Farm-Related Fatalities in Australia, 1989-1992

Richard Franklin
Australian Centre for Agricultural Health and Safety

Rebecca Mitchell
National Occupational Health and Safety Commission

Tim Driscoll
National Occupational Health and Safety Commission

Lyn Fragar
Australian Centre for Agricultural Health and Safety

ISBN 1 87649196 5

Farm-related fatalities in Australia, 1989-1992
Publication no. 00/70
Project no. AHU-5A

Researcher contact details:
R Franklin
Australian Centre for Agricultural Health and Safety
University of Sydney
PO Box 256
Moree NSW 2400

Phone: 02 6752 8215
Fax: 02 6752 6639
Email: rfranklin@doh.health.nsw.gov.au

RIRDC contact details:
Rural Industries Research and Development Corporation
Level 1, AMA House
42 Macquaries Street
Barton ACT 2600
PO Box 4776
Kingston ACT 2604

Phone: 02 6272 4539
Fax: 02 6272 5877
Email: rirdc@rirdc.gov.au

Published in June 2000

The suggested citation is:
Franklin R, Mitchell R, Driscoll T, Fragar L (2000) *Farm-Related Fatalities in Australia, 1989-1992*. ACAHS, NOHSC & RIRDC: Moree.

FOREWORD

This report of farm related deaths for the period 1989 to 1992 is the most comprehensive compendium of relevant agricultural fatality information ever produced for Australia.

The report provides a reliable baseline from which future farm health and safety programs will be established and monitored and will be useful for:

- Defining the key OHS risks and program needs for specific agricultural industries;
- Defining the key OHS risks that are generic across all key agricultural industries;
- Defining the key OHS risks and program needs for each state's agricultural industries;
- Development of effective health and safety programs that address key risks; and
- Defining further research needs to improve health and safety in agriculture in Australia.

The study is the product of an effective partnership between the National Farm Injury Data Centre, the National Occupational Health and Safety Commission and the Farm Safety Joint Research Venture partners. The basis of the report has been driven by the agricultural industry occupational health and safety (OHS) data needs as defined in the Farm Injury Optimal Dataset, and hence capitalises on the previous OHS investment by Rural Industries Research and Development Corporation and the Joint Venture, as well as the investment by the National Occupational Health and Safety Commission in the industry wide deaths study.

The Joint Venture is committed to investment in priority health and safety research and development programs in light of the high costs – economic, social and personal, that are being incurred through work related injury and illness in the agricultural and horticultural industries.

Peter Core
Managing Director
Rural Industries Research and Development Corporation

PREFACE

It is my pleasure to write this preface for this study into farm-related fatalities for the period 1989 to 1992. I say this because it is a joint project between the Australian Centre for Agricultural Health and Safety (ACAHS) and the National Occupational Health and Safety Commission (NOHSC) which now provides us with accurate and comprehensive information about the circumstances leading to injury and deaths on farms in Australia. More importantly, the uncertainty of whether to accept an incident as having occurred on a farm or having been related to farm work or recreation on farm, has required definition. Further, this will provide information that can be used in the planning, prioritisation and implementation of prevention activities, including training and education. The aim of the study is to report comprehensively on the number, type and circumstances of non–suicide injury, deaths related to farms in Australia

The farm is not only a workplace, but is also the family home and recreation area. Definitions used throughout the report clearly identify those areas of activity and the category of people involved in the farm incidents. Agriculture commodity production processes involve a large range of hazards, most of which carry significant risk of severe injury, if they are not well controlled. These hazards affect not only the farm worker, but also anyone else who is near the farm and therefore in the vicinity of the hazard. This is clearly demonstrated in the categories where there is an equal percentage of deaths to people designated as worker and bystander. Age and work status alarmingly point to the high percentage of child deaths (0 to 4yrs), teenagers (15yrs) and to the number of young (average age 37) people killed on properties.

The four most common enterprise types where fatal accidents occurred were in cereal grains, cattle, sheep, and pigs. Individually, meat cattle were the highest at 16.6%. This report makes available to us specific information about commodities, agents, age groups and mechanisms for each state and the Northern Territory and for prevention activities. The information can be used for prevention and prioritising of Farmsafe work. A clear example of this is the recommendations that have come from the “Farm Injury Prevention 99” conference held in Cairns recently, attended by people from a broad spectrum of the community from around Australia.

Most of the fatalities are preventable. To this end it requires education and training for all people on farms. Farm safety is about involving the whole community, from producer organisations to machinery dealers, agricultural educators, health providers, service agencies, community groups, farmers and Government agencies. Managing farm safety programs are critical for the achievement of improved health and safety on farms and should be accessible to all-practising farmers, farm workers and farm families.

Moves are under way to make information regarding deaths available more quickly and readily accessible through the National Coronial Information System, thereby making it easier to focus on those high-risk areas through education and awareness programs.

I commend this report to you.

Donald Sutherland.
Chairman, Farmsafe Australia Inc.

CONTENTS

ACKNOWLEDGEMENTS

This project was funded by the Farm Health and Safety Joint Research Venture and the Rural Industries Research and Development Corporation.

The Australian Centre for Agricultural Health and Safety is funded by a grant from New South Wales Department of Health.

We would like to thank the many people who have over the process of this project had input into its production. These include:
Sandra Healey, John Mandryk, Leigh Hendrie, Rosie Hewitt, James Houlahan, Susan Madden, Andrew Page, Richard Glenn, Don Sutherland, Keith Ferguson, Lesley Day and Tony Lower.

ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACAHS	Australian Centre for Agricultural Health and Safety
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
ASCO	Australian Standard Classification of Occupations
ASIC	Australian Standard Industry Classification
CAISP	Canadian Agricultural Injury Surveillance Program
CI	95% Confidence Interval
DPIE	Department of Primary Industries and Energy
ECLF	Employed Civilian Labour Force
EVAO	Estimated Value of Agricultural Output
LFS	Labour Force Survey
NCHS	National Centre for Health Statistics
NCIS	National Coronial Information System
NDS	National Data Set
NEC	Not Elsewhere Classified
NOHSC	National Occupational Health and Safety Commission
NSW	New South Wales
NT	Northern Territory
NTOF	National Traumatic Occupational Fatalities
OHS	Occupational Health and Safety
QLD	Queensland
RIRDC	Rural Industries Research and Development Corporation
ROPS	Rollover Protective Structure
SA	South Australia
TAS	Tasmania
US	United States
VIC	Victoria
WA	Western Australia
WHO	World Health Organisation
WRFS 1	Work-Related Fatality Study, Australia, 1982-1984
WRFS 2	Work-Related Fatality Study, Australia, 1989-1992

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Farm-related Fatalities in Australia, 1989-1992

Objective:

Agricultural production processes involve a large range of hazards, most of which carry significant risk of severe injury or death if they are not well controlled. In order to control the hazards, it is important to have accurate and comprehensive information concerning the circumstances leading to fatal injury. The objective of this report was to provide a detailed analysis of farm-related fatalities (excluding suicide) in Australia during 1989-1992.

Background:

This information regarding farm-related fatalities in Australia during 1989-1992 comes from the second study of work-related fatalities conducted by the National Occupational Health and Safety Commission (NOHSC). Prior to this the most recent national information regarding fatalities in the agricultural industry was for the period 1982-1984 and came from the first work-related fatalities study conducted by NOHSC.

For this report, NOHSC and the Australian Centre for Agricultural Health and Safety (ACAHS) collaborated to analyse all farm-related fatal injuries during 1989-1992.

Methodology:

The information regarding farm-related fatalities was collected as part of a larger study of all work-related traumatic deaths in Australia during 1989-1992. Coronial records were primarily used to identify all farm-related fatalities and then the relevant information on the circumstances of the fatal incident was collected, coded and analysed. Included in the report is specific information regarding people who were working at the time of the fatal incident, people who were bystanders to workplace activities or equipment and people who were fatally injured on a farm, but not in connection with any work activity or equipment.

In this report, the overall results are initially presented and then detailed analysis has been conducted for several areas. These areas include: specific commodities (orchard and other fruit; vegetables including potatoes; cereal grains; sheep-cereal grains; meat cattle-cereal grains; sheep-meat cattle; sheep; meat cattle; dairy; and sugar cane), states and the Northern Territory, specific age groups (children; young adults; and older adults), major agents involved in the fatal incident (trucks; utilities; cars; two-wheel motorcycles; aircraft; tractors; firearms; dams; horses; and trees being felled), specific mechanisms of the fatal incident (drowning, electrocution and falls), intentional fatalities and OHS and workers' compensation coverage information.

Findings:

There were 607 farm-related fatalities between 1989-1992. Of these, 587 were unintentional fatalities and 20 were intentional deaths (ie. homicides). Of the 587 unintentional fatalities, 373 were of workers, 142 were of bystanders to work and 72 were other farm fatalities. For all

unintentional farm-related fatalities there were on average 147 fatalities per year during 1989-1992 or approximately three fatalities per week.

For workers employed in the agricultural industry the fatality rate was 20.6 per 100,000 workers per year. This rate was four times the all industry rate for Australia. The overall fatality rate per 10,000 agricultural establishments for workers was 5.3.

The majority of farm-related fatalities occurred to males. The average age of people fatally injured in farm-related incidents was 37 years. There were 115 children aged less than 15 years who were fatally injured in farm-related incidents. The majority of bystander deaths involved children aged less than 15 years.

The most common farm enterprises where the fatal incident occurred were meat cattle; cereal grains, sheep, cattle and pigs; and sheep. The most common locations of farm-related fatalities were paddocks (either under crop or clear for grazing); roads and lanes; dams, water reservoirs and irrigation channels; and areas of natural vegetation.

The most common agents involved in the fatal incident were farm vehicles; mobile farm machinery; and farm structures. Fatal incidents involving workers commonly involved tractors and aircraft. Incidents involving bystanders commonly involved dams; tractors; utilities; and cars. Fatal incidents involving other farm persons commonly involved fire or smoke; cattle; and creeks or rivers.

The most common agent and mechanism of the fatal incident for children less than five years of age was drowning in dams. As the child aged, the fatal incident was more likely to involve vehicles or mechanical equipment.

For young adults aged 15-29 years, cars, trucks, firearms and aircraft were the most common agents of the fatal incident and vehicle accidents was the most common mechanism.

For older adults, aged 55 year or older, the common circumstances involved in the fatal incident were tractor rollovers, being hit by moving tractors and being hit by falling trees or tree branches. There were also a number of older adults who drowned in dams, creek and rivers.

Overall the three most common mechanisms involved in the fatal incident were vehicle accidents; drowning; and being hit by moving objects. Vehicle accidents for workers, drowning for bystanders, and contact with flame or heat for other farm persons were the most common mechanisms of the fatal incident.

