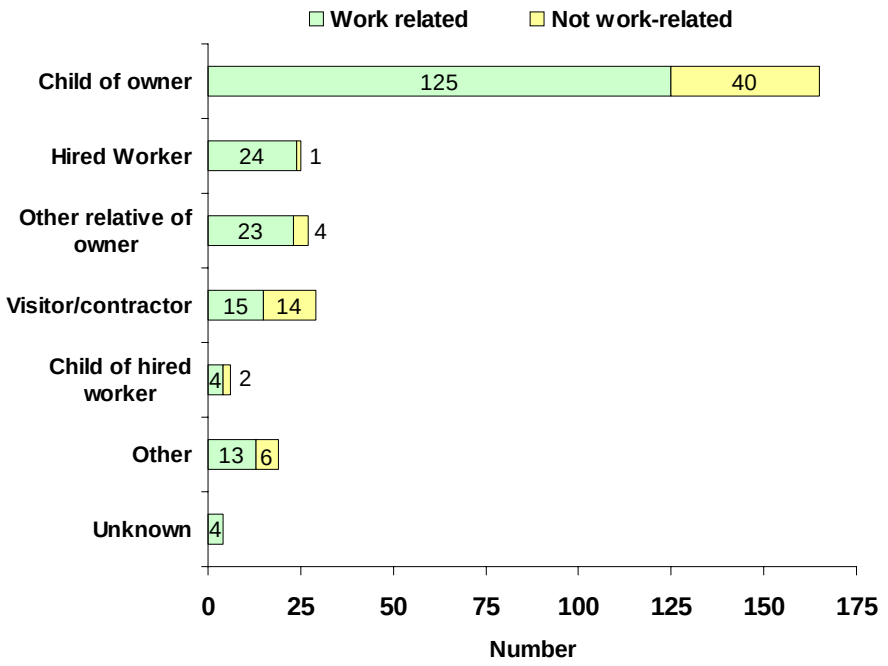


Source: Canadian Agricultural Injury Surveillance Program (CAISP)

3.7 RELATIONSHIP

Figure 3.7 shows the distribution of fatal agricultural injuries by relationship of the injured person to the owner/operator. Among children and youth who died in agricultural related injury events, 192/274 (70.1%) were the children or other relatives of the owner/operator. 9.1% were hired workers and 10.6% were visitors, including paid contractors aged 19 and under.

FIGURE 3.7 **Fatal agricultural injuries by relationship of the injured person to the agricultural owner, 1990-2003 (274 cases)**

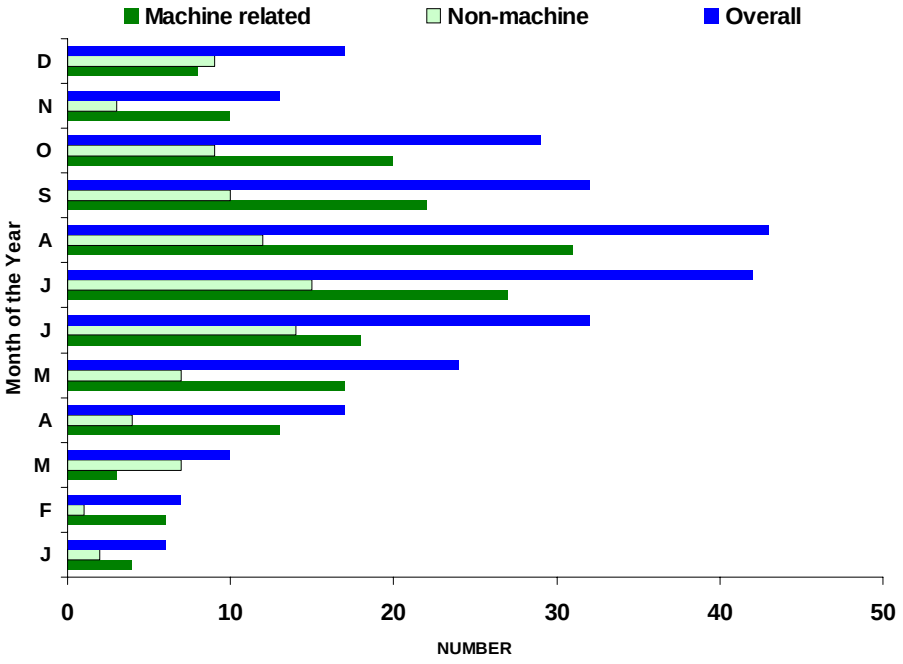


Source: Canadian Agricultural Injury Surveillance Program (CAISP)

3.8 MONTH

Figure 3.8 shows the distribution of fatal agricultural injuries among children and youth by month of the year. Machine-related fatalities occurred most frequently from April to October, with the peak incidence during August. The frequency dropped off sharply during the winter months. Non-machine fatalities occurred in every month of the year, with highest frequency during June, July and August.

FIGURE 3.8 **Fatal agricultural injuries by month of the years and main cause, 1990-2003 (274 cases*)**

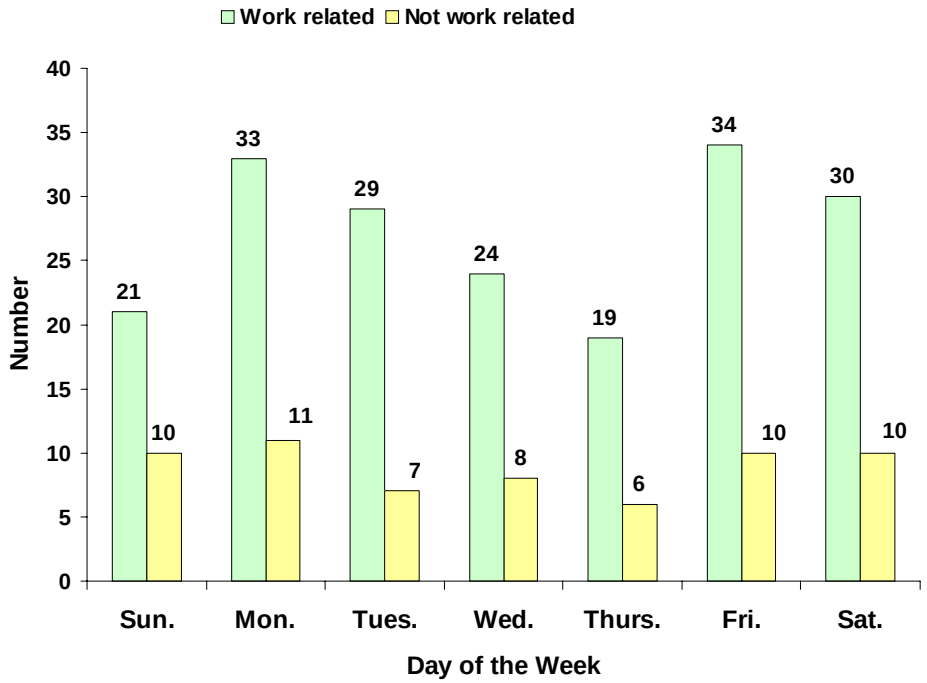


Source: Canadian Agricultural Injury Surveillance Program (CAISP)
* Missing for 2 cases

3.9 DAY OF THE WEEK

Figure 3.9 shows the distribution of fatal agricultural injuries by day of the week. Work-related fatalities occurred most frequently on Mondays, Fridays and Saturdays. Non work related fatalities took place most frequently from Friday to Monday. The days of the week where fewest fatalities occurred were Tuesday, Wednesday and Thursday.

FIGURE 3.9 **Fatal agricultural injuries by day of the week and major activity, 1990–2003 (272 cases)***

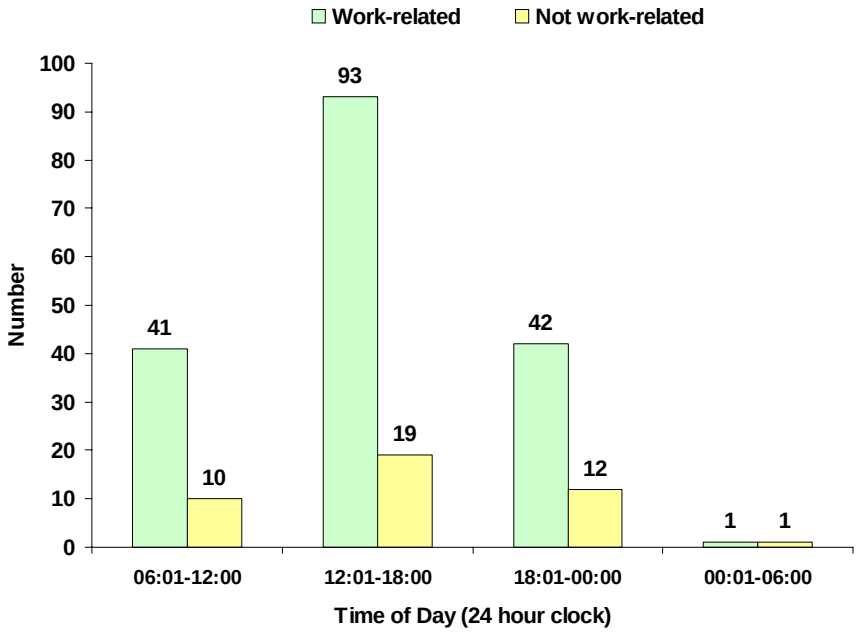


Source: Canadian Agricultural Injury Surveillance Program (CAISP)
*Missing for 2 cases.

3.10 TIME OF DAY

Figure 3.10 shows the distribution of fatal agricultural injuries by time of day. 51.1% of all deaths for which time of death was known occurred between noon and 6:00 p.m. The distribution of events by time of day was similar for both work related and not work-related events.

FIGURE 3.10 **Fatal agricultural injuries by time of day and major activity, 1990-2003 (219 cases*)**



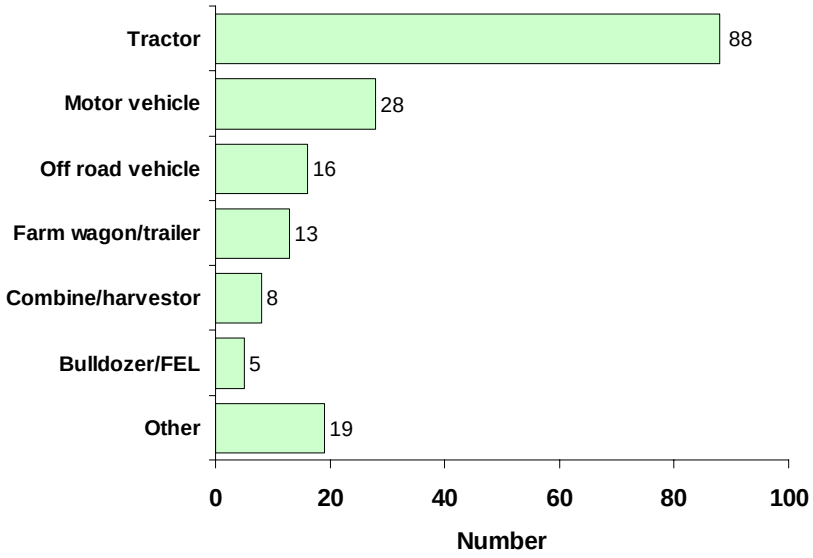
*

T*Missing or unknown for 55 cases.
Source: Canadian Agricultural Injury Surveillance Program (CAISP)

3.12 MACHINE RELATED

66.1% of all fatal injuries were machine related. Figure 3.12 shows the distribution of machine related fatal injuries by type of machine. Tractors were involved in over half (48.6%) of the fatalities. Motor vehicles were the second most common type of machine (15.5%), followed by off road vehicles (8.8%). Of the motor vehicle-related fatalities, 60.7% involved farm trucks and 25% involved pick up trucks. Only one off-road vehicle fatality was work-related.

FIGURE 3.12 **Machine related fatal agricultural injuries by type of machine, 1990-2000 (181 cases)**



Source: Canadian Agricultural Injury Surveillance Program (CAISP)
Other includes: auger, mower, power take off, baler, plough, hay elevator/conveyor, manure spreader

3.13 MECHANISM OF INJURY TABLE 3.13 Fatal agricultural injuries by mechanism of injury and age category, 1990–2003 (274 cases)

Mechanism of Injury	1-4 years		5-9 years		10-14 years		15-19 years		1-19 years	
	n	%	n	%	N	%	n	%	n	%
Bystander or dismounted passenger runover/struck/pinned	**34**	**35.4**	**10**	**18.5**	2	4.4	1	1.3	**47**	**17.2**
Machine rollover	3	3.1	5	9.3	**15**	**33.3**	**18**	**22.8**	**41**	**15.0**
Passenger fell from moving machine, then runover/struck/pinned by it	**19**	**19.8**	**10**	**18.5**	**6**	**13.3**	4	5.1	**39**	**14.2**
Drowning	**20**	**20.8**	**8**	**14.8**	2	4.4	4	5.1	34	12.4
Entangled/caught in machine	2	2.1	2	3.7	**3**	**6.7**	**8**	**10.1**	15	5.5
Animal related	4	4.2	5	9.3	**3**	**6.7**	2	2.5	14	5.1
Machine/vehicle traffic collision	0	0.0	0	0.0	3	6.7	**9**	**11.4**	12	4.4
Struck by object (not machine-related)	5	5.2	1	1.9	2	4.4	3	3.8	11	4.0
Caught in/under/between object (not machine)	5	5.2	5	9.3	0	0.0	0	0.0	10	3.6
Pinned or struck by machine component or collapsing machine	0	0.0	3	5.6	1	2.2	4	5.1	8	2.9
Exposure to toxic substance	0	0.0	0	0.0	0	0.0	7	8.9	7	2.6
Operator/alighted operator/other runover by moving machine	0	0.0	1	1.9	1	2.2	4	5.1	6	2.2
Exposure to fire	0	0.0	2	3.7	0	0.0	4	5.1	6	2.2
Passenger fell from moving machine, *not* runover/struck/pinned by it	2	2.1	0	0.0	1	2.2	1	1.3	4	1.5
Fall from height (not machine-related)	0	0.0	1	1.9	1	2.2	1	1.3	3	1.1
Asphyxiation in grain or soil	0	0.0	0	0.0	1	2.2	2	2.5	3	1.1
Off-road machine collision	0	0.0	0	0.0	1	2.2	2	2.5	3	1.1
Other machine-related*	1	1.0	0	0.0	1	2.2	4	5.1	6	2.2
Other non-machine related**	1	1.0	1	1.9	2	4.4	1	1.3	5	1.8
TOTAL	**96**	**100**	**54**	**100**	**45**	**100**	**79**	**100**	**274**	**100**

Source: Canadian Agricultural Injury Surveillance Program (CAISP)
* Includes drowning in machine, struck by object from machine, machine fire/explosion, operator fell from machine.
** Includes firearm injuries, electrocution and strangulation.

Table 3.13 shows the distribution of mechanisms of injury for fatal agricultural injuries by age category. Four of the top five fatality mechanisms were machine-related. Overall, machine runovers and machine rollovers accounted almost half of all deaths (48.6%). Deaths caused by machine runovers decreased in frequency in older age categories.

Among the youngest children aged 1 to 4, bystander runover events were the single largest cause of death (35.4%). In every case, the children were not engaged in agricultural work themselves, but rather present in an area where agricultural work was being done. In 5 to 9 year olds, bystander runovers (18.5%) and extra rider runovers (18.5%) were the most frequent causes of death. For the two youngest age groups, drowning was an important cause of death, ranking second for 1 to 4 year olds (20.8%) and third for 5 to 9 year olds (14.8%).

The pattern changed dramatically for children aged 10 to 14. In that age group machine rollovers were the leading cause of death (33.3%) followed by extra rider runovers (13.3%). 46.7% of the machines that rolled over were off road vehicles (ORVs). Of the ORV rollovers, only one was work-related. Bystander runovers (4.4%) and drownings (4.4%) caused relatively few deaths in children 10 to 14 years old.

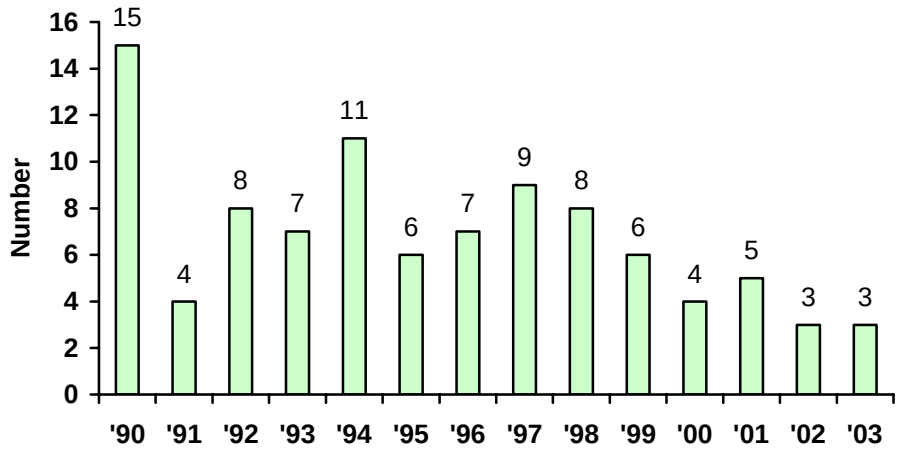
In youth aged 15 to 19, runover events were relatively rare as fatality mechanisms (extra rider runovers 5.1% and bystander runovers 1.3%). Machine rollover events were the leading cause of death in the oldest age group (22.8%), followed by traffic collisions (11.4%) and machine entanglements (10.1%). Exposure to toxic substances was also an important fatality mechanism in this age group (8.9%). Exposure to hydrogen sulfide gas from hog manure was responsible for 42.9% of the deaths from toxic substances among youth aged 15 to 19.