The activity that the fatally injured person was performing at the time of the incident was related to their work status. For workers, transport for work purposes; working with animals; working with crops; and maintenance activities were the most common activities. Bystanders were commonly involved in recreation or playing activities. Other farm persons were commonly involved in recreation or playing; and transport activities.

The majority of persons fatally injured in farm-related incidents were residents of the farm.

Just over half of the farm-related fatalities of workers were recorded by either the OHS or workers' compensation system. Under a third of workers were reported solely by the

workers' compensation system. Similarly, the reporting by OHS agencies of workers' fatally injured in farm-related incidents was just over a third. Approximately 8% of bystander deaths and 8% of other farm fatalities were recorded by an OHS agency.

Discussion:

Farm-related fatalities in Australia continue to contribute significantly to the number of people fatally injured while working. Agriculture, with its unique environment where people are living and working at the same location, increases the risk to those not working, of being involved in a farm accident. This study of 607 farm-related fatalities that occurred between 1989 and 1992 provides a comprehensive collection of farm-related fatalities for those years, allowing detailed examination of the injury event. Of these, 587 were unintentional and 20 were intentional (homicides). There were 387 people working at the time of the fatal incident. The rate of fatal injury was 20.6 per 100,000 workers per year.

The information collected examined the injury event by age, gender, location on farm, commodity group, states and the Northern Territory, agent, mechanism, activity at time of injury, pathophysiological cause of death, blood alcohol content, drugs, resident of the farm, intent, and by workers' compensation and OHS coverage. This study compared the information found to that of similar studies from Australia and internationally. Many similarities were found including rates of injury, types of injuries, agents and mechanism involved, and location on farms. This study, unlike many other studies, collected detailed information on those who were not working but were bystanders to work activity. Drowning especially was unique to Australia and a particular concern for farms where children are present.

There were some difficulties in this study in terms of the definitions, although any study of farm-related deaths faces difficulties in this area. Despite great care being taken, of particular concern to this study were definitions of what constitutes a farm and farm activity; whether an injured person should be classified as a worker, a bystander or neither; selecting the most appropriate agricultural industry group; and in identifying the most appropriate denominator to be used for calculating rates. The same areas are also likely to have been issues in other studies and interpretation of the current study's results, and comparison with results from other studies, should therefore be made with these issues in mind.

This study also demonstrated that the traditional providers of the information of work-related fatalities underestimate the true number of farm-related deaths up to a factor of five. However, by the continued good work of the many organisations throughout Australia and farmers themselves, the number of deaths on Australian farms will hopefully decline in the ensuing years.

Researchers: Richard Franklin*, Rebecca Mitchell[#], Tim Driscoll[#], Lyn Fragar*

Organisations: *Australian Centre for Agricultural Health and Safety
PO Box 256
Moree, NSW 2400
[#]National Occupational Health and Safety Commission
GPO Box 58
Sydney NSW 2001

CHAPTER 1: Introduction

Agricultural production processes involve a large range of hazards, most of which carry significant risk of severe injury or death if they are not well controlled. These hazards affect not only the farm worker, but also anyone else who is on or near the farm and therefore in the vicinity of the hazards. In Australia during 1998, there were over 144,000 agricultural establishments (ABS, 1999) producing a wide variety of agricultural commodities.

The farm is a place of work, a place of recreation and a home. In recent years, agricultural industry groups in Australia have increasingly realised the importance of identifying and controlling hazards on farms. These include hazards to all people, whether they are farm workers or workers from other industries, whether they live on the farm or visit it, whether they come to the farm for work or for recreation, and whether they are children or adults.

In order to control the farm-related hazards, it is important to have accurate and comprehensive information concerning the circumstances leading to injury. Unfortunately, until recently, this sort of information, especially on a national scale, has not been available.

The National Occupational Health and Safety Commission's (NOHSC) study of work-related fatalities (NOHSC, 1998) allowed the collection of detailed information from coronial records of all work-related fatalities in Australia during 1989-1992 to be conducted. NOHSC also collected information on all traumatic fatalities on farms (excluding suicide), thus allowing for an in-depth study of on-farm fatalities. To do this, NOHSC and the Australian Centre for Agricultural Health and Safety (ACAHS) collaborated to analyse all farm-related fatal injuries from this period. The collaborative approach allowed key contributions to be made from personnel from both organisations and also ensured that the research was useful to and could be used extensively by, the farming sector.

History of the Formation of Farmsafe Australia

Considerable work started in the late 1980's and early 1990's with the aim of reducing farm injury and death. The most notable action was the formation of Farmsafe Australia. In 1988, the first Australian farm safety conference was held at the University of New England in Armidale, New South Wales called Farmsafe '88. The conference was jointly organised by the Commonwealth Department of Primary Industries and Energy, NOHSC and the University of New England (DPIE, 1991).

The conference brought together people from around Australia, as well as from overseas, who were working in the area of rural health and safety. The conference papers ranged in subject matter from defining the nature and scope of issues, to legislation. Some papers were industry-specific and others dealt with rural life. International perspectives from Sweden, New Zealand and Canada were also provided. From within Australia there were representatives from every state and territory, community health, Australian Workers Union, NOHSC, universities, the National Safety Council of Australia, consultants, government (local, state and federal), CSIRO, and other relevant organisations. The disciplines represented ranged from medical practitioners to safety professionals, from community health workers to aircraft pilots, and from physiotherapists to veterinarians (DPIE, 1991).