4 FATAL AGRICULTURAL INJURIES IN CHILDREN 1 TO 4 YEARS OLD

4.1 YEAR

Figure 4.1 shows the distribution of injuries by year for children aged 1 to 4. The number of fatalities per year appears to have declined over the surveillance period. This should be interpreted with caution as there was a decline in the farm population from 1990 to 2003.

FIGURE 4.1 **Fatal agricultural injuries among children aged 1 to 4 by year, 1990-2003 (96 cases)**

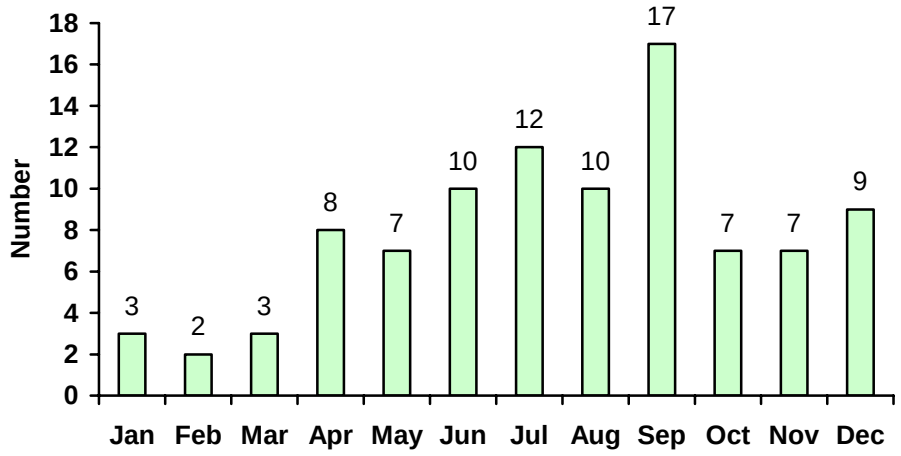


Source: Canadian Agricultural Injury Surveillance Program

4.2 MONTH

Figure 4.2 shows the distribution of fatal injuries by month of the year. Children aged 1 to 4 were fatally injured during every month of the year. The frequency of fatal injury events declined during the winter months and increased from May to December. The peak incidence was during September.

FIGURE 4.2 **Fatal agricultural injuries among children aged 1 to 4 by month of the year, 1990-2003 (96 cases)**

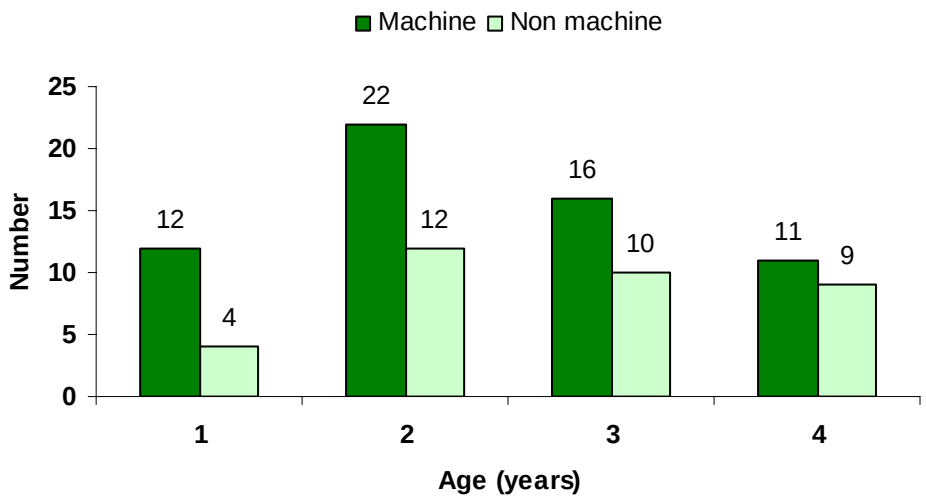


Source: Canadian Agricultural Injury Surveillance Program

4.3 MAJOR CAUSE BY AGE

Figure 4.3 shows the number of agricultural fatalities by age and major cause. One-year-old children had the highest proportion of machine related deaths (75%). For all ages, the number of machine-related deaths exceeded the number of non-machine deaths.

FIGURE 4.3 **Fatal injuries among children aged 1 to 4 by age and major cause, 1990-2003 (96 cases)**



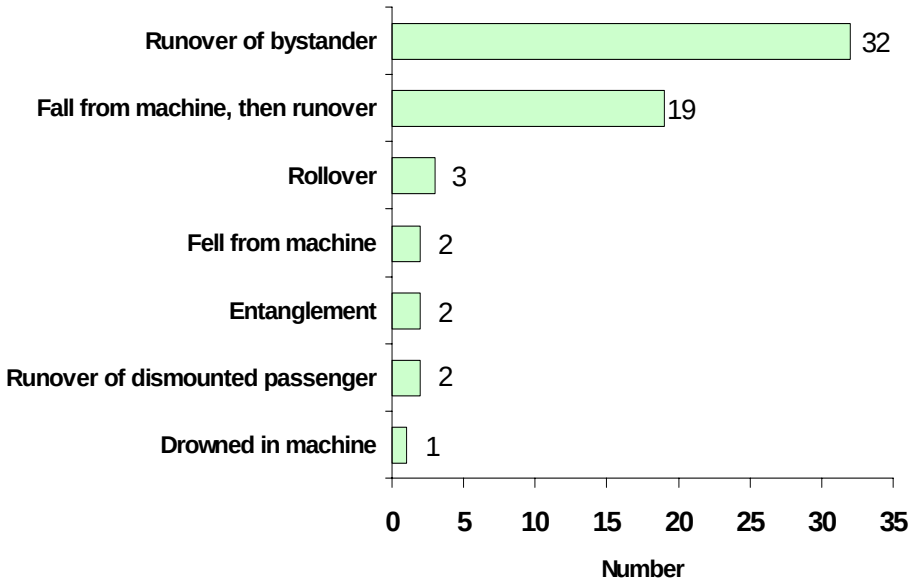
Source: Canadian Agricultural Injury Surveillance Program

4.4 MACHINE RELATED

Machine related fatalities accounted for 63.5% (61/96) of all fatal injuries in this age group. The leading machine-related mechanisms of injury were bystander runovers and extra rider runovers.

55.2% of all fatalities in children aged 1 to 4 were due to runovers. 24 children were killed because they had been taken on a machine as an extra rider. (Extra rider events include machine rollovers and falls from machines that were not followed by the victim being runover.)

FIGURE 4.4 **Fatal machine-related injuries among children aged 1 to 4 by mechanism of injury, 1990-2003 (61 cases)**



Source: Canadian Agricultural Injury Surveillance Program

4.5 MACHINE RELATED FATAL INJURY PATTERNS FOR CHILDREN 1 TO 4 YEARS OLD

- 90.1% (55/61) of the machine-related fatalities were work-related.
- In 54.1% of the machine-related fatalities, the child was in the company of an adult who was engaged in agricultural work activities. In the remainder of the injury events, the child was playing in the vicinity of the work area.

Runover by Machine*

- In 78.9% of the extra rider runovers, the machine involved was a tractor.
- For fatal bystander runovers, 31.2% of the machines involved were trucks and 37.5% were tractors.
- Of the 34 fatal bystander and dismounted passenger runovers, the machine was moving forwards in 52.9% of the cases and reversing in 35.3% of the cases.
- At least 55.9% of the victims were runover by machines operated by their own fathers. In all, at least 70.6% of the victims were runover by machines operated by family members.

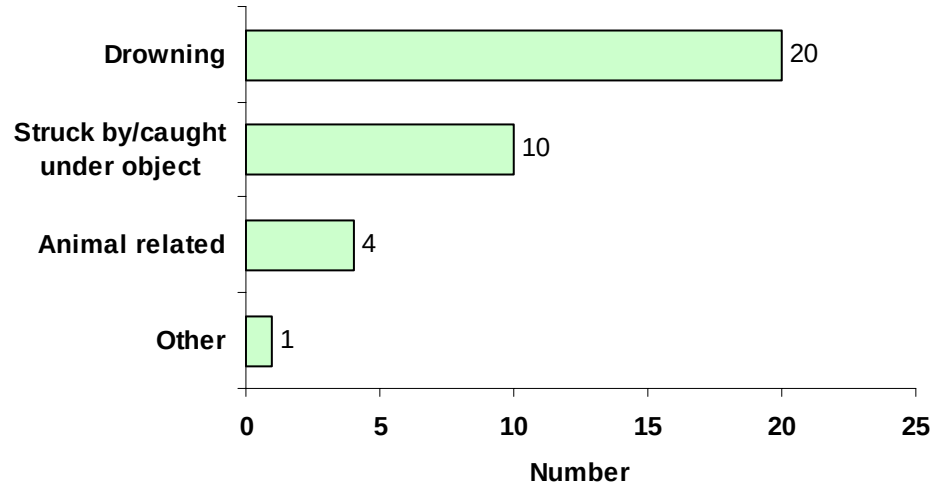
*For greater detail, please refer to *Agricultural Runovers in Canada for 1990-2000*, available at www.CAISP.ca.

4.6 NON-MACHINE

Figure 4.6 shows the distribution of non-machine fatalities by mechanism of injury. Drowning in natural and man-made water sources on farms accounted for 57.1% of all non-machine related fatalities in this age group.

Being struck by or caught under a heavy object was reported as the mechanism of injury in 28.6% of the non-machine cases. A large variety of heavy objects were involved, including two steel gates and two steel fence panels/dividers.

FIGURE 4.6 Fatal non-machine injuries among children aged 1 to 4 by mechanism of injury, 1990-2003 (35cases)



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

4.7 NON MACHINE FATAL INJURY PATTERNS FOR CHILDREN 1 TO 4 YEARS OLD

- Among the non-machine fatalities, 31.4% were work related and 68.6% were due to a hazard of the farm environment.

Drowning

- Drowning was the leading cause of non machine related fatalities among children 1 to 4 years old (57.1%).
- Children in this age group had the highest incidence of drowning among all children and youth.
- 55% (11/20) of the drownings occurred in man made water sources such as dugouts, troughs and sewage lagoons.

Struck by or caught under object

- All but one of these events happened when a young child caused a heavy object (e.g. a steel gate) to fall on top of him/her. Most of these fatalities occurred in the farmyard or barn.

Animal related

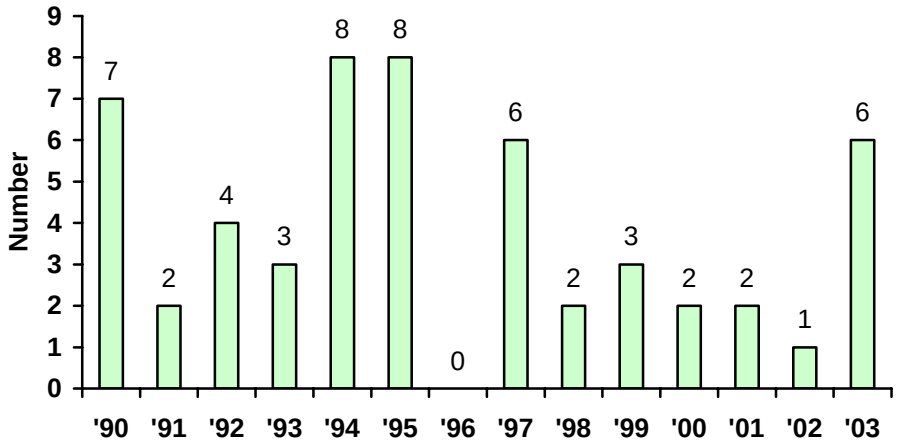
- All of these fatalities were caused by horses.

5 FATAL AGRICULTURAL INJURIES IN CHILDREN 5 TO 9 YEARS OLD

5.1 YEAR

Figure 5.1 shows the distribution of injuries by year for children aged 5 to 9. There was no consistent pattern in the number of fatalities per year over the surveillance period. There were a high number of injuries in 2003 even though the farm population is known to have declined since 1990.

FIGURE 5.1 **Fatal agricultural injuries among children aged 5 to 9 by year, 1990-2003 (54 cases)**

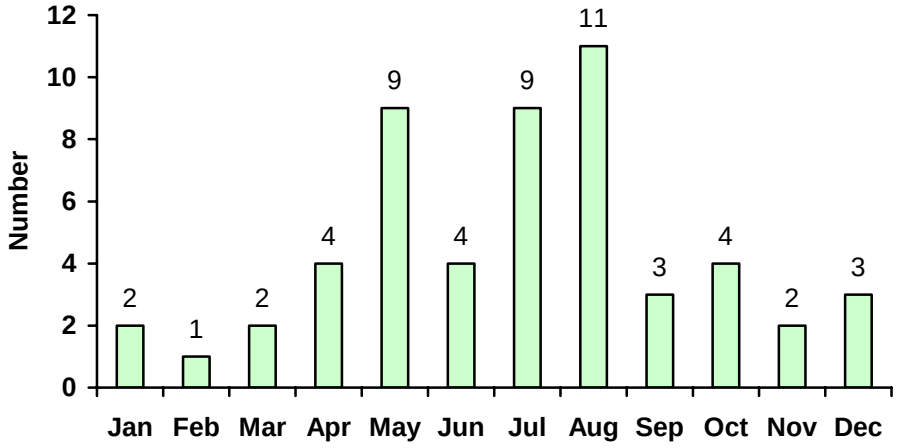


Source: Canadian Agricultural Injury Surveillance Program

5.2 MONTH

Children aged 5 to 9 were fatally injured during every month of the year, but most of the fatalities occurred from May to August. The highest numbers of fatalities took place in May and during the school holiday months of July and August.

FIGURE 5.2 **Fatal agricultural injuries among children aged 5 to 9 by month of the year, 1990-2003 (54 cases)**

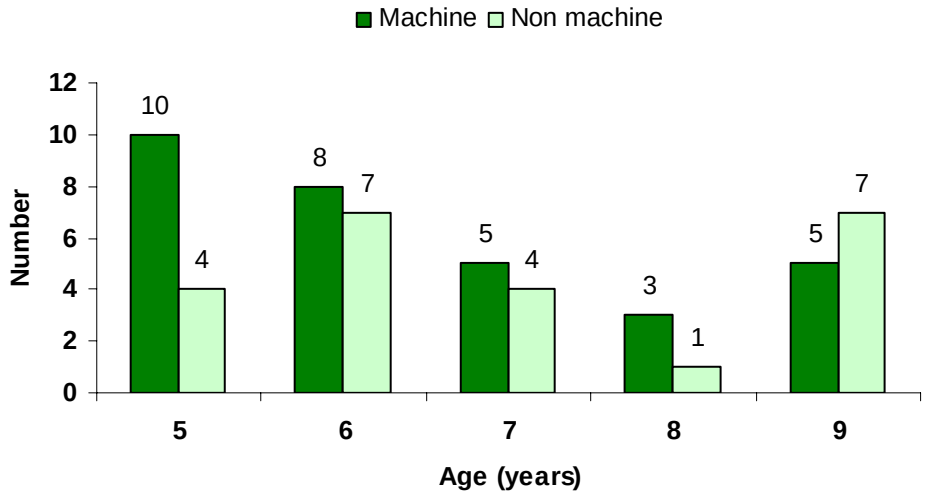


Source: Canadian Agricultural Injury Surveillance Program

5.3 MAJOR CAUSE BY AGE

Figure 5.3 shows the number of agricultural fatalities by age and major cause. Five year old and eight year old children had the highest proportions of machine related deaths (71.4% and 75% respectively). For ages 5 to 8, the number of machine-related deaths exceeded the number of non-machine deaths.

FIGURE 5.3 **Fatal injuries among children aged 5 to 9 by age and major cause, 1990-2003 (54 cases)**

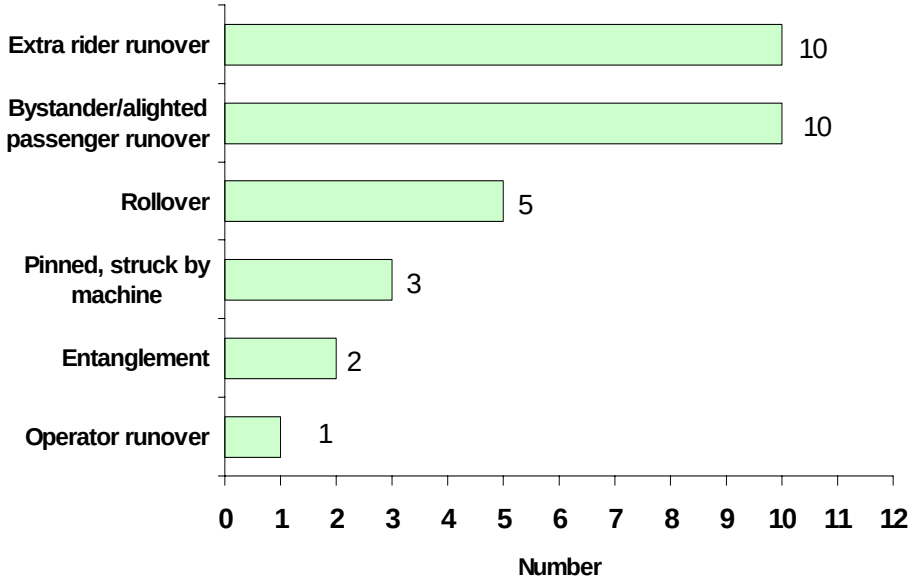


Source: Canadian Agricultural Injury Surveillance Program

5.4 MACHINE RELATED

Machine related fatalities accounted for 57.4% (31/54) of all fatalities in children aged 5 to 9. The leading mechanism of injury was extra rider runovers (32.3%). The combined bystander and alighted passenger runover categories also accounted for 32.3% of the machine-related deaths. In all, 64.6% of all machine fatalities in children aged 5 to 9 were due to runovers. 13 children were killed because they had been taken on a machine as an extra rider. (Extra rider events include any machine rollovers where the child had been taken as an extra rider on the machine.)

FIGURE 5.4 **Fatal machine-related injuries among children aged 5 to 9 by mechanism of injury, 1990-2003 (31 cases)**



Source: Canadian Agricultural Injury Surveillance Program

5.5 MACHINE-RELATED FATAL INJURY PATTERNS FOR CHILDREN 5 TO 9 YEARS OLD

- 87.1% (27/31) of the machine-related fatalities were work-related.
- In 71% of the machine-related fatalities, the child was in the company of an adult who was carrying out agricultural work activities. In the remainder of the injury events, the child was either playing near the work area or engaged in a work task.

Runover by Machine*

- In 50% (5/10) of the extra rider runovers, the machine involved was a tractor. Three trucks and two wagons were also cited in extra rider runovers.
- For fatal bystander and alighted passenger runovers, 80% of the machines involved were tractors. The remaining two incidents involved a wagon and a manure spreader.
- Of the 10 fatal bystander and dismounted passenger runovers, the machine was moving forwards in 40% of the cases and reversing in 30% of the cases. The direction of movement was unknown in two cases.
- At least 70% of the victims were runover by machines operated by family members.

Machine Rollover

- Rollover victims included an 8-year-old ATV operator and a 7-year-old lawn tractor operator. The other children killed in rollovers had been taken onto machines as extra riders.

*For greater detail, please refer to *Agricultural Runovers in Canada for 1990-2000*, available at www.CAISP.ca.

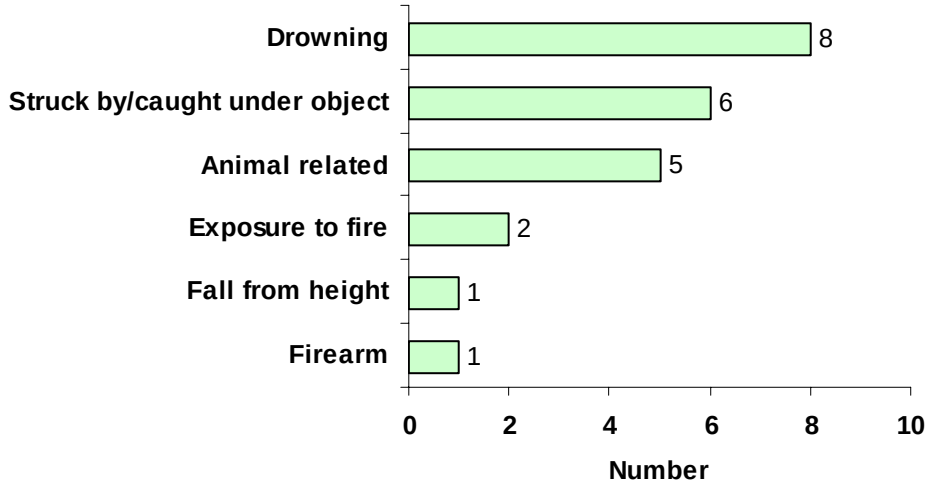
5.6 NON-MACHINE

Figure 5.6 shows the distribution of non-machine fatalities by mechanism of injury. Drowning in natural and man-made water sources on farms accounted for 34.8% of all non-machine related fatalities among children aged 5 to 9.

Being struck by or caught under a heavy object was reported as the mechanism of injury in 26.1% of the non-machine cases.

21.7% of the non-machine related deaths were due to animals (three incidents involving horses and two maulings by domestic dogs).

FIGURE 5.6 Fatal non-machine injuries among children aged 5 to 9 by mechanism of injury, 1990-2003 (23 cases)



5.7 NON MACHINE FATAL INJURY PATTERNS FOR CHILDREN 5 TO 9 YEARS OLD

- Among the non-machine fatalities, 39.1% were work related and 60.9% were due to a hazard of the farm environment.

Drowning

- Drowning was the leading cause of non machine related fatalities among children 5 to 9 years old (34.8%).
- 87.5%% (7/8) of the drownings occurred in man made water sources such as sewage lagoons and dugouts.

Struck by or caught under object

- 66.7% of these events happened when a child, while playing, caused a heavy object (e.g. a steel gate) to fall on top of him/her.

Animal related

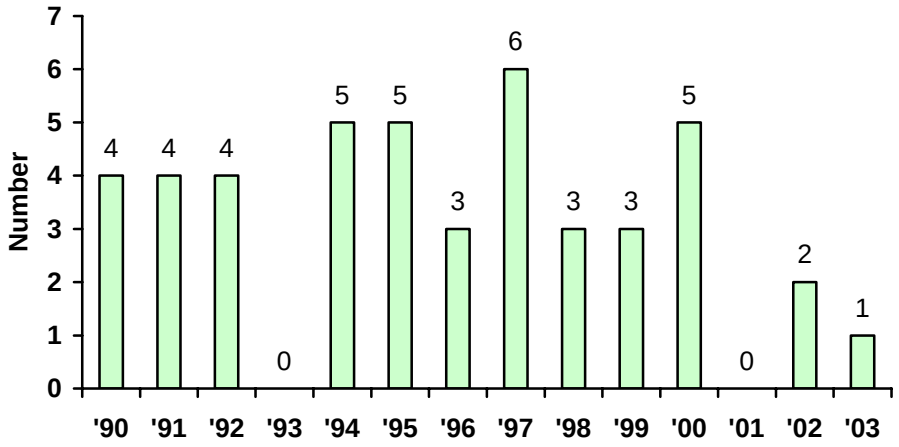
- 60% of these deaths were caused by horses and 40% by dogs.

6 FATAL AGRICULTURAL INJURIES IN CHILDREN 10 TO 14 YEARS OLD

6.1 YEAR

Figure 6.1 shows the distribution of injuries by year for children aged 10 to 14. There was no consistent pattern in the number of fatalities per year over the surveillance period.

FIGURE 6.1 **Fatal agricultural injuries among children aged 10 to 14 by year, 1990-2003 (45 cases)**

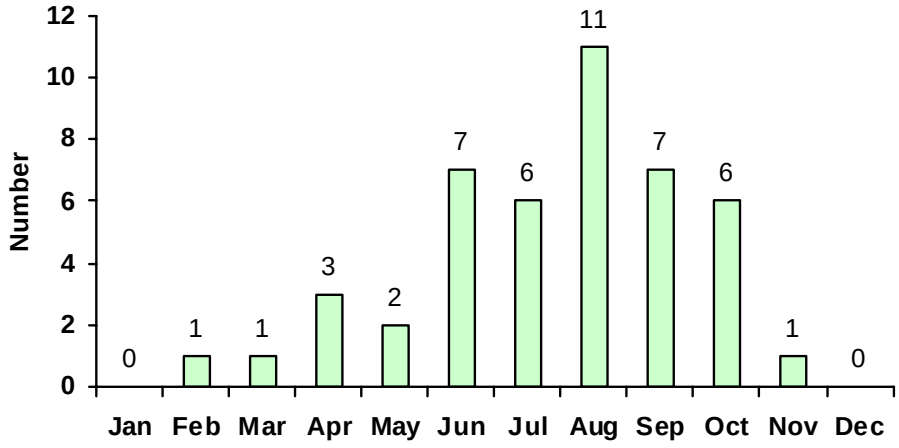


Source: Canadian Agricultural Injury Surveillance Program

6.2 MONTH

Figure 6.2 shows the distribution of fatal injuries by month of the year. For this age group, most of the fatalities occurred from June to October. The peak number of fatalities (24.4%) took place during the school holiday month of August. No children aged 10 to 14 were killed during the months of December and January.

FIGURE 6.2 **Fatal agricultural injuries among children aged 10 to 14 by month of the year, 1990-2003 (45 cases)**



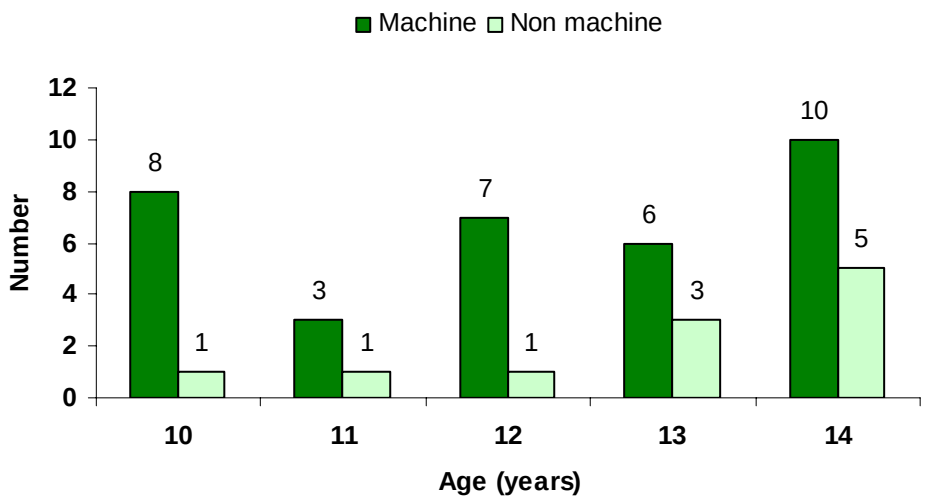
Source: Canadian Agricultural Injury Surveillance Program

6.3 MAJOR CAUSE BY AGE

Figure 6.3 shows the number of agricultural fatalities by age and major cause. Ten- and twelve-year-old children had the highest proportions of machine-related deaths (88.9% and 87.5%). For all ages, the number of machine-related deaths exceeded the number of non-machine deaths.

There were more deaths among children 14-years-old than there were for children of any other age.

FIGURE 6.3 **Fatal injuries among children aged 10 to 14 by age and major cause, 1990-2003 (45 cases)**



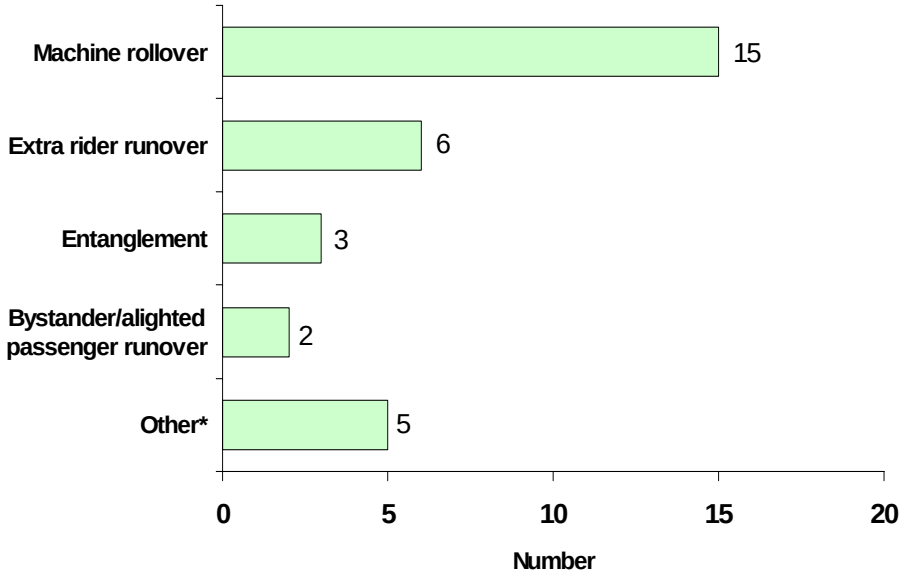
Source: Canadian Agricultural Injury Surveillance Program

6.4 MACHINE RELATED

Machine related fatalities accounted for 75.6% (34/45) of all fatalities in children aged 10 to 14. The leading mechanism of injury was, by far, machine rollovers (42.9% of machine-related deaths). Extra rider runovers accounted for another six (17.6%) of the machine-related deaths. Four children who were extra riders on machines died when the machines rolled over.

Eleven deaths (32.4%) involved Off Road Vehicles (ORVs). These included ten ATVs and one dune buggy. Of the ORV deaths, there were six rollovers, three traffic collisions, one extra rider runover and one off-road collision.

FIGURE 6.4 **Fatal machine-related injuries among children aged 10 to 14 by mechanism of injury, 1990-2003 (34 cases)**



*Includes one incidence each of: pinned/struck by machine, operator runover, operator fell from machine, off-road collision, struck by object from machine.

Source: Canadian Agricultural Injury Surveillance Program

6.5 MACHINE-RELATED FATAL INJURY PATTERNS FOR CHILDREN 10 TO 14 YEARS OLD

- 70.6% (24/34) of the machine fatalities were work-related. 58.8% of the victims were performing work themselves.
- Twelve of the machines involved were tractors (35.3%), 11 were Off Road Vehicles (32.5%), 5 were motor vehicles (14.7%) and 2 were harvesters (5.9%). There was one incident each involving a hay elevator, a power tool, a combine and a mower.
- All of the children killed in ORV-related incidents were male.
- Only one of the 11 ORV-related deaths (9.1%) was work-related.
- Eighteen of the children who died were machine operators. These included:
  - A 10-year-old, two 12-year-olds and two 14-year-olds driving full-sized tractors.
  - An 11-year-old driving a grain truck on a grid road.
  - A 14-year-old operating a mower.
  - Three 10-year-olds, an 11-year-old, a 12-year-old, two 13-year-olds and four 14-year-olds driving off road vehicles.

Machine Rollover

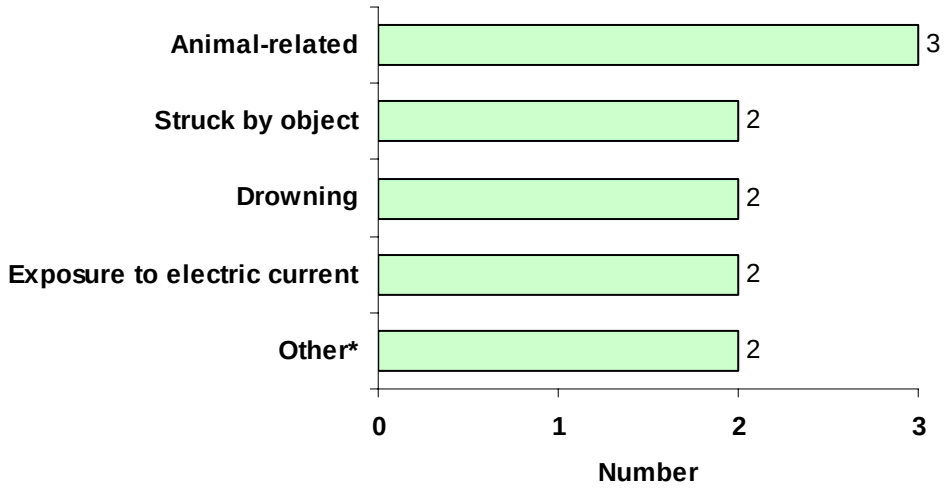
- 46.7% of the machines that rolled over were off-road vehicles and 33.3% were full-sized tractors.
- 46.7% of the machine rollovers were work related.
- Of the seven ORV rollovers, only one (14.3%) was work-related.

6.6 NON-MACHINE

Figure 6.6 shows the distribution of non-machine fatalities by mechanism of injury.

Only eleven children aged 10 to 14 were killed in non-machine events from 1990 to 2003. Three children (27.3%) died in horse-related incidents, two were struck by objects, two drowned in dugouts, and two were electrocuted

FIGURE 6.6 **Fatal non-machine injuries among children aged 10 to 14 by mechanism of injury, 1990-2003 (11 cases)**



*Includes one incidence each of a fall from height and a firearm injury.

Source: Canadian Agricultural Injury Surveillance Program

6.7 NON MACHINE FATAL INJURY PATTERNS FOR CHILDREN 10 TO 14 YEARS OLD

- Among the non-machine fatalities, 54.5% were work related and 45.5% were due to a hazard of the farm environment.

Animal events

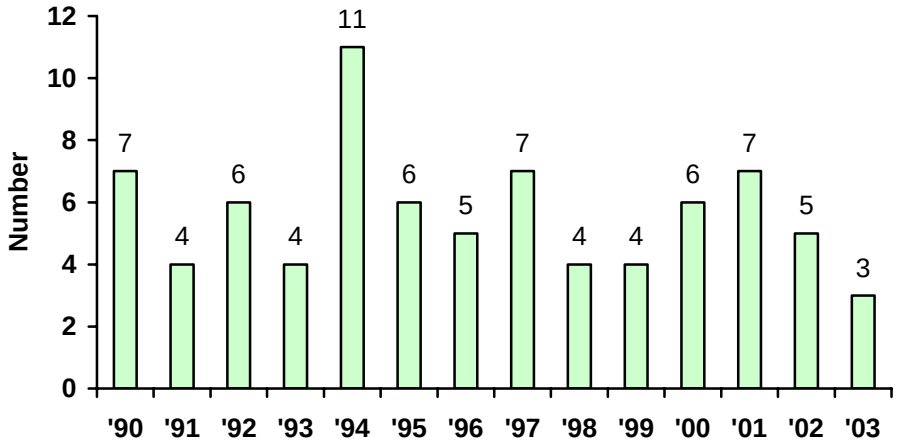
- Animal-related events were the leading cause of non-machine related fatalities among children aged 10 to 14.
- All three animal events involved horses. Two riders were thrown from their horses and one child was entangled in the reins of a horse and then dragged along by it.

7 FATAL AGRICULTURAL INJURIES IN YOUTH 15 TO 19 YEARS OLD

7.1 YEAR

Figure 7.1 shows the distribution of injuries by year for youth aged 15 to 19. There was no consistent pattern in the number of fatalities per year over the surveillance period.