The most important aspect of the first Farmsafe conference was the chance for working groups to discuss the information presented at the conference, particularly examining the following four areas:

- "…What are the health and safety priorities for agriculture, forestry and fisheries in Australia? [and] What are the information / research and communication needs?
- What models for delivery of health and safety services for primary industries should be considered appropriate in Australia, taking into account the nature of farm work and the current infrastructure in Australia?
- What is the current status of data collection, research and education activity in occupational health and safety in primary industries in Australia? What are the priorities for research and education? How should research activity in these areas be instituted and co-ordinated?
- What should be the role of the Australian Government, States, industry, unions and producer organisations in improving farm health and safety? [and] What are the priorities for legislative action?…" (DPIE, 1991 p iii)

Following the 1988 conference, a Ministerial Advisory Group on Farm Safety was assembled. This group had a national focus and was comprised of key players, who developed a draft strategy for farm occupational health and safety in Australia. Key bodies, nationally, then adopted the report. The aim of the national program was:

"…To develop a national framework which will enable community-driven occupational health and safety programs for the farm population to be established and to promote farm safety…" (Clarke & Wolfenden, 1991, p. 19).

After the national strategy was adopted, local Farmsafe action groups were established. Also established was a Farmsafe Secretariat under the auspices of the Rural Training Council of Australia (Clarke & Wolfenden, 1991).

Although both the formation of Farmsafe Australia and the development of a national strategy for rural injury prevention were the most significant activities in the farm safety area being undertaken in the late 1980's and early 1990's, state OHS authorities, as well as local health promotion officers, were also trying to address the rural health and safety problem. The formation of Farmsafe Australia occurred during the data collection period of NOHSC's second work-related fatalities study and the impact of Farmsafe Australia's activities may not be reflected in the fatality data.

Work-related Fatalities in Australia

The information presented in this report comes from the second national study of work-related fatalities conducted by NOHSC. The overall results from the study revealed that the agricultural industry had the fifth highest fatality rate and the second highest number of fatalities of workers, and that there had been a 6% increase in the fatality rate in agriculture between the two studies (Table 1).

Table 1 Industry of working persons - working deaths[a]. Rate[b] and percentage change in mortality rate - Australia, 1982-1984, 1989-1992

Industry	1982-1984	1989-1992	% Change
	Rate	Rate	%
Agriculture	18.5	19.5	5.6
Forestry and Logging	93.1	92.8	-0.4
Fishing and Hunting	110.2	86.2	-21.9
Mining	23.4	36.1	54.2
Manufacturing	3.6	3.0	-15.6
Electricity, Gas and Water	3.8	6.8	77.3
Construction	14.1	10.4	-26.2
Wholesale and Retail Trades	2.1	1.8	-14.2
Transport and Storage	20.4	23.0	12.6
Communication	2.4	2.4	-1.5
Finance, Property and Business Services	1.9	1.3	-29.1
Public Administration and Defence	3.8	3.2	-15.2
Community Services	0.9	1.2	29.5
Recreational, Personal and Other Services	3.6	3.5	-1.1
Overall Mortality Rate	**6.7**	**5.5**	**-17.9**

[a] Following data revisions, information presented in this report may differ from 'Work-related traumatic fatalities in Australia, 1989 to 1992' (NOHSC, 1998) and from that presented in Erlich et al (1993).
[b] Incidence rate - deaths per 100,000 workers per year - based on ECLF.

Much of the early work and priority setting by Farmsafe Australia was based on information on work-related agricultural fatalities from the first work-related fatalities study, which covered the three year period 1982 and 1984 (Erlich et al, 1993). Again this information came out of a larger study of work-related fatalities (Harrison et al, 1989).

Erlich et al (1993) found that there were 257 farm-related fatalities. Of these, 223 (86.8%) were deaths of persons employed in the civilian labor force at the time of their fatal injury. Of the 223 persons, 209 (93.7%) were males, with a mean age of 46.9 (range 15-87) years. There were also 14 (6.3%) females, with a mean age of 37.9 (range 24-57) years.

During 1982-1984, the fatality incidence for agricultural workers was 19.4 per 100,000 workers per year employed in the civilian labor force (Erlich et al, 1993). Erlich and colleagues found that there was an increasing fatality incidence with age (Table 2). Farm workers who were non-managers had a fatality incidence of 28 per 100,000 farm workers per year, which was almost twice as high as farm managers, who had a fatality incidence of 15 per 100,000 farm managers per year (Erlich et al, 1993).

Table 2 Workers employed in the agriculture industry by age group. Number[a], rate[b] and CI[c], Australia, 1982-1984

Age Group	Number	Rate	95% CI
15-19	14	17	*9-27*
20-24	17	16	*9-24*
25-34	35	15	*10-20*
35-44	29	12	*8-17*
45-54	43	19	*14-26*
55-64	44	26	*19-35*
65-74	29	47	*31-67*
≥ 75	11	77	*39-138*
Total	**222**	**19**	***17-22***

[a] Age not known for one subject.
[b] Average incidence per 100,000 workers per year in each age stratum of the employed civilian labor force ($X^2_1 = 28.36$, $P<0.0005$).
[c] 95% confidence interval.

Source: Erlich et al (1993) page 164.

The most common agent of fatal injury was tractors and attached machinery, which accounted for 88 (39.5%) agricultural fatalities. The other major groups of agents involved in the fatal incident were other mobile machines (67: 30.0%), and horses (12: 5.4%). There were also 56 (25.1%) fatalities from other causes, such as electrocutions, drownings, contact with flames, being shot by a firearm and being struck by falling trees or branches (Table 3) (Erlich, 1990; Erlich et al, 1993).

When investigating the agents involved in the fatal incidents, Erlich et al (1993) did not include any farm-related fatalities involving aircraft. Further investigation of the first work-related fatality database for 1982-1984 revealed that there were 13 fatalities of persons involved in farm-related aircraft fatal incidents. It also appears that there were six additional work-related fatalities involving tractors that were not included in the original paper regarding work-related agricultural fatalities in Australia (L Hendrie, personal communication, 2000).

Table 3 Agent[a] of fatal incident for workers employed in agriculture industry by usual working status of the decedent, Australia, 1982-1984

Agent	Agricultural workers[b]		Not agricultural workers[c]		Total	
	n	%	n	%	n	%
Tractors and Attached Machinery[d]						
Rollover	45	24.9	15	35.7	60	26.9
Other	27	14.9	1	2.4	28	12.6
Other Mobile Machines						
Rollover	32	17.7	8	19.0	40	17.9
Other	23	12.7	4	9.5	27	12.1
Horses						
Fell or thrown	7	3.9	3	7.1	10	4.5
Other	1	0.6	1	2.4	2	0.9
Other Causes	46	25.4	10	23.8	56	25.1
Total	**181**	**100.0**	**42**	**100.0**	**223**	**100.0**

[a] Aircraft not included.
[b] Usually work as agricultural workers.
[c] Do not usually work as agricultural workers.
[d] There were two additional rollovers and three other incidents involving tractors (one runover and two hit by moving object) that were not included in these results.

Source: Erlich et al (1993) page 165.

Erlich and colleagues (1993) found there were 34 fatalities of children less than 15 years that were farm-related during 1982-1984. However, one of the major causes of death to children on farms, drowning, was not included in the inclusion criteria in this study for child deaths. Thus it is very likely that this number is an under-representation of the true number of child fatalities on farms. Of the 34 child fatalities, 13 (38.2%) were due to incidents involving tractors and attached machinery, ten (29.4%) were from other mobile machines, six (17.6%) were from horses and five (14.7%) were from other causes (Table 4).

Table 4 Agent of death in farm-related fatalities among children less than 15 years of age by bystander and worker status of the decedent, Australia, 1982-1984

Agent	Bystander		Workers		Total	
	n	%	n	%	n	%
Tractors and Attached Machinery						
Rollover[a]	6	28.6	6	46.2	12	35.3
Other	1	4.8	-	-	1	2.9
Other Mobile Machines						
Rollover	3	14.3	4	30.8	7	20.6
Other	3	14.3	-	-	3	8.8
Horses						
Fell or Thrown	-	-	3	23.1	3	8.8
Other	3	14.3	-	-	3	8.8
Other Causes	5	23.8	-	-	5	14.7
Total	**21**	**100.0**	**13**	**100.0**	**34**	**100.0**

[a] There was one additional tractor rollover that were not included in these results.

Source: Erlich et al (1993) page 165.

Some of the suggestions regarding possible prevention activities that arose in the Erlich et al (1993) paper were that roll-over protective structures be fitted to tractors, modification of machinery should take place and improved work practices (i.e. safe handling of tractors) be adopted. Erlich and colleagues also suggested that there was a need for education of agricultural workers concerning farm hazards and the prevention of injury. They also found that there was at least one death per month of a child on a farm and that appropriate precautions need to be taken to ensure the safety of children on a farm.

International Studies Investigating Farm Fatalities

Investigation of international research regarding agricultural fatalities and comparison of this research with Australian data allows common agents and mechanisms involved in fatal incidents to be determined. It also enables common patterns associated with fatal incidents and trends to be identified. This type of information is essential for the development and subsequent evaluation of both non-fatal and fatal injury prevention programs.

The manufacturers of major agricultural machinery are not located within Australia. It is important that the circumstances regarding fatalities involving agricultural machinery is collated worldwide, in order to inform manufacturers about possible design problems that need to be addressed.

The Canadian Agricultural Injury Surveillance Program (CAISP) examined 590 fatal farm injuries in Canada between 1991 and 1995. Of the 590 deaths, 503 (85.3%) occurred during work activities and the remaining 87 (14.7%) deaths were non-work related and were excluded from the analysis. However of the 87 fatalities, 26 (29.9%) persons were children under the age of 14 years and 25 (96.2%) of these children were male.

Of the 503 work-related fatalities, 239 (47.5%) were tractor-related, 121 (24.1%) were machinery-related (excluding tractors) and 143 (28.4%) were not machinery-related. Of the 503 fatalities, 228 (45.3%) were owner operators, 93 (18.5%) were farm workers but their work status could not be determined, 57 (11.3%) were the child of the owner, 44 (8.7%) were hired workers and 81 (16.1%) were other persons (including spouse and visitors) (CAISP, 1997).

Similar to findings from the first Australian study of agricultural work-related fatalities, in Canada there was a general increase in the number of fatalities as people aged (Table 5). There was also a marked increase in the fatality rate as age increased (CAISP, 1997).