FIGURE 7.1 **Fatal agricultural injuries among youth aged 15 to 19 by year, 1990-2003 (79 cases)**

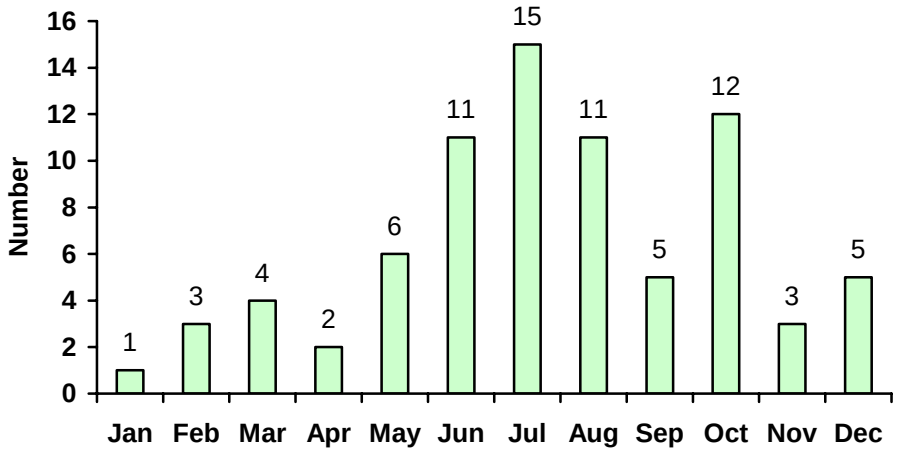


Source: Canadian Agricultural Injury Surveillance Program

7.2 MONTH

Figure 7.2 shows the distribution of fatal injuries by month of the year. For this age group, most of the fatalities occurred from June to August. The greatest number of fatalities took place during the school holiday month of July. There was another peak in fatalities during October.

FIGURE 7.2 **Fatal agricultural injuries among youth aged 15 to 19 by month of the year, 1990-2003 (79 cases)**



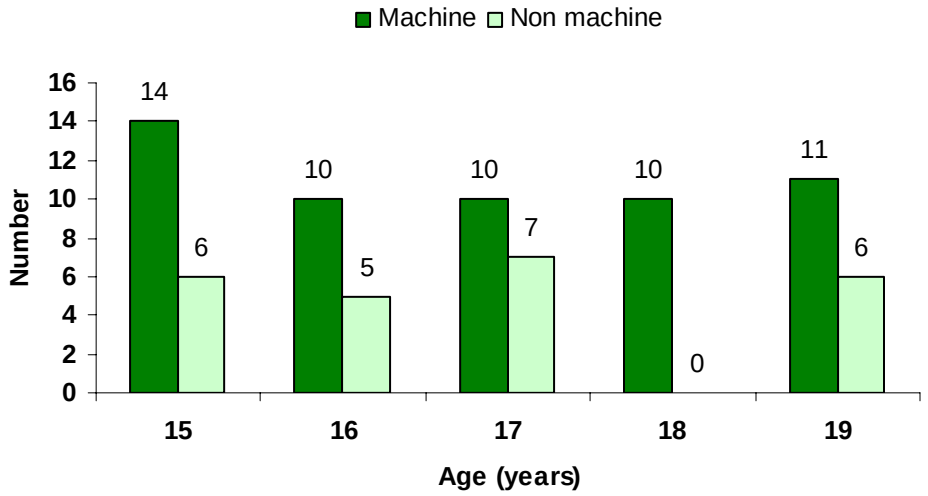
Source: Canadian Agricultural Injury Surveillance Program

7.3 MAJOR CAUSE BY AGE

Figure 7.3 shows the number of agricultural fatalities by age and major cause. Eighteen- and fifteen-year-old youth had the highest proportions of machine-related deaths (100% and 70%). For all ages, the number of machine-related deaths exceeded the number of non-machine deaths.

There were more deaths among youth who were 15-years-old than there were for youth of any other age.

FIGURE 7.3 **Fatal injuries among youth aged 15 to 19 by age and major cause, 1990-2003 (79 cases)**



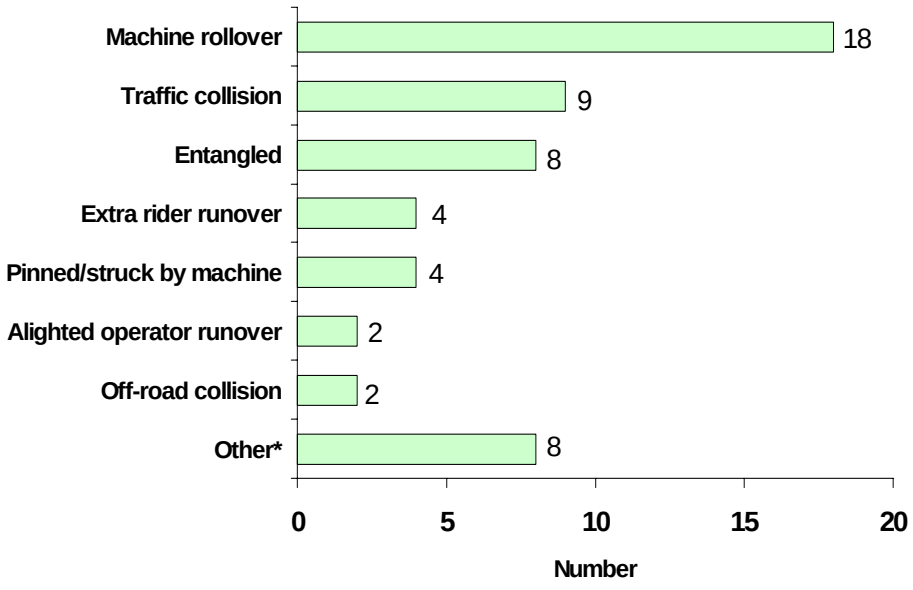
Source: Canadian Agricultural Injury Surveillance Program

7.4 MACHINE RELATED

Machine related fatalities accounted for 69.6% (55/79) of all fatalities in youth aged 15 to 19. The leading mechanism of injury was machine rollovers (32.7%). Traffic collisions and machine entanglements accounted for another 16.4% and 14.5% of the machine-related deaths.

In contrast to the 10 to 14 age group, only four deaths (7.2%) involved ORVs. None of these was work related.

FIGURE 7.4 **Fatal machine-related injuries youth aged 15 to 19 by mechanism of injury, 1990-2003 (55 cases)**



*Includes one incidence each of: operator fell from machine (not runover), operator runover, passenger fell from machine (not runover), bystander runover, machine-related explosion, machine-related drowning, unspecified runover, and struck by object propelled from machine.

Source: Canadian Agricultural Injury Surveillance Program

7.5 MACHINE-RELATED FATAL INJURY PATTERNS FOR YOUTH AGED 15 TO 19 YEARS OLD

- 92.7% of the victims of machine-related injury events were male.
- 85.5% (47/55) of the machine fatalities were work-related.
- 83% (39/47) of the victims of work-related fatalities were performing work themselves.
- Twenty-five of the machines involved were tractors (45.5%). There were also 10 motor vehicles (18.2%), 5 combines (9%), 4 augers (7.2%), 3 wagons (5.5%), and 2 PTOs (3.6%), as well as one front end loader (FEL) and one harvester. .
- 47.3% of the youth killed in machine-related events were operating the machine.

Machine Rollover

- Of the 18 machine rollovers, 16 (88.8%) involved full-sized tractors. The other two machines were a motor vehicle and an ATV.

Traffic Collision

- None the nine victims of traffic collisions were farm workers. Their deaths were classified as agricultural because eight of them died in collisions with farm machines and one died in a collision with a farm animal. None of the farm machine operators were killed.
- Three of the collisions appear to have been caused by driver error on the part of the victim. Two of those collisions involved motor cycles traveling at high speed that hit farm machines turning left.
- Three victims died together when a vehicle they were traveling in collided with a large combine that crossed the centre line while making a right turn.

Entanglement

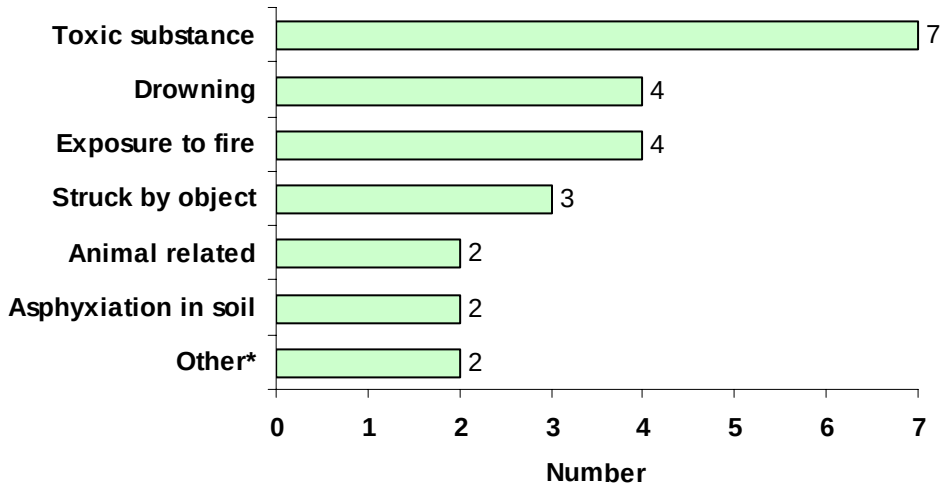
- All eight of the entanglements were work-related.
- In at least five of the cases, the victim became entangled because of loose clothing.

7.6 NON-MACHINE

Figure 7.6 shows the distribution of non-machine fatalities by mechanism of injury.

24 youth aged 15 to 19 were killed in non-machine events from 1990 to 2003. The most common mechanisms of non-machine fatalities were exposure to toxic substances (29.2%), drowning (16.7%) and exposure to fire (16.7%).

FIGURE 7.6 **Fatal non-machine injuries among youth aged 15 to 19 by mechanism of injury, 1990-2003 (24 cases)**



*Includes one incidence each of a fall from height and a firearm injury.

Source: Canadian Agricultural Injury Surveillance Program

7.7 NON MACHINE FATAL INJURY PATTERNS FOR YOUTH AGED 15 TO 19 YEARS OLD

Among the non-machine fatalities, 58.3% were work related and 41.7% were due to a hazard of the farm environment.

Exposure to toxic substances

- Three of the deaths were part of multiple fatality events involving exposure to hydrogen sulfide gas (H_2S) from hog manure.
- In one event, two youth were among three persons killed by H_2S as they were unplugging a hog barn sewage pipe at the pit end.
- Another youth was among three persons who died from H_2S exposure while they were transferring liquid hog manure from a sewage lagoon to a tanker truck. The youth died while attempting to rescue the other two victims.
- H_2S from hog manure was responsible for 42.9% of the deaths due to toxic substances
- A double fatality resulted from exposure to a low oxygen environment in a root cellar.
- One victim died because he was overcome by silo gas and then fell into the silo.
- Another died because he entered a well that had just been cleaned using hydrochloric acid.

Exposure to fire

- Two of the youth died together in a barn fire. Investigators concluded that they had been smoking in the barn.
- One youth died in a bunkhouse fire.
- The remaining death was part of a triple fatality resulting from the explosion of a gasoline storage tank in a farm yard.

Drowning

- Two of the drownings occurred in an irrigation pond, one in a dugout and one in a creek.
- Half of the drownings were work-related.

Struck by object

- All three deaths involved the collapse of a building or building component.
- Two of these deaths were work-related.

8 HOSPITALIZED AGRICULTURAL INJURIES IN CHILDREN AND YOUTH: OVERVIEW

8.1 AGE

The distribution of agricultural injuries by age is shown in Table 8.1. The rate of hospitalization increased with increasing age except for children 10 to 14 years old. The highest rate was among youth aged 15 to 19 years. This pattern differs from that seen for fatal injuries where the youngest age group, children 1 to 4 years old, had the highest rate of death.

TABLE 8.1 **Hospitalized agricultural injuries by age category, April 1990-March 2000 (2,828 cases)***

Age Group	Hospitalizations		Farm Population**		Crude rate per 100,000/yr
	No.	%	No.	%	
0-4	471	16.7	52,125	18.1	90.4
5-9	675	23.9	71,035	24.7	95.0
10-14	742	26.2	84,025	29.2	88.3
15-19	940	33.2	80,455	28.0	116.8
Total	**2,828**	**100**	**287,640**	**100**	**98.3**

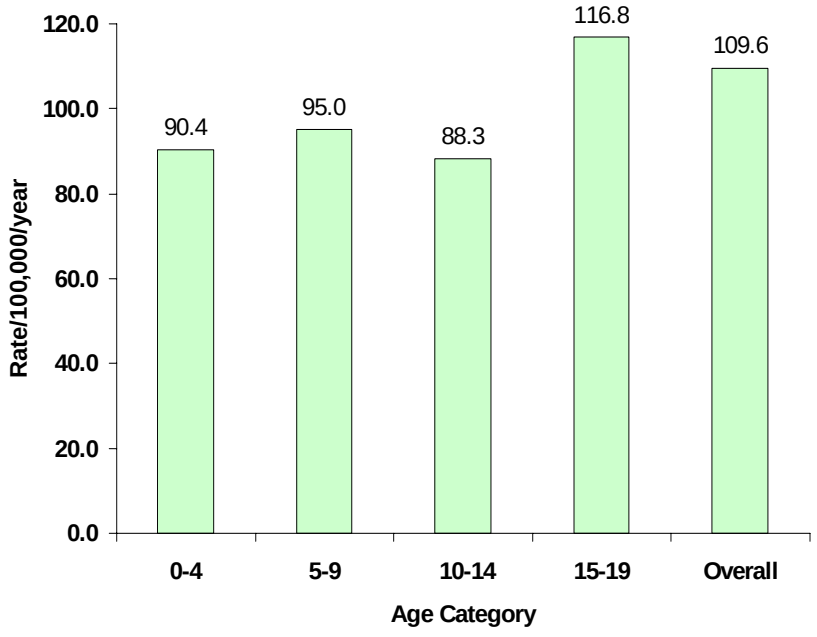
* Data are missing for Alberta for the last two years of the surveillance period.
** 1996 Census of Agriculture and Population Census, Statistics Canada

Source: Canadian Agricultural Injury Surveillance Program (CAISP)

8.2 RATES

The age specific rates of hospitalized agricultural injuries per 100,000 farm population are shown in Figure 8.2. 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 hazards of the farm or ranch environment.

FIGURE 8.2 **Age specific rates of hospitalized agricultural injuries per 100,000 farm population by age category, April 1990-March 1998 (2,828 cases)**



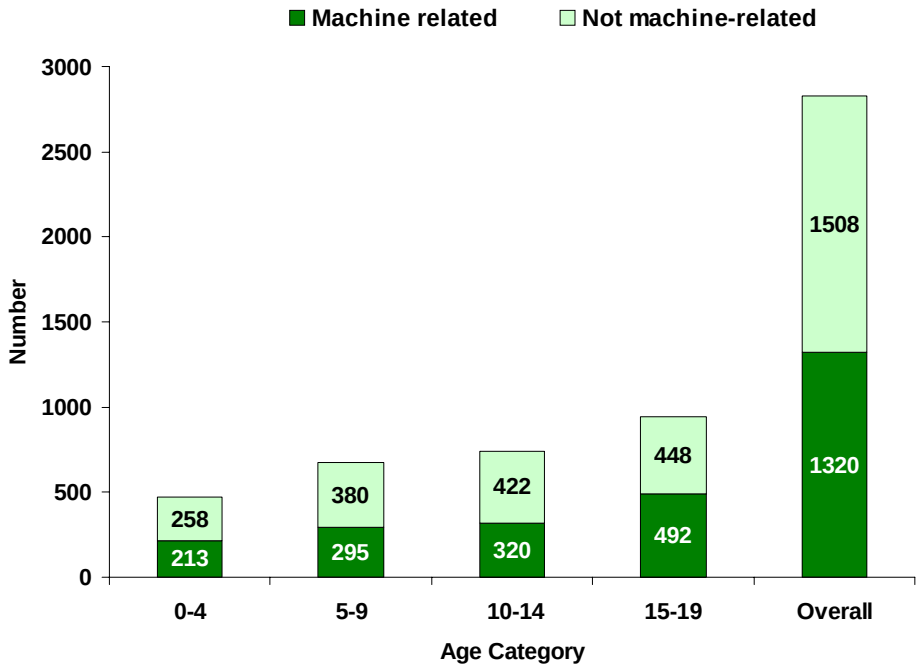
Source: Canadian Agricultural Injury Surveillance Program (CAISP)

8.3 COUNTS

FIGURE 8.3 **Number of hospitalized agricultural injuries by age category and major cause, April 1990-March 2000 (2828 cases)**

Figure 8.3 shows the distribution of agricultural injuries by age group and major cause.

Overall, 53.3% of the injuries were machine-related. Youth aged 15 to 19 were the only age group where the number of machine-related injuries exceeded the number of non-machine injuries.

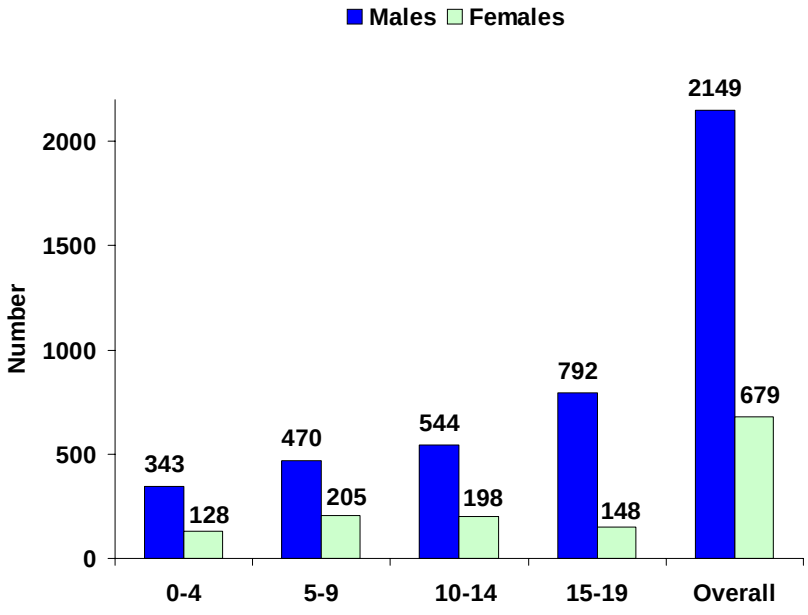


Source: Canadian Agricultural Injury Surveillance Program (CAISP)

8.4 AGE AND GENDER

FIGURE 8.4 **Hospitalized agricultural injuries by age and gender, April 1990-March 2000 (2,828 cases)**

Figure 8.4 shows the distribution of agricultural injuries by gender in each age group. More males than females were injured in all age categories. Overall, 76% of the persons who were hospitalized for agricultural injuries were male. The male to female ratio was lowest in the 5 to 9 year age category (2.3:1) and highest in the oldest age category (5.4:1).