Table 5 Work-related fatalities by age group, Canada, 1991-1995

Age Group	Deaths		Resident Farm Population[a]		Rate per 100,000 farm residents per year
	no.	%	no.	%	
<5	23	4.6	59,155	6.8	7.8
5-9	17	3.4	74,210	8.6	4.6
10-14	10	2.0	81,180	9.4	2.5
15-19	24	4.8	78,405	9.0	6.1
20-29	43	8.6	96,650	11.1	8.9
30-39	64	12.7	127,020	14.6	10.1
40-49	70	13.9	128,995	14.9	10.9
50-59	68	13.5	109,975	12.7	12.4
60-69	89	17.7	76,610	8.8	23.2
70-79	71	14.1	27,955	3.2	50.8
80+	23	4.6	7,065	0.8	65.1
Total	**502[b]**	**100.0**	**867,220**	**100.0**	**11.6**

[a] Statistics Canada, Census of Agriculture, 1991.
[b] Age not known for one person.

Source: CAISP (1997) Table 4.1.

The three most common types of machinery (excluding tractors) that were involved in farm fatalities in Canada were motor vehicles (19: 15.7%), power take-offs (13: 10.7%) and grain augers (10: 8.3%). However, there were over 30% (43: 35.5%) of fatalities included in an 'other' category where no information was available regarding the agent involved in the fatal incident.

The four main mechanisms that commonly caused work-related farm fatalities in Canada between 1991 and 1995 were rollovers (118: 23.5%), runovers (73: 14.5%) (33 were runovers of the operator, 23 were runovers of a passenger and 17 were runovers of a bystander), pinned or struck by machinery (52: 10.4%), and entanglement (49: 9.8%) (CAISP, 1997).

Due to season-dependent changes in farming activity in Canada, the monthly pattern of fatal injury showed a sharp increase in the number of fatalities in the warmer months (CAISP, 1997).

In the United States during the 10-year period from 1980 through to 1989, 63,589 workers died from injuries sustained at work. Males during this period accounted for 94% of the fatal

injuries reported. The 20-24 year age group had the largest number of fatalities (8,621: 13.6%), but those workers aged 65 years or greater had the highest fatality rate (14.6 deaths per 100,000 workers per year). The leading causes of death were motor vehicle accidents (23%), machine-related incidents (14%), homicides (12%), falls (10%), electrocutions (7%) and being struck by falling objects (7%) (US Department of Health and Human Services, 1993).

During the same ten year period (1980-1989) in the United States, the agriculture, forestry and fishing industry had the fourth largest number of fatalities (12% of fatalities) and the third highest fatality rate (18.3 deaths per 100,000 workers per year). The rate of fatalities for the agriculture, forestry and fishing industry varied with age, from 8.5 fatalities per 100,000 workers per year in the 16-19 year age group to 52.3 fatalities per 100,000 workers per year for those 65 years or older (US Department of Health and Human Services, 1993).

Between 1975 and 1984 there were 237 fatal injuries which occurred on New Zealand farms. During this period, the rate of fatal injury for the agriculture, hunting, forestry and fishing industry was 22.6 per 100,000 workers per year. This rate was three and a half times higher than the rate of 6.2 per 100,000 workers per year for all New Zealand workers and was the second highest rate after mining and quarrying (60.9 per 100,000 workers per year).

Crandall et al (1997), in a study of farming and non-farming occupational fatalities in New Mexico during the period 1980 to 1991, identified 613 work-related fatalities. Of the 500 work-related fatalities where the industry employing the worker was able to be determined, 53 (10.6%) were identified as farm-related injury deaths. All of the farm-related deaths were unintentional.

The rate of death for farm workers in New Mexico was 21.3 per 100,000 workers per year. This rate was four times higher than the all industry rate of 5.6 per 100,000 workers per year. The rate of death for males of 24.1 per 100,000 workers per year was four times the rate for females (5.4 per 100,000 workers per year). Farm-related deaths involved a higher proportion of older workers compared to non-farm deaths (Crandall et al, 1997).

In New Mexico, common agents and mechanisms involved in farm-related deaths were motor vehicles (including 18 tractors) (23: 43.4%), electrocutions (including six from lightning strikes) (9: 17.0%), farm animals (9: 17.0%), non-tractor farm machinery (4: 7.5%), falling objects (2: 3.8%), falls (2: 3.8%), hypothermia (2: 3.8%), fire or explosions (1: 1.9%) and firearms (1: 1.9%) (Crandall et al, 1997).

Child Farm Fatalities

The farm can be a workplace, home and area of recreation for children. Children face unique risks on a farm for a number of reasons, including their small size, lack of physical strength and relative inexperience (Mandryk & Harrison, 1995).

Young children may not appreciate some of the hazards associated with farm equipment and surrounding structures, such as dams. Information surrounding the circumstances that can lead to the death of a child should be examined in order to develop effective prevention strategies.

In Canada between 1991 and 1995, there were 50 work-related fatalities to children with an overall rate of 4.7 per 100,000 children per year (Table 6). The rate and number of deaths decreased as the age of the children increased during this period. There were also 25 additional farm fatalities in Canada of children that were not work-related. Of these 25 fatalities, 14 (56.0%) were due to drowning and four (16.0%) were from incidents involving recreational vehicles (CAISP, 1997).

Table 6 Work-related fatalities of children by age group, Canada, 1991-1995

Age Group	Deaths		Farm Population		Rate per 100,000 per year
	n	%	n	%	
<5	23	46.0	59,155	27.6	7.8
5-9	17	34.0	74,240	11.3	4.6
10-14	10	20.0	81,180	37.8	2.5
Total	**50**	**100.0**	**214,575**	**100.0**	**4.7**

Source: Canadian Agricultural Injury Surveillance Program, 1997.

OF THE 50 WORK-RELATED DEATHS TO FARM CHILDREN ON CANADIAN FARMS, RUNOVER OF BYSTANDER (17: 34.0%) WAS THE MOST COMMON MECHANISM OF THE FATAL INCIDENT. OTHER COMMON MECHANISMS INCLUDED RUNOVER OF PASSENGER (15: 30.0%), RUNOVER OF OPERATOR (2: 4.0%), ROLLOVER (4: 8.0%), ENTANGLEMENT, ANIMAL AND STRUCK BY OBJECT (2: 4.0% EACH) (CAISP, 1997).

In the United States between 1992 and 1996, there were 155 deaths of agricultural workers aged 19 years or less. Of these, 64 (41.3%) were working in their family's business at the time of the fatal incident (MMWR, 1999). Rivara (1997) during 1991-1993 found that there were on average 104 farm deaths each year of children and adolescents 19 years of age or younger in the United States. This gave a rate of 8.0 deaths per 100,000 population per year for this age group.

During 1991-1993, the ratio of males to females aged 19 years or less fatally injured in farm-related fatalities in the United States was 6:1, but this ratio varied from 4:1 for those less than five years of age to 12:1 in the 15-19 year age group. The rate for male deaths was 13.0 (range 10.5 to 17.2) per 100,000 farm resident children. This rate was much higher than the female rate of 2.3 (ranges 1.8 to 3.2) per 100,000 farm resident children (Table 7) (Rivara, 1997).

Table 7 Fatal farm injuries of children and adolescents in the United States, 1991-1993, NCHS data, 0-19 years, average annual deaths

	Age Group				
	<5	5-9	10-14	15-19	Total
Annual number of deaths					
Male	21.0	17.7	20.0	31.0	89.7
Female	5.0	3.3	3.0	2.7	14.0
Total	**26.0**	**21.0**	**23.0**	**33.7**	**103.7**
Annual rate[a]					
Male	11.9	10.5	11.9	17.2	13.0
Female	3.2	2.2	2.0	1.8	2.3
Total	**7.8**	**6.6**	**7.3**	**10.2**	**8.0**

a Incidence rate per 100,000 farm resident children.

Source: Rivara (1997) p 191.

In the United States during 1991-1993, the most common mechanisms of the fatal incident involving children or adolescents less than 19 years of age were machinery (34.1%); drowning (24.1%); and firearms and explosives (14.8%). For children of different ages, there were noticeable differences in the mechanism of the fatal incident (Table 8). For example, although machinery and drowning were significant in all age groups, in the 10-14 year age group firearm and explosives were the second most common contributor to death (Rivara 1997).

Table 8 Fatal farm injuries to children and adolescents in the United States, 1991-1993, NCHS data, 0-19 years, cause of death by age (percent)

	Age Group				
Mechanism	**<5**	**5-9**	**10-14**	**15-19**	**Total**
Machinery	35.9	46.0	34.8	24.8	34.1
Drowning	32.1	23.8	11.6	26.7	24.1
Suffocation	1.3	-	7.3	1.0	2.3
Falls	6.4	3.2	5.8	3.0	4.5
Firearms / explosives	3.9	4.8	21.7	25.7	14.8
Electrical	1.3	1.6	4.3	1.0	1.9
Other	19.2	17.5	14.5	17.8	18.0

Source: Rivara (1997) p 191.

Fatality Data From Other Sources

Information obtained from coronial records regarding fatal injuries is generally more detailed and comprehensive than data from other sources. Coronial information can be used to identify almost all work-related and farm-related deaths, unlike data from other sources.
Workers' compensation statistics are a non-coronial source that is commonly used to estimate the number of work-related fatalities, as well as to provide information regarding work-related injury and disease.

National Workers' Compensation Information in Australia

The National Data Set (NDS) of workers' compensation statistics contains information regarding workers' compensation claims that are made under the respective jurisdictions' or Commonwealth Compensation Acts in Australia. A workers' compensation claim is reported in the NDS if the work-related incident (excluding commuting to and from work) results in a fatality, permanent disability or temporary disability that results in an absence from work for five or more working days. However, workers' compensation statistics in Australia do not cover all occurrences of work-related fatal injuries or disease. Workers' compensation statistics generally do not take into account workers who are self employed or workers for whom no workers' compensation claim is made, i.e. workers without dependents or beneficiaries.

In Australia, information from the NDS is the only source of data available on a regular basis and, although it does not identify all occurrences, it does provide an indication of current injury and disease experience.

Information from the NDS for the 1997/98 financial year indicates that there were 392 fatalities compensated[1], of which 368 (93.9%) were of males. The fatalities commonly occurred to workers aged 55 years or older (78: 19.9%) and 45-49 years (67: 17.1%). The transport and storage (68: 17.7%), manufacturing (66: 17.1%), construction (45: 11.6%) and agriculture, forestry and fishing (33: 10.3%) industries were the four industries with the highest number of fatalities (NOHSC, 1999a). In the agricultural industry during 1997/98, there were 22 fatalities reported to a compensation agency, which gave a rate of 20 deaths per 100,000 wage and salary earners (NOHSC, 1999a).