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

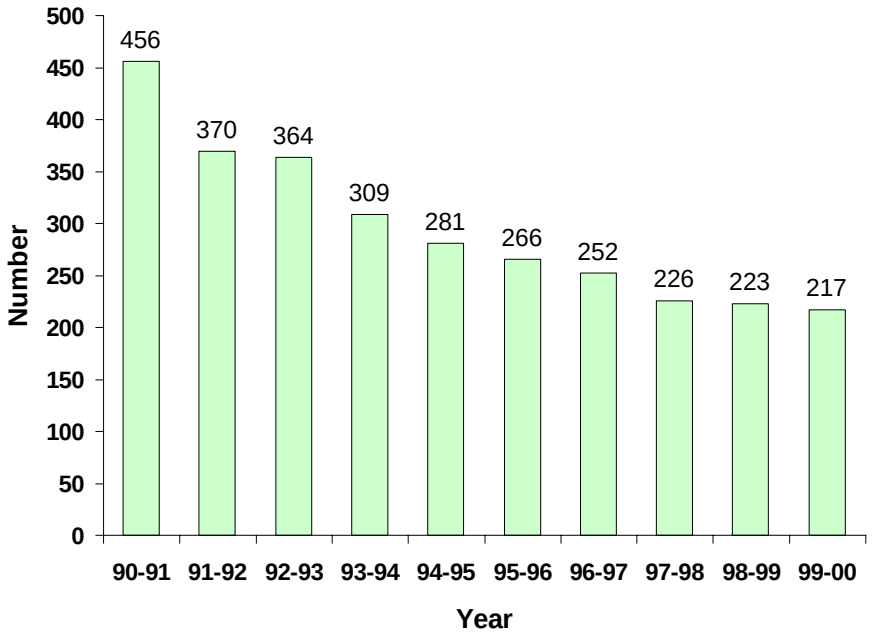
8.5 YEAR

Figure 8.5 shows the distribution of hospitalized agricultural injuries by fiscal year during the surveillance period.

There was a gradual decline in the annual number of child and youth agricultural injuries treated in Canadian hospitals between 1990 and 2000. This trend could be attributed, in part, to a reduction in the proportion of injured persons admitted to hospital relative to the proportion of injured persons who were treated and released.

Note: data are imputed for Alberta from April 1, 1998 to March 31, 2000 (n = 68)

FIGURE 8.5 **Hospitalized agricultural injuries by fiscal year, April 1990-March 2000 (2,828 cases)***

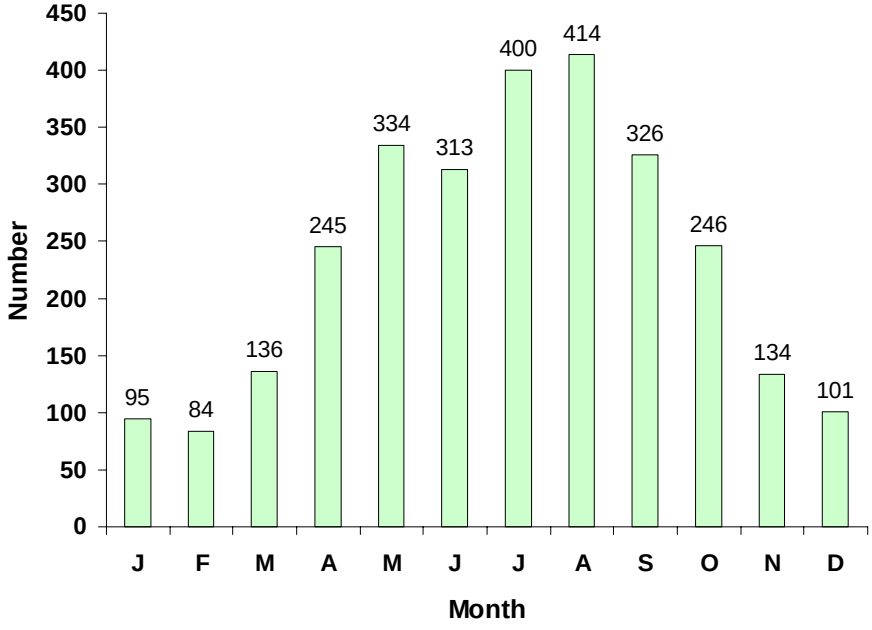


Source: Canadian Agricultural Injury Surveillance Program (CAISP)
*Data was imputed for Alberta for the last two fiscal years. Imputed values are not included in the total number of cases (2,828).

8.6 MONTH

Figure 8.6 shows the distribution of hospitalized agricultural injuries by month of admission. There was an increase in the frequency of admissions during the crop production season from April to October. Distinct peaks occurred during the school holiday months of July and August. This pattern was similar to that observed for fatal agricultural injuries among children and youth.

FIGURE 8.6 **Hospitalized agricultural injuries by month of admission, April 1990-March 2000 (2,828 cases)**



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

8.7 MAJOR CAUSE

Figure 8.7 shows the distribution of hospitalized farm injuries by major cause for each age group. A disproportionately large percentage of machine related injuries were observed in the 15 to 19 year age group compared to the proportion of the population that they represent.

TABLE 8.7 **Hospitalized agricultural injuries by major cause, April 1990-March 2000 (2,828 cases)**

Age Category	Machine-related		Non-machinery		Farm Population*	
	No.	%	No.	%	No.	%
0 – 4	213	16.1	258	17.1	52,125	18.1
5 – 9	295	22.3	380	25.1	71,035	24.6
10 – 14	320	24.3	422	28.0	84,025	29.2
15 – 19	492	37.3	448	29.7	80,455	27.9
Total	**1320**	**100**	**1508**	**100**	**287,640**	**100**

* 1996 Agricultural Census and Population Census, Statistics Canada
Source: Canadian Agricultural Injury Surveillance Project (CAISP)

8.8 LENGTH OF STAY

Table 8.8 shows the length of stay in hospital (including subsequent readmissions for treatment of the same injury). A total of 13,341 days were required to treat all injuries. Almost 30% of the cases required a hospital stay of greater than 3 days, indicating that these injuries were relatively severe.

TABLE 8.8 **Hospitalized agricultural injuries by length of stay, fiscal years April 1990 - March 2000 (2,828 cases)**

Length of stay	Number	Percent
1 day	1296	45.8
2 to 3 days	717	25.4
4 to 6 days	342	12.1
Greater than 6 days	473	16.7

Total hospital days used: 13,341
Source: Canadian Agricultural Injury Surveillance Program (CAISP)

8.9 PRIMARY DIAGNOSIS TABLE 8.9 Hospitalized agricultural injuries by primary diagnosis, fiscal years April 1990 - March 2000 (2,828 cases)

Diagnostic Code*	Description of Diagnostic Code	0 - 4 yrs		5– 9 yrs		10-14 yrs		15-19yrs		Total	
		n	%	n	%	n	%	n	%	n	%
800-804	Fracture: skull	51	**10.8**	40	5.9	26	3.5	33	3.5	150	5.3
805-809	Fracture: spine and trunk	**	0.6	22	3.3	26	3.5	55	5.9	106	3.7
810-819	Fracture: upper limb	56	**11.9**	155	**23.0**	179	**24.1**	145	**15.4**	535	**18.9**
820-829	Fracture: lower limb	39	8.3	84	**12.4**	101	**13.6**	129	**13.7**	353	**12.5**
830-839	Dislocation	**	0.6	**	0.6	9	1.2	20	2.1	36	1.3
840-848	Sprains / strains of joints and adjacent muscles	**	0.2	0	0	8	1.1	17	1.8	26	0.9
850-854	Intracranial injury, excl. those with skull fracture	79	**16.8**	95	**14.1**	80	**10.8**	78	8.3	332	**11.7**
860-869	Internal injury of chest, pelvis, and abdomen	13	2.8	23	3.4	23	3.1	33	3.5	92	3.3
870-879	Open wound: head, neck, and trunk	31	6.6	39	5.8	25	3.4	23	2.4	118	4.2
880-887	Open wound: upper limb	39	8.3	37	5.5	51	6.9	81	**8.6**	208	7.4
890-897	Open wound: lower limb	11	2.3	29	4.3	45	6.1	58	6.2	143	5.1
900-904	Injury blood vessel	0	0	**	0.3	**	0.3	7	0.7	11	0.4
910-919	Superficial injury	9	1.9	7	1.0	5	0.7	11	1.2	32	1.1
920-924	Contusion with intact skin intact	19	4.0	28	4.1	36	4.9	41	4.4	124	4.4
925-929	Crushing injury	11	2.3	10	1.5	15	2.0	30	3.2	66	2.3
940-949	Burns	22	4.7	17	2.5	24	3.2	34	3.6	97	3.4
950-957	Injury to nerves and spinal cord	**	0.4	**	0.1	**	0.4	**	0.3	9	0.3
958-959	Traumatic complications and unspecified injuries	19	4.0	27	4.0	20	2.7	47	5.0	113	4.0
	Injury, other and unspecified	63	13.4	55	8.1	64	8.6	95	10.1	276	9.8
	TOTAL	**471**	**100**	**675**	**100**	**742**	**100**	**940**	**100**	**2828**	**100**

* Based on the main diagnostic nature of injury code from: U.S. Department of Health and Human Services (1989). "The International Classification of Diseases, 9th Revision." DHHS Publication No. (PHS) 89-1260.
** Less than 5 cases.

Source: The Canadian Agricultural Injury Surveillance Program (CAISP)

Table 8.9 shows the distribution of agricultural injuries by major diagnostic category. Only the main diagnosis is reported in this table. (Most of the cases had more than one diagnosis).

- Fractures of the upper and lower limbs and intracranial injuries were the most frequent primary diagnoses overall and within each of the three older age categories.
- Although less common, open wounds of the upper and lower limbs occurred in substantial numbers.
- Children aged 0 to 4 years experienced a disproportionately high number of head injuries (including skull fractures).
- Children aged 5 to 14 years had a disproportionately high number of upper limb fractures.

8.10 MECHANISM OF INJURY TABLE 8.10 Hospitalized agricultural injuries by mechanism of injury and age category, April 1990 - March 2000 (2,828)

Mechanism of Injury	0 - 4 years		5– 9 years		10-14 years		15-19years		Total	
	n	%	n	%	n	%	n	%	n	%
Animal related	83	**17.6**	104	**15.4**	150	**20.2**	168	**17.9**	505	**17.8**
Entangled / caught in machine	73	**15.5**	85	**12.6**	116	**15.6**	169	**17.9**	443	**15.7**
Fall from height (excluding machinery)	72	**15.3**	162	**24.0**	118	**15.9**	66	**7.0**	418	**14.8**
Runover by machine	61	**13.0**	73	**10.8**	47	**6.3**	61	6.5	242	**8.5**
Pinned or struck by machine	38	8.1	43	6.4	38	5.1	111	**11.8**	230	**8.1**
Fall from machine, not runover	33	7.0	53	**7.8**	57	**7.7**	58	6.2	201	7.1
Struck by an object (not from a machine)	20	4.2	27	4.0	41	5.5	64	**6.8**	152	5.4
Contact with toxic substance	41	**8.7**	15	2.2	15	2.0	36	3.8	107	3.8
Struck against an object (including machinery)	8	1.7	31	4.6	33	4.4	30	3.2	102	3.6
Exposure to fire	7	1.5	12	1.8	19	2.6	27	2.9	65	2.3
Machine rollover	**	0.2	6	0.9	17	2.3	30	3.2	54	1.9
Fall on the same level	7	1.5	14	2.1	16	2.1	19	2.0	56	1.9
Struck by object falling from a machine	**	0.2	5	0.7	13	1.7	23	2.4	42	1.5
Jumped to lower level	**	0.4	9	1.3	15	2.0	**	0.4	30	1.1
Caught in / under objects (not machine)	5	1.1	5	0.7	10	1.3	7	0.7	27	0.9
Traffic collision	0	0	9	1.3	10	1.3	6	0.6	25	0.9
Contact with temperature extremes	6	1.3	**	0.4	5	0.7	7	0.7	21	0.7
Firearms	**	0.2	**	0.1	5	0.7	10	1.0	17	0.6
Near drowning	6	1.3	**	0.1	0	0	0	0	7	0.2
Other and unknown	3	1.3	17	2.5	17	2.3	44	4.7	84	3.0
TOTAL	**471**	**100**	**675**	**100**	**742**	**100**	**940**	**100**	**2828**	**100**

** Less than 5 cases
Source: Canadian Agricultural Injury Surveillance Program (CAISP)

Table 8.10 shows the mechanisms of hospitalized farm injuries by age category for children and youth.

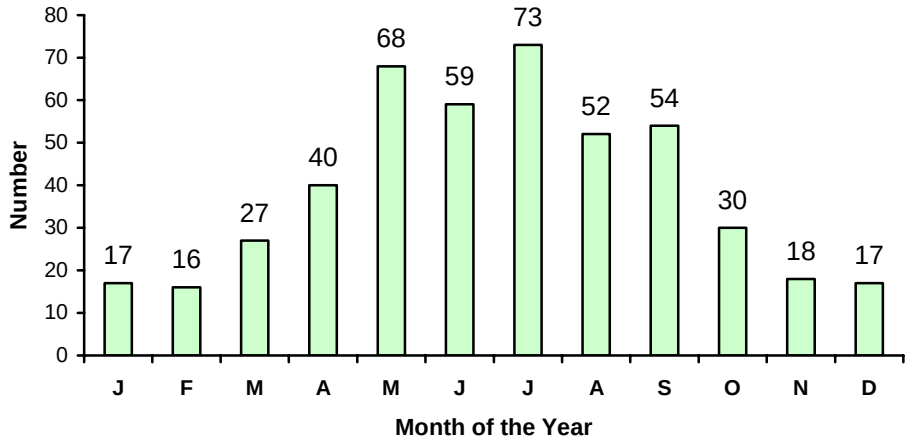
- The six leading mechanisms of injury among children and youth hospitalized for agricultural injuries were animal events, machine entanglements, falls from height, machine runovers, being pinned or struck by a machine, and falls from machines. These six mechanisms accounted for 72.1% of all the cases.
- Animal-related injuries ranked first overall and first for the 0-4 and 10-14 age categories.
- Injuries from becoming entangled or caught in machines occurred in all age groups, but most frequently among youth 15 to 19 years. In this age group they were ranked first as a mechanism of injury.
- There were a disproportionately high number of falls from height among children 5 to 9 years old. For that age group they were ranked first as a mechanism of injury.
- Youth aged 15 to 19 years experienced a much higher incidence of pinned or struck by machine injuries compared with the younger age groups.
- Children aged 0 to 4 years were far more likely to be injured in machine runovers than were older children and youth.
- Hospitalized injuries resulting from exposure to toxic substances occurred in all age groups, but with far greater frequency in the youngest age group, where they were ranked fifth as a mechanism of injury.

9 HOSPITALIZED AGRICULTURAL INJURIES IN CHILDREN 0 TO 4 YEARS OLD

9.1 MONTH

Figure 9.1 shows the distribution of hospitalized injuries by month of the year for children 0 to 4 years of age. Injury events were more frequent during the times of year that corresponded to increased activity in the farmyard and field.

FIGURE 9.1 **Hospitalized injuries in children aged 0 to 4 by month, April 1990–March 2000 (471 cases)**

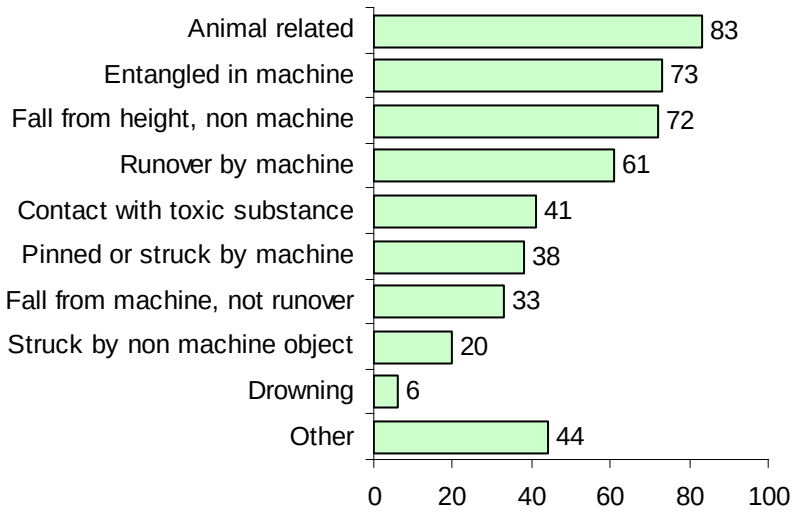


Source: Canadian Agricultural Injury Surveillance Program (CAISP)

9.2 MECHANISM

Figure 9.2 shows the mechanisms of hospitalized injuries for children aged 0 to 4. Machine related injuries accounted for 45% of the hospitalized injuries in this age group. The most frequent causes of hospital admissions were animal-related events. (17.6% of the total). Falls from height and machinery entanglements were the next most frequent mechanisms of injury, each representing 15% of the total.

FIGURE 9.2 **Hospitalized injuries in children aged 0 to 4 by mechanism of injury, April 1990–March 2000 (471 cases)**

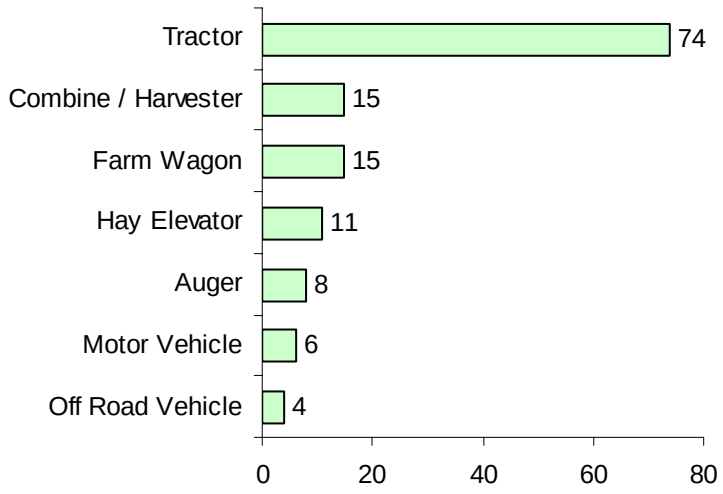


Source: Canadian Agricultural Injury Surveillance Program

9.3 MACHINE TYPE

FIGURE 9.3 **Hospitalized injuries in children aged 0 to 4 by machine type, April 1990–March 2000 (213 cases)**

Figure 9.3 shows the distribution of fatal and hospitalized machine-related injuries by type of machine. Tractors were the machine type most frequently involved in injury events, followed by combines and farm wagons.



Source: Canadian Agricultural Injury Surveillance Program (CAISP)
* Other machine 75, unknown machine 9

9.4 MACHINE RELATED HOSPITALIZED INJURY PATTERNS FOR CHILDREN 0 TO 4 YEARS OLD

- Among children under five years old who were hospitalized due to machine-related injuries, 23% required a total hospital stay of one week or longer.
- Children in this age group were injured throughout the year in machine related events, but the largest percentage of injuries occurred from April to October.
- The children injured in machine related events were rarely operating the machine. Most were accompanying adults at the time of injury.

Runover by Machine*

- Bystander runover events accounted for 49% of hospitalized runover injuries in this age group. All of the other runovers occurred when the child was taken on a machine as an extra rider.
- The machines most commonly involved in non-fatal runovers were tractors, farm trucks and farm wagons.

Entangled/caught in Machine

- In this age group, children became entangled in tractors (15.1%), conveyors (9.6%) and augers (8.2%). The remainder of the entanglements involved a wide variety of machines.
- Fractures and open wounds of the upper limbs accounted for 66% of the hospitalized injuries caused by entanglements.

Falls from Machines (not involving a runover)

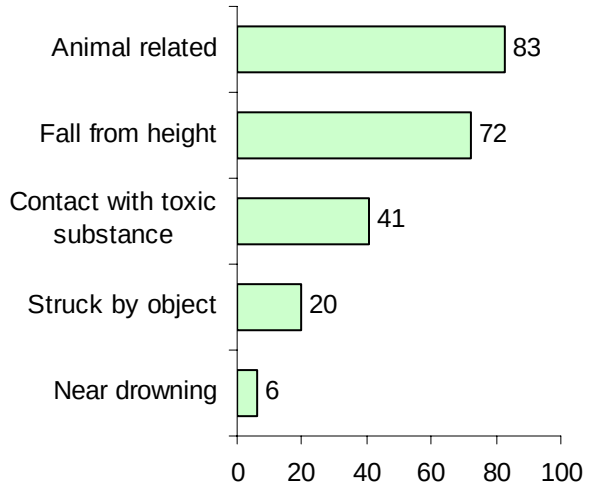
- Tractors were the machine type most frequently involved in these events, accounting for 36% of the total.
- Among children in this age group who were injured in falls from machines (not involving a runover), 51% had head injuries (including fractures of the skull) and 39% had fractures of the extremities.

*For greater detail, please refer to *Agricultural Runovers in Canada for 1990-2000*, available at www.CAISP.ca.

9.5 NON MACHINE

Figure 9.5 shows the distribution hospitalized farm injuries by non-machine mechanism of injury. The leading causes of non-machine injuries for children in this age group were animal related events, falls from height, and contact with toxic substances.

FIGURE 9.5 **Hospitalized injuries in children aged 0 to 4 by non machine mechanism, April 1990–March 2000 (258 cases)**



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

9.6 NON MACHINE HOSPITALIZED INJURY PATTERNS FOR CHILDREN 0 TO 4 YEARS OLD

- The leading causes of hospitalized non-machine agricultural injuries among children 0 to 4 years old were animal related events, falls from height, and contact with toxic substances.
- In this age group, males represented 68% of the children hospitalized for non-machine injuries.

Animal related injuries

- Among the children in this age group hospitalized for animal-related injuries, 14.4% of the cases required a hospital stay of greater than 4 days.
- Head injuries (38.6%) and fractures of the extremities (9.6%) were the main diagnoses for 38.6% of the children aged 0 to 4 admitted for animal-related injuries.
- Horses accounted for 61% of the injuries in this category, followed by cattle (20%) and dogs (13%).
- Children in this age group were most often struck or crushed by an animal. Very few were injured in falls from animals.

Falls from height

- For children aged 0-4 admitted to hospital for falls from height, the main diagnoses were head injuries (62.5%) and fractures of the limbs (23.6%).
- The barn (usually the hayloft) was the most common location for these falls (63.9%).

Contact with toxic substances

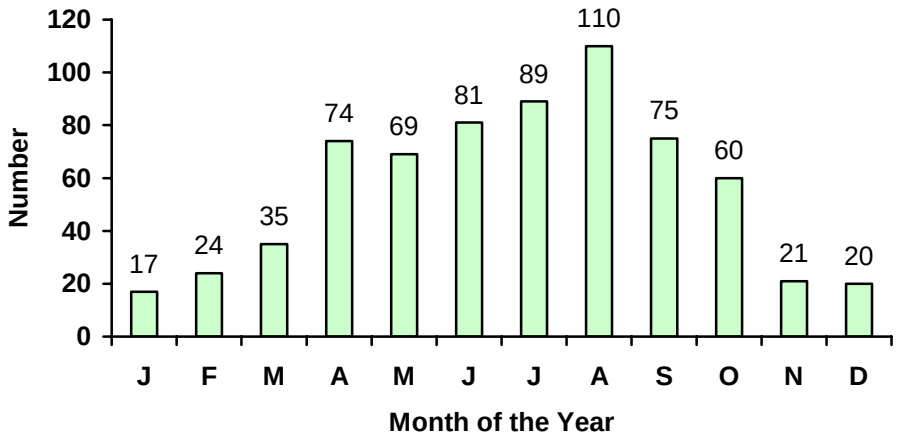
- In this age group, forty-one children were hospitalized for injuries due to contact with toxic substances.
- The most frequent route of absorption was by ingestion (75.6%).
- The most common substances ingested were pesticides (36%) and caustic and corrosive cleaners (36%).

10 HOSPITALIZED AGRICULTURAL INJURIES IN CHILDREN 5 TO 9 YEARS OLD

10.1 MONTH

Figure 10.1 shows the distribution of injuries by month of the year for children 5 to 9 years old. Hospitalized injuries occurred with greater frequency during the times of year that corresponded with increased activity in the farmyard and field and during the school holidays.

FIGURE 10.1 **Hospitalized injuries in children aged 5 to 9 by month, April 1990–March 2000 (675 cases)**

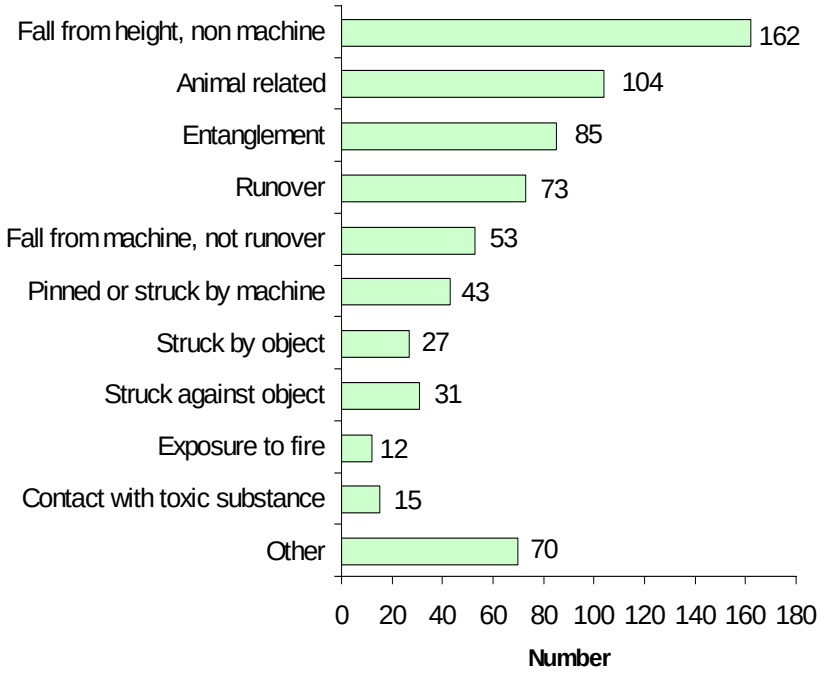


Source: Canadian Agricultural Injury Surveillance Program (CAISP)

10.2 MECHANISM

The distribution of hospitalized injuries among children aged 5 to 9 years is shown in figure 10.2. Falls from height (24.0%) and animal-related injuries (15.5%), both non-machine mechanisms of injury, were the most common causes of hospitalization for this age group. Non machine related events accounted 56% of all hospitalizations.

FIGURE 10.2 **Hospitalized injuries in children aged 5 to 9 by mechanism of injury, April 1990–March 2000 (675 cases)**

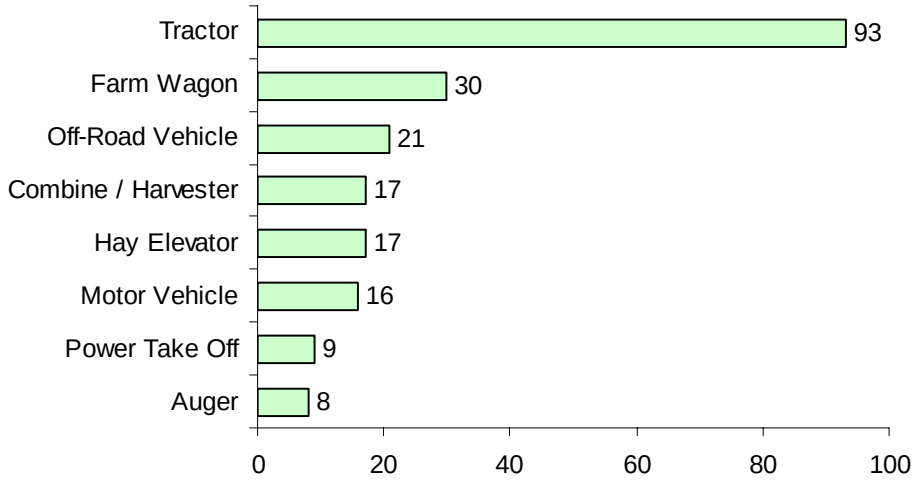


Source: Canadian Agricultural Injury Surveillance Program

10.3 MACHINE TYPE

FIGURE 10.3 **Hospitalized injuries in children aged 5 to 9 by machine type*, April 1990–March 2000 (295 cases))**

Figure 10.3 shows the distribution of hospitalized machine-related injuries by type of machine. Tractors were the machine type most frequently cited, accounting for 32% of the machine-related hospitalizations. The remainder of the injury events involved a wide variety of farm machines.



Source: Canadian Agricultural Injury Surveillance Program (CAISP)
*Other machine 72, unknown machine 12

10.4 MACHINE RELATED HOSPITALIZED INJURY PATTERNS FOR CHILDREN 5 TO 9 YEARS OLD

- Machine related injuries accounted for 44% of hospitalized injuries in this age group.
- 79% of the children 5 to 9 years old hospitalized for machine-related injuries were male.
- Machine-related non-fatal injuries occurred most frequently from April to October (87% of the total). 13% occurred from November to March.
- A hospital stay of longer than one week was required in 25% of the cases.

Entangled/Caught in Machine

- The machines most commonly involved in entanglement injuries were tractors (15.5%), power take offs (10%), and augers (9%).
- 77% of the main diagnoses were fractures and open wounds of the extremities.

Runover by Machine*

- Bystander runover events accounted for 47% of all hospitalized runover injuries in this age group.
- 53% of the runovers occurred when a child extra rider fell from a farm machine and was subsequently runover.
- The machines most commonly involved in runovers were tractors and farm wagons.
- Children in this age group accounted for 30% of all hospitalizations due to runovers among children and youth.

*For greater detail, please refer to *Agricultural Runovers in Canada for 1990-2000*, available at www.CAISP.ca.

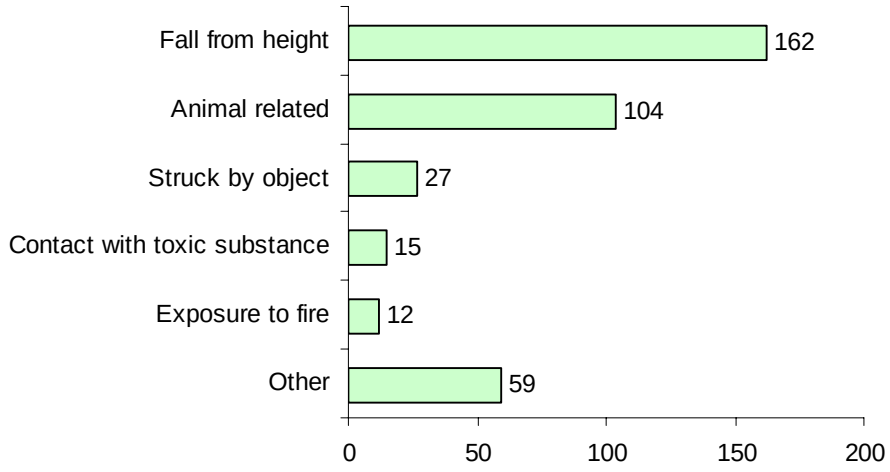
Falls from Machines (not runover)

- The machines most often cited in falls without subsequent runovers were tractors (24.5%), farm wagons (17%) and motor vehicles (17%).
- The most common primary diagnoses for this type of injury event were fractures of the extremities (53%) and head injuries, including fractures of the skull, (30%).

10.5 NON-MACHINE

FIGURE 10.5 **Hospitalized injuries in children aged 5 to 9 by non-machine mechanism of injury, April 1990–March 2000 (379 cases)**

Figure 10.5 shows the distribution of hospitalized non-machine injuries for children 5 to 9 years of age. Falls from height and animal related injuries accounted for 70% of all hospitalized non-machine injuries in that age group.



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

10.6 NON MACHINE HOSPITALIZED INJURY PATTERNS FOR CHILDREN 5 TO 9 YEARS OLD

- Among children 5 to 9 years old, non-machine injuries accounted for 56% of all hospitalized injuries.
- 79% of non-machine related injuries occurred from April to October and 21% from November to March (a larger percentage of late fall and winter injuries than for machine-related events).
- 38% of the children in this age group who were hospitalized for non-machine related injuries were female. This was the largest proportion of females observed among all age groups.
- 60% of the children aged 5 to 9 injured in non-machine events required a total hospital stay of only one day compared with 41% of the children admitted for machine-related injuries.

Animal related events

- Fractures of the extremities (30%) followed by head injuries (28%) were the most frequent main diagnoses in children admitted to hospital for animal-related injuries.
- Horses accounted for 63% of the injuries in this category, followed by cattle (16%).
- Among children in this age group, 33% of the animal-related injuries were due to falls from animals (horses).

Falls from height

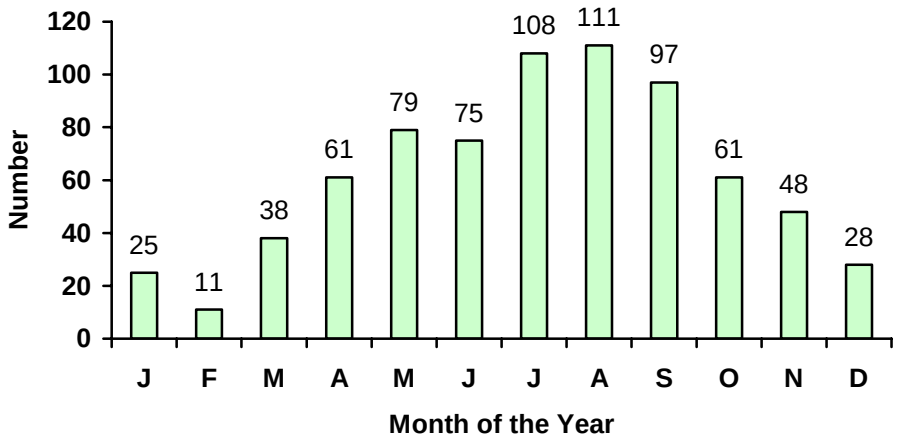
- The barn (specifically the hayloft) was the most common location for falls from height (46%), followed by woodlots (20%).
- Children aged 5 to 9 experienced injuries due to falls from height more frequently than any other age group. They accounted for 39% of all falls from height.

11 HOSPITALIZED AGRICULTURAL INJURIES IN CHILDREN 10 TO 14 YEARS OLD

11.1 MONTH

Figure 11.1 shows the distribution of injuries by month of the year for youth aged 10 to 14. Hospitalized injuries were most frequent during the spring and summer months. The months with the highest numbers of hospital admissions were July and August.