During 1997/98, there were 117,464 new compensated injury and disease cases in Australia (excluding ACT and Victoria). This gave an incidence rate of 22 injury and disease cases per 1,000 wage and salary earners and a frequency rate of 13 injury and disease cases per million hours worked. These work-related injury and disease cases resulted in 910,544 working weeks lost during 1997/98, with an average of eight working weeks per occurrence. There was an average cost of $6,492 per new compensation case reported. For the agriculture, forestry and fishing industries, there were 5,177 new workers compensation cases in Australia (excluding ACT and Victoria), which gave an incidence rate of 35.3 injury and disease cases per 1,000 wage and salary earners (Table 9). This rate was nearly half as high again as the incidence rate for all industries (NOHSC, 1999a).

[1] It should be noted that this figure is preliminary.

Table 9 Agriculture, forestry and fishing compensation cases by state and territory, Australia, 1997/98 [a]

State or Territory	Number of workers' compensation cases	Incidence rate (per 1,000 wage and salary earners)	Frequency of new cases (per 1,000,000 hours worked
NSW	2,149	42.58	19.89
QLD	949	22.79	10.92
WA	1,096	47.95	22.44
SA	577	28.18	14.08
TAS	230	27.22	13.64
NT	179	63.54	28.32
Cwlth	0	*	*
Australia	**5,177**	**35.29**	**16.81**

[a] Victoria and the ACT have been excluded.
* Denominator data equal to zero or relative standard error greater than 50%.

Source: NOHSC, 1999a.

It should be noted that not all work related injuries receive workers compensation, as discussed previously. Recent research has shown that 71.9% of work-related traumatic deaths of workers employed in agricultural industry during 1989-1992 did not receive workers compensation. The OHS agencies only reported 38.4% of fatalities of workers in the agriculture industry. Thus the OHS or compensation agencies were aware of only 51.0% of worker fatalities in the agricultural industry. The comparison of the OHS and compensation agencies coverage of agriculture fatalities is lower than that found for all industries, where 67.0% were identified by the OHS and compensation agencies (NOHSC, 1998).

Aim of the Report

The aim of this report is to describe the frequency, incidence, nature and circumstances of all non-suicide traumatic deaths on farms in Australia, with the objective of providing information that is directly or indirectly useful for actions designed to prevent such occurrences.

Relevance and Benefits of Report

This study allows, for the first time, description and analysis of the full scope of fatal injury on Australian farms, excluding suicides. This report will be a valuable reference document for agencies and organisations concerned with rural safety and health. For example, the Farmsafe Australia Goals and Targets to the year 2001 (Fragar, 1996) nominates "reduction in injury related deaths on farm by 30%" as its first priority. The information from this study is the only available, reliable and comprehensive source of baseline information against which the target can be measured.

This report will also allow planning of, and lobbying for, services and interventions to be made on a more rational and justifiable basis than has been possible to date because of a paucity of reliable and comprehensive information. Information on specific areas can be used in farm and community education and prevention campaigns, either as background material for presenters or as information contained in pamphlets, hand-outs and other documents.

CHAPTER 2: METHODS

Introduction

This report presents information on work-related traumatic deaths related to agricultural activity. The information was collected as part of a study of all work-related traumatic deaths in Australia. These deaths were identified primarily through the coronial system. The relevant information on the circumstances of the fatal incident was then collected, coded and analysed. In this chapter, the approach used in the study is summarised, with emphasis on the aspects relevant to the study of deaths related to agricultural activity. More detailed descriptions are provided in the report describing the full work related fatalities study (NOHSC, 1998). Methods specific to this analysis of work-related traumatic deaths associated with agricultural activity are also described.

The study of work-related agricultural deaths provides a number of difficulties that centre around the level of certainty required to accept an incident as having occurred on a farm or having been related to farm work. Difficulties arise from the definition of what constitutes a farm, and from the fact that the farm is both a workplace and a home. In addition, the farm can be the site of activities that may have benefits both for recreation and for the productive activity of the farm.

This report includes information on all traumatic deaths that occurred as a result of agricultural activity. This includes people who were working at the time of their fatal injury and persons who were not. Most of those who were fatally injured in connection with agricultural activity, but who were not working, were fatally injured as a result of the work processes or work equipment on a farm or in connection with a farm. These persons are described in this report as “bystanders”. A smaller number of people were fatally injured in incidents which occurred on farms, but in incidents which did not appear to be related to work processes or equipment. These persons are described in this report as “other farm persons”. They, and the incidents in which they were fatally injured, were still of interest because the events occurred on a farm. However, they are not the primary focus of the report.

For the reasons mentioned above, in this study there were situations where it was very difficult to determine whether a person should be considered to have been working at the time a particular incident took place. In other circumstances, it was difficult to determine whether exposure to a particular agent arose because of someone’s work activity, as was required if the definition of farm bystander was to be met. In response to these difficulties, a number of definitions and criteria specific to this report were developed prior to the analysis.

General Inclusion Criteria

All non-suicide fatal incidents which occurred on a farm, or occurred away from a farm but in the course of agriculture work, were included in this study. All other incidents were excluded. A broad definition of work-relatedness was used, and deaths were separated into various categories which had relevance to particular aspects of OHS.

Important general inclusion / exclusion criteria included:

- Only deaths due to external causes, which would commonly be described as 'injuries', were included in the study[2]. Generally this meant that the person died as a consequence of physical trauma