FIGURE 11.1 **Hospitalized injuries in children aged 10 to 14 by month, April 1990–March 2000 (742 cases)**

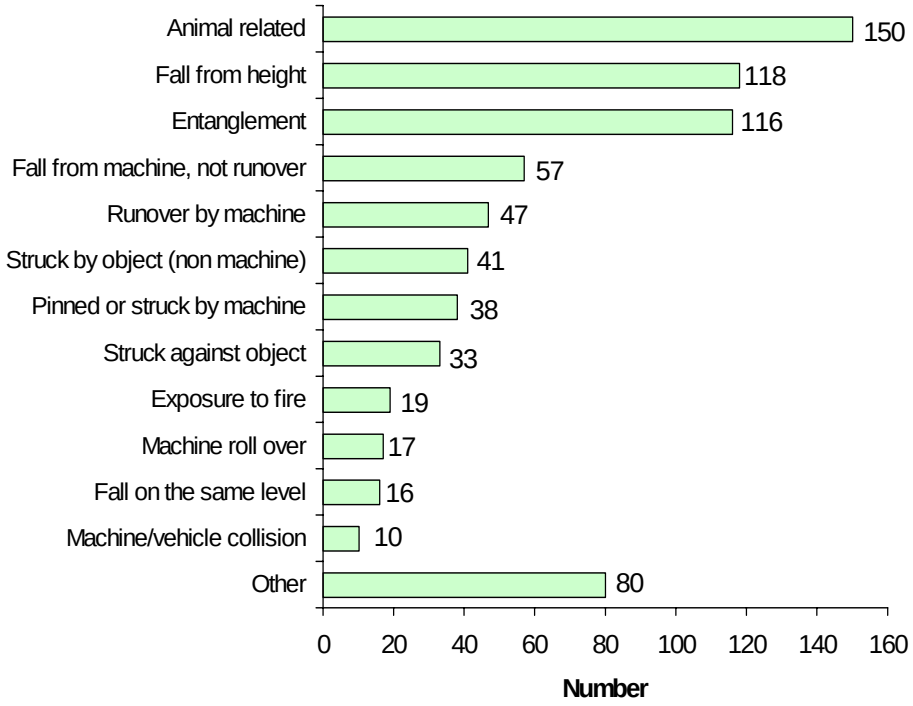


Source: Canadian Agricultural Injury Surveillance Program (CAISP)

11.2 MECHANISM

The distribution of hospitalized injuries among children aged 10 to 14 years is shown in figure 11.2. Animal related events were the most common cause of hospitalized injuries (20.2%), followed by falls from height (15.9%) and machinery entanglements (15.9%). Machinery related events accounted for 43% of the hospitalized injuries.

FIGURE 11.2 **Hospitalized injuries in children aged 10 to 14 by mechanism of injury, April 1990–March 2000 (742 cases)**



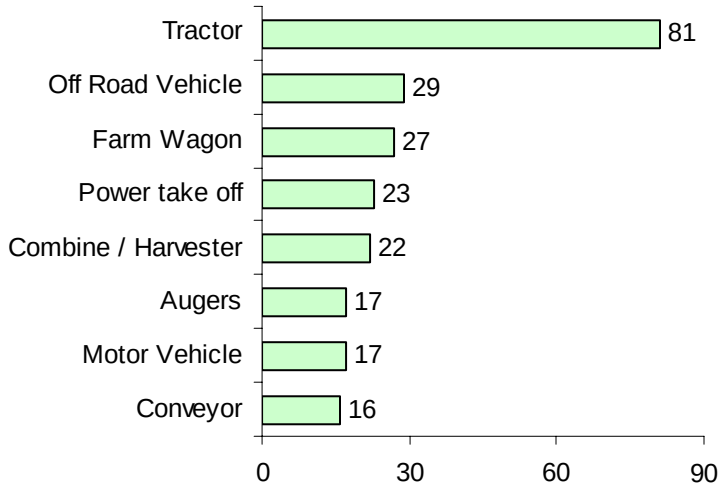
Source: Canadian Agricultural Injury Surveillance Program

11.3 MACHINE TYPE

FIGURE 11.3 **Hospitalized injuries in children aged 10 to 14 by machine type*, April 1990–March 2000 (320 cases)**

Figure 11.3 shows the distribution of hospitalized machine-related injuries by type of machine.

In this age group, tractors were the machine type most frequently cited, followed by off road vehicles and farm wagons. The remainder of the injury events involved a wide variety of farm machines.



Source: Canadian Agricultural Injury Surveillance Program (CAISP)
*Other machine 89, unknown machine 5.

11.4 MACHINE RELATED HOSPITALIZED INJURY PATTERNS FOR CHILDREN 10 TO 14 YEARS OLD

- Machine-related injuries accounted for 43% of hospitalized injuries in this age group.
- Males comprised 86% of the children aged 10-14 injured in machine-related events.
- The peak incidence of machine related injuries was during July, August and September (45% of the total number of machine injuries).
- A hospital stay of longer than one week was required in 22% of the cases.

Entangled/caught in Machine:

- The machines most commonly involved in entanglement injuries were power take offs (18%), augers (10%), combines/harvesters (13%) and conveyors (10%).
- 53% of the injuries were fractures and open wounds of the upper limbs. 25% were fractures and open wounds of the lower limbs.

Falls from Machines (not runover):

- Tractors (23%) and farm wagons (25%) were the machine types most often cited in falls from machines, followed by motor vehicles (19%), and off road vehicles (16%).
- Among children aged 10-14 hospitalized due to falls from machines, 49% had fractures of the extremities and 19% had head injuries (including skull fractures).

Machine Runovers*

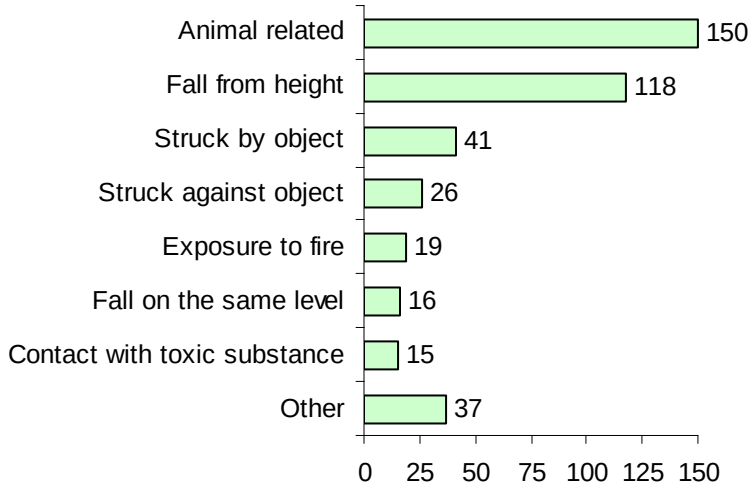
- Extra rider runovers accounted for 44% of the runover injuries in children aged 10-14.
- Of those injured in runover events, 34% required a hospital stay of greater than one week.
- The most frequent types of injury due to runovers were fractures of the lower limb (36%) and fractures of the spine and trunk (15%).

*For more detail, please refer to *Agricultural Runovers in Canada for 1990-2000*, available at www.CAISP.ca.

11.5 NON-MACHINE

FIGURE 11.5 **Hospitalized non machine injuries in children aged 10 to 14 by mechanism*, April 1990–March 2000 (422 cases)**

Figure 11.5 shows the distribution of hospitalized non-machine injuries by mechanism of injury for children aged 10 to 14. Animal related events followed by falls from height were the most frequent mechanisms of non-machine injuries.



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

11.6 NON MACHINE HOSPITALIZED INJURY PATTERNS FOR CHILDREN 10 TO 14 YEARS OLD

- Non-machine related events accounted for 57% of the hospitalized injuries in this age group.
- Males comprised 64% of the children aged 10 to 14 who were injured in non-machine events.
- 64% of the non-machine injuries occurred from May to September.
- A hospital stay of less than two days was required in 52% of the cases, indicating a lower severity of injuries than for machine-related events.

Animal related injuries

- In this age group, falls from animals were the leading cause of hospitalizations due to animal-related injuries, accounting for 43% of animal-related admissions. The next most common animal-related injury mechanism was being struck or crushed by the animal (17%).
- Horses (73%) and cattle (21%) were the animals most frequently involved in these injury events.

Falls from height

- Falls from barns (mainly haylofts) accounted for 42% of the hospitalized injuries in this age group due to falls from height.
- In this age group the main diagnoses resulting from falls from height were fractures of the upper limb (47%) and head injuries (22%).

Struck by object

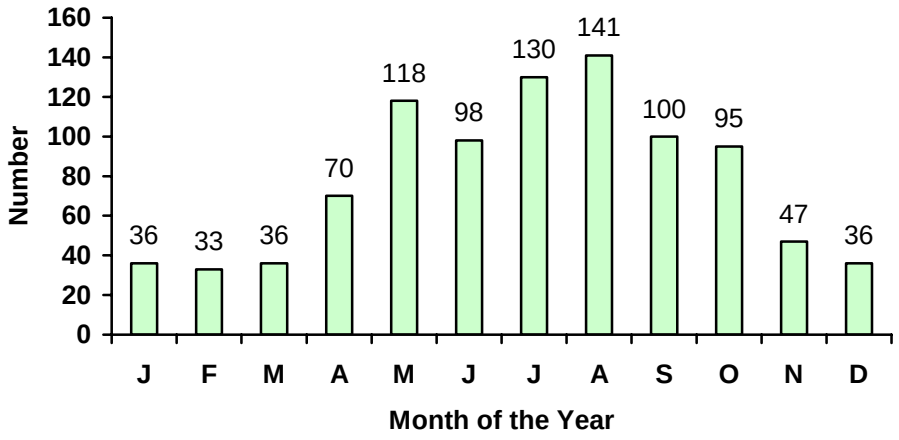
- Being struck by an object accounted for 6% of all injuries in this age group.
- Children aged 10-14 were most often struck by tools (36% of these injuries). The tool most often involved was a pitchfork.

12 HOSPITALIZED AGRICULTURAL INJURIES IN YOUTH 15 TO 19 YEARS OLD

12.1 MONTH

Figure 12.1 shows the distribution of injuries by month of the year for youth 15 to 19 years of age. Hospitalized injuries occurred with greater frequency during the growing season and declined in winter. The months with the highest numbers of hospital admissions were July and August.

FIGURE 12.1 **Hospitalized injuries in youth aged 15 to 19 by month, April 1990–March 2000 (940 cases)**

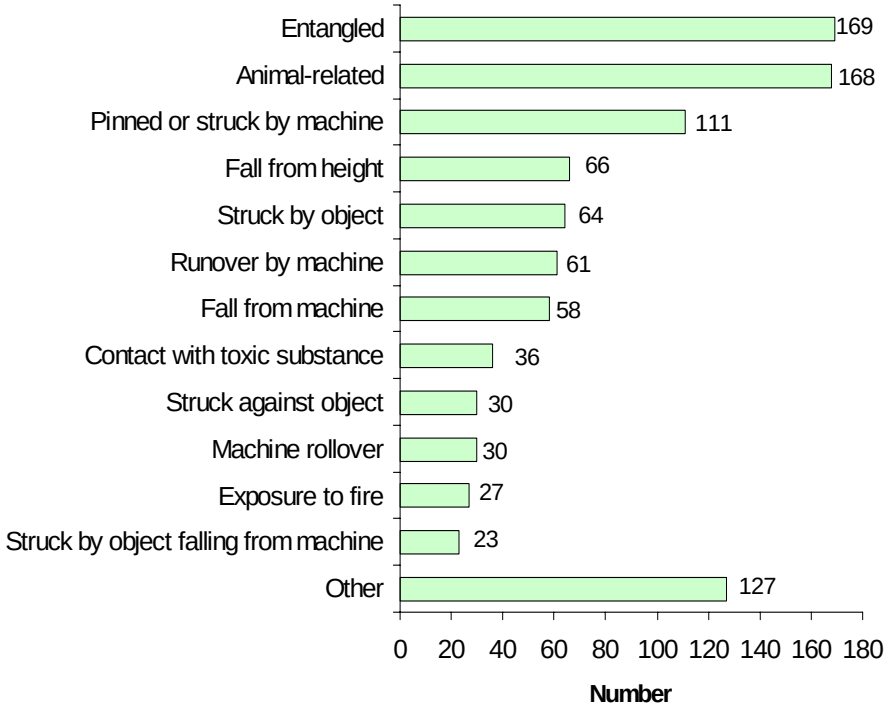


Source: Canadian Agricultural Injury Surveillance Program (CAISP)

12.2 MECHANISM OF INJURY

The mechanisms of injury for youth aged 15 to 19 years are shown in figure 12.2. Machinery entanglements (18.0%) and animal-related injuries (17.9%) were the most common causes of hospitalized injuries. Machinery related events accounted for 52% of hospitalizations in this age group.

FIGURE 12.2 **Hospitalized injuries in youth aged 15 to 19 by mechanism of injury, April 1990–March 2000 (940 cases)**



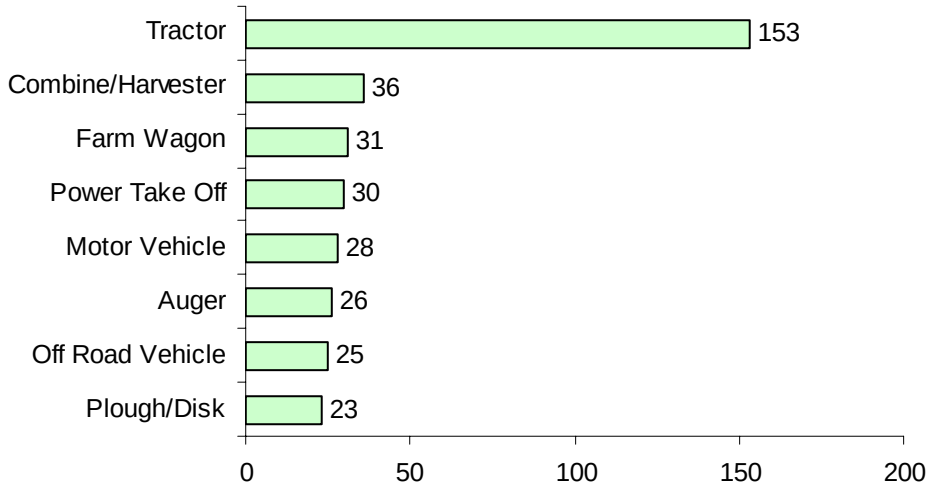
Source: Canadian Agricultural Injury Surveillance Program

12.3 MACHINE TYPE

FIGURE 12.3 **Hospitalized injuries in youth aged 15 to 19 by machine type, April 1990–March 2000 (492 cases)**

Figure 12.3 shows the distribution of hospitalized machine related injuries by type of machine.

Tractors were the machine type most frequently involved, followed by combines and harvesters. The remainder of the injury events involved a wide variety of farm machines.



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

12.4 MACHINE RELATED HOSPITALIZED INJURY PATTERNS FOR YOUTH 15 TO 19 YEARS OLD

- Machine related events accounted for 52% of hospitalized injuries in this age group.
- 93% of persons aged 15 to 19 who were hospitalized for machine injuries were male.
- July, August and September were the months with the highest incidence of machine injuries, accounting for 47% of the total.
- A hospital stay of longer than one week was required in 25% of the cases.

Entangled/Caught in Machine

- Entanglements were the leading cause of machine-related injuries in this age group.
- The machines most commonly involved in entanglement injuries were power take offs (17.8%), combines/harvesters (13.7%), and augers (10.7%).
- In at least 20% of the entanglement events, caught clothing was the initiating factor.
- A hospital stay of longer than one week was required in 36% of the persons aged 15 to 19 admitted for entanglement injuries.
- Amputations involving the extremities were the primary diagnosis in 20% of the cases.

Pinned or Struck by Machine

- Tractors were the machine type most frequently cited in Pinned or Struck by Machine cases (34.2%).
- The remainder of these events involved a wide variety of farm machines.
- The main diagnoses for persons hospitalized for this type of injury were fractures of the extremities (38%) and open wounds of the extremities (22%).

Runover by Machine*

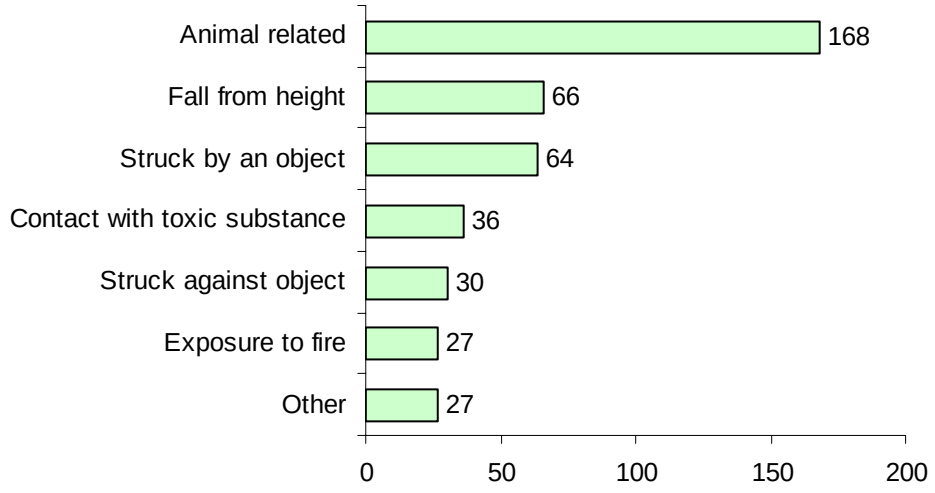
- In at least 40% of the cases, the runover victim was the operator of the machine, usually a tractor.
- There were two common runover scenarios:
  - an operator fell from a machine and was then runover by it
  - an operator who dismounted from a machine was subsequently runover by the unmanned machine.

*For more detail, please refer to *Agricultural Runovers in Canada 1990-2000*, available at www.CAISP.ca

12.5 NON-MACHINE

FIGURE 12.5 **Hospitalized injuries in youth aged 15 to 19 by non-machine mechanism, April 1990–March 2000 (448 cases)**

Figure 9.5 shows the distribution hospitalized non-machine injuries by mechanism of injury. Animal related injuries, falls from height, and being struck by an object were the most frequent mechanisms of non-machine injury.



Source: Canadian Agricultural Injury Surveillance Program (CAISP)

12.6 NON MACHINE HOSPITALIZED INJURY PATTERNS FOR YOUTH 15 TO 19 YEARS OLD

- Non-machine related injuries accounted for 48% of all injuries in this age group.
- 75% the persons aged 15 to 19 hospitalized for non-machine injuries were male.
- The peak incidence for non-machine injuries in this age group was from May to August (53%).
- Of persons aged 15 to 19 admitted to hospital for non-machine injuries, 49% required a hospital stay of only one day. This suggests a lower severity of injuries for non-machine related events compared with machine-related events.

Animal related injuries

- Falls from animals accounted for (36%) of admissions, followed by being struck or crushed by the animal (31%).
- 68% of the animal injury events involved horses and 28% involved cattle (28%).

Falls from height

- Falls in barns (including the hayloft) accounted for 39% of hospitalized injuries.
- In this age group, the main diagnoses for those hospitalized for falls from height were most frequently fractures of the limbs (44%) followed by head injuries (18%) and fractures of the spine and trunk (14%).

Struck by object

- Being struck by an object accounted for 14% of all injuries in this age group.
- The objects most frequently involved in these events were hand tools (16%) and gates (11%).

Appendix A Decision Rules

Inclusion of deaths and injuries in the CAISP fatality database

Alcohol Involvement

Fatal injuries where the victim was under the influence of alcohol were included in the database if they involved agricultural work or an agricultural hazard.

Deaths on Highways

Fatal injuries on public highways that involved agricultural vehicles, agricultural machinery or farm animals were included in the database.

Pre-existing Medical Conditions

Deaths attributed to pre-existing medical conditions (e.g., seizure, heart disease) were 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, were also excluded.

Secondary Complications

Deaths that occurred in hospital from secondary complications of agricultural injuries (e.g., embolism, respiratory distress) were 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.

Off Road Vehicles

Deaths involving off road vehicles such as ATVs, dirt bikes and dune buggies were included in the fatality database if they occurred on a farm or ranch and/or involved agricultural work.

Children at Play

Deaths of children who were playing in the agricultural work place were included e.g., cases where a person engaged in agricultural work was unable to supervise a child whom he/she had taken to the agricultural work place; cases where a child was killed as a direct result of someone engaged in an agricultural work activity; cases where a child was killed due to a hazard of the farm or ranch environment such as a farm animal, dugout, manure pit etc.

Appendix B Glossary

General Terms

Agricultural Fatalities
CAISP 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 livestock, supplies or harvested crops on public highways. It also includes collisions with farm animals on public highways. Deaths where victims are killed because a third party is engaged in agricultural work are also included.

Denominator data
Data used as denominator values in rate calculations. If presented as a fraction, the lower half of an injury 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.)*

Numerator data
Data used as numerator values in rate calculations. If presented as a fraction, the top half of an injury rate refers to the number of cases (events) for a particular mechanism of injury and/or age group.

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

Appendix C CAISP's Data Abstraction Forms

CAISP FATAL FARM INJURIES – DATA ABSTRACTION FORM

Please complete all fields. For fields where information is recorded as missing, please enter 99 in the database, with the exception of date fields – these should be left blank.

Coroner's File #: _____-_____ (year / no.) **CAISP ID:** _____-_____-_____ (prov. / year / no.)

Agricultural Fatalities: 1) Any unintentional injury resulting in death that occurred during activities related to the operation of a farm 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: _____ Birth Date: ____ / ____ / ____ (mm / dd / yyyy) Birth date missing (circle)? Yes No

Sex (circle): M F Province: _____ County/Regional Municipality: _____

Region: _____ Date of Injury: ____ / ____ / ____ (mm / dd / yyyy) Weekday of Injury (circle): S M T W T F S

Time of Injury _____ (24:00) Date of Death: ____ / ____ / ____ (mm / dd / yyyy)

Source of data for case identification (circle all that apply):

1 Coroner	2 Medical Examiner	3 Media
4 RCMP / police	5 Registrar General	6 Other

A. DESCRIPTION OF INJURY EVENT

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

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

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B. CAUSE OF INJURY NOT MACHINERY OR VEHICLE RELATED

1 crushed or struck by animal. Specify animal: _____
2 other type of animal injury. Specify animal: _____
3 fall from animal. Specify animal: _____
4 struck by non-machine object
5 struck against non-machine object
6 caught inside, under or between non-machine objects
If 4, 5 or 6, specify object: _____
7 fall from height. Give specific fall location: _____
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 radiation, caustic, toxic or noxious substance by (circle):
inhalation ingestion absorption injection
Specify agent: _____
18 asphyxiation by grain or soil. Specify: _____
19 firearm
77 other non machine related. Specify: _____
88 unknown non machine related
99 not applicable

C. CAUSE OF INJURY MACHINERY OR VEHICLE RELATED

1 sideways rollover
2 backwards rollover
3 unspecified rollover
4 entangled/caught in machinery
5 pinned or struck by machine component or collapsing machine
6 traffic collision on road or highway
7 operator fell from moving machine, not runover, pinned, or struck by it
8 operator fell from moving machine, then runover, pinned, or struck by it
9 passenger fell from moving machine, not runover, pinned, or struck by it
10 passenger fell from moving machine, then runover, pinned, or struck by it
11 alighted operator/other person runover, pinned, or struck by moving machine
12 alighted passenger runover, pinned, or struck by moving machine
13 bystander runover, pinned, or struck by moving machine
14 machine-related contact with electrical current
15 machine related fire, explosion or burn
16 machine collision off-road
17 machine-related drowning
18 struck by object falling or propelled from machine
20 runover, pinned, or struck by moving Machine - unspecified
77 other machine related. Specify: _____
88 unknown machine related
99 not applicable
If 5 or 18, specify object/component: _____

D. TYPE OF MACHINERY

(Circle appropriate number if the injury event was machinery or vehicle related)
1 tractor
2 auger. Specify whether freestanding, attached to machine, or unknown (circle) _____
3 mower
4 power take off, specify machine PTO attached to: _____
5 baler
6 farm wagon/trailer
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: _____
19 fencing equipment
20 spraying equipment
22 garden equipment
24 planting equipment
25 swather
77 other farm implement/machine. Specify: _____
88 unknown
99 not applicable

E. IMMEDIATE LOCATION OF INJURY

1 Field (includes dry ditches next to field)
2 Barn
3 Silo/grain bin, (circle)
4 Shed
5 Farmyard
6 Road/highway (includes dry ditches)
7 Driveway (includes dry ditches)
8 Farm house
9 Farm road (includes dry ditches)
10 Woods, orchard
11 Water source; includes water-filled ditch, dugout, manure lagoon, sewage pit, etc. Specify: _____
12 Corral/outdoor animal enclosure
77 Other location. Specify: _____
88 Unknown

F. LOCATION OF DEATH

1 Found dead
2 Died *en route*
3 Died in hospital
77 Other location of death. Specify: _____
88 Unknown

G. RELATIONSHIP OF INJURED PERSON TO FARM OWNER/OPERATOR

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 non-visiting child
10 Other non-visiting adult
11 Adult visitor or contractor
12 Child visitor
77 Other relationship. Specify: _____
88 Unknown

H. METHOD OF DISCOVERY

Who found the deceased? (i.e. relationship to deceased) _____
Was the fatality witnessed? (circle) Y N
(Indicate if information not available)

I. NATURE OF INJURY BY BODY PART
e.g., NI1 crush injury, BP1 chest.
(List from most to least serious injury, where the most serious injury was the cause of death.)

Nature of injury 1: _____
Body part 1: _____
Nature of injury 2: _____
Body part 2: _____
Nature of injury 3: _____
Body part 3: _____

J. WAS AN EXTERNAL CAUSE OF INJURY CODE GIVEN? If so, specify: _____

K. REVIEW FOR CONSENSUS? (Circle) Yes No If yes, please explain the points needing consensus of opinion.

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CAISP HOSPITALIZED FARM INJURIES – DATA ABSTRACTION FORM

ID: XX-XX-XXXX
Prov yr number

Instructions:
The <respective provincial agency> has provided us with the hospital separation record for the following patient treated in your hospital for an agricultural injury. Please confirm the information below and provide us with the additional information requested on the back of this form. Thank you for your help.

Hospital Information

Chart number:
Year:
Institution code:

Patient Information

Date of birth:
Sex:

Services

Date of admission:
Date of discharge:
Length of stay:
Admission category:
Ambulance required:

Injury Information

Main diagnostic code:
Other diagnostic codes:
External cause of injury code:

Is the above information correct? (circle number)
1 YES
2 NO Please comment on any corrections:

Was this patient transferred from another hospital? (circle number)
1 YES Please tell us which hospital: _____
2 NO

Was this a readmission for a previous injury? (circle number)
1 YES If yes, date of original admission: _____/_____/_____ (dd/mm/yyyy)
2 NO

If this was not a farm-related injury, please describe with as much detail as possible what type of injury this was:

_____
_____

1. Please describe in detail the circumstances of the injury event and what the injured person was doing at the time of the injury:

_____
_____
_____
_____
_____

2. Did the injury event involve a machine or vehicle?
No complete section 1.
Yes complete section 2, parts A and B.

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SECTION 1 – NON-MACHINE	SECTION 2 – MACHINE/VEHICLE RELATED	
Cause of injury	**Part A Cause of injury**	**Part B Machine type**
Animal-related Specify animal: _____ 1 crushed or struck by animal 2 other type of animal injury 3 fall from animal **Struck/caught by non-machine object(s)** Specify object: _____ 4 struck by object 5 struck against object 6 caught inside/under/between objects **Fall/Jump** Specify fall from where: _____ 7 fall from height 8 fall on same level 9 jumped to lower level 10 **Overexertion** 11 **Near drowning** Specify where: _____ 12 **Exposure to fire** **Contact with:** 13 temperature extremes 14 electric current 16 toxic substances/allergens Specify substance: _____ Contact by: (circle) inhalation ingestion absorption injection 19 firearms 77 other non-machine cause, Specify: _____ 88 Unknown, not machine related 99 Does not apply (machine-related)	**Machine/vehicle rollover** 1 sideways rollover 2 backwards rollover 3 unspecified rollover 4 **Entangled in machine** **Struck by, against or pinned by** Specify: _____ 5 pinned or struck by machine component or collapsing machine 18 struck by object propelled or falling from machine 23 struck against machine/machine component 6 **Traffic collision (farm road or highway)** **Fall from moving machine, not run over, pinned, or struck** 7 operator 9 passenger 15 person unspecified over age 10 **Fall from moving machine, then run over, pinned, or struck** 8 operator 10 passenger 16 person unspecified over age 10 **Run over, pinned, or struck by moving machine (no fall involved)** 11 alighted operator 12 alighted passenger 13 bystander 17 person unspecified 21 **Machine-related overexertion** 22 **Jumped from machine** 77 Other cause, specify: _____ 88 Unknown machine-related 99 Does not apply (no machine)	1 Tractor 2 Auger Specify whether freestanding, attached to machine or unknown 3 Mower 4 Power take off. Specify machine PTO attached to: _____ 5 Baler 6 Farm wagon/trailer 7 Combine 8 Power tool (except chainsaw) 9 Chainsaw 10 Welder 11 Harvester 12 Plough/disk 13 Hay elevators/conveyors 14 Manure spreader 15 Bulldozer, bobcat, skid steer, FEL 16 Motor vehicle, Specify type: _____ 17 Off-road vehicle, Specify type: _____ 19 Fencing equipment 20 Spraying equipment 21 Lawn mower 22 Garden equipment 24 Planting equipment 25 Swather 77 Other type, specify: _____ 88 Unknown machine 99 Does not apply (no machine)

Location

1	Field (includes dry ditches)	8	Farm house
2	Barn	9	Farm road (includes dry ditches)
3	Silo/grain bin	10	Woodlot, orchard
4	Shed	11	Water source (any kind), manure lagoon, sewage pit etc. (specify)
5	Farm yard	12	Corral/outdoor animal enclosure
6	Road/highway (includes dry ditches)	77	Other (specify)
7	Driveway (includes dry ditches)	88	Unknown

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

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Appendix D Denominator Data

Canadian Farm Population by Age Group and Province: Statistics Canada, Census of Agriculture 1996

Province	Age Group												
	< 1 yr	1 - 4	5 - 9	10 - 14	15 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80+ yrs	Total
NL	5	10	115	130	200	170	225	405	210	105	85	25	1680
PE	65	335	620	660	725	1040	1110	1080	1095	580	420	80	7810
NS	100	580	1040	1260	975	1335	1690	2200	1960	1245	475	205	13060
NB	110	380	725	1020	995	1030	1320	1890	1290	925	485	185	10350
QC	1225	6205	9820	11315	11460	12380	18195	18485	14690	7165	2780	880	114605
ON	2165	10925	17510	21180	20440	23005	29635	34840	29020	20650	9510	2345	221225
MB	935	4575	7265	8170	7155	7950	11585	13015	9680	6260	2545	700	79835
SK	1295	6645	11335	14855	15055	11635	19860	25255	18180	14260	5930	1245	145560
AB	2250	10570	16835	18700	17540	16670	28085	30020	24065	16205	6185	1370	188510
BC	670	3085	5765	6735	5895	5550	9535	12240	9940	6220	2415	725	68770
CANADA	8810	43315	71035	84025	80455	80775	121230	139425	110135	73620	30825	7755	851405

Note: Statistics Canada randomly rounds category totals up or down by a factor of five.

Number of Farms by Province: Statistics Canada, Census of Agriculture 1996

Province	Number
Newfoundland	742
Prince Edward Island	2,217
Nova Scotia	4,453
New Brunswick	3,405
Québec	35,991
Ontario	67,520
Manitoba	24,383
Saskatchewan	56,995
Alberta	59,007
British Columbia	21,835
CANADA	**276,548**

Appendix E Contact Information

National Office/Ontario

Dr. Rob Brison, CAISP Co-Director
Dr. Will Pickett
Deborah Emerton, Administrative Coordinator
Catherine Isaacs MSc, CAISP National Coordinator/Data Manager
c/o Department of Emergency Medicine
Kingston General Hospital
76 Stuart Street
Kingston, Ontario K7L 2V7
Tel. (613) 548-3232
Fax (613) 548-1381
E-mail: emertond@kgh.kari.net

British Columbia

Dr. Helen Ward
University of British Columbia
Department of Medicine, Vancouver General Hospital
390-828 W. 10th Ave
Vancouver, British Columbia V5Z 1L8
Tel. (604) 875-4813
Fax (604) 875-4695
E-mail: Helen.Ward@vch.ca

Alberta

Kathy Belton, MEd, CAISP Co-Director
Alberta Centre for Injury Control and Research
4075 RTF 8308-114 Street
University of Alberta
Edmonton, Alberta T6G 2V2
Tel. (780) 492-6019
Fax (780) 492-7154
E-mail: kathy.belton@ualberta.ca

Dr. Don Voaklander
Associate Professor
Alberta Centre for Injury Control and Research
School of Public Health
University of Alberta
Edmonton AB, T6G 2G3
Tel. (780) 492-0454
Fax (780) 492 7154
E-mail: don.voaklander@ualberta.ca

Saskatchewan

Dr. Neils Koehncke or Louise Hagel MSc
Institute of Agricultural Rural and Environmental Health University of Saskatchewan
Wing 3E, Royal University Hospital
Saskatoon, Saskatchewan S7N 0W8
Louise Hagel's tel. (306) 966-6648
Fax (306) 966-8799
E-mail: niels.koehncke@sask.usask.ca
E-mail: hagell@sask.usask.ca

Manitoba	Dr. Ted Redekop Manitoba Department of Labour and Immigration Workplace Safety and Health Division, Occupational Health Branch 200 - 401 York Avenue Winnipeg, Manitoba R3C 0P8 Tel. (204) 945-5765 Fax (204) 945-4556 E-mail: tredekop@labour.gov.mb.ca
Québec	To be arranged.
New Brunswick	Dr. B. Christofer Balram Director, Provincial Epidemiology Service, Provincial Epidemiologist Department of Health and Community Services P.O. Box 5100 Fredericton, New Brunswick E3B 5G8 Tel. (506) 453-3092 Fax (506) 453-2780 E-mail: christofer.balram@gnb.ca
Nova Scotia	Dr. Judy Guernsey Department of Community Health and Epidemiology 5849 University Avenue Dalhousie University Halifax, Nova Scotia B3H 4H7 Tel. (902) 494-3860 Fax (902) 494-1597 E-mail: Judy.Guernsey@dal.ca
Prince Edward Island	Marilyn Affleck P.E.I. Federation of Agriculture 420 University Avenue Charlottetown, P.E.I. C1A 7Z5 Tel. (902) 368-7289 Fax (902) 368-7204 E-mail: marilyna@peifa.ca
Newfoundland and Labrador	Billy Woods Farmers with Disabilities NL 17 Ryan's Rd, Torbay, Newfoundland A1K 1G9 Tel. (709) 437-1480 E-mail: billyw@nl.rogers.com

Appendix F References

Agricultural Injuries in Canada for 1990-2000. CAISP, Kingston, Ontario, Canada.

Canada Census of Agriculture 1996. Statistics Canada, Ottawa, Ontario, Canada.

Canada Census of Agriculture 2001. Statistics Canada, Ottawa, Ontario, Canada.

Leigh, JP, McMurdy SA, Schenker MB. *Costs of Occupational Injuries in Agriculture*. *Public Health Rep*. 2001; 116:235-248.

Locker, R., Dorland JL and Hartling L. *Economic Burden of Agricultural Machinery Injuries in Ontario, 1985 to 1996*. *Rural Health Research*. Summer 2003, 285-291.

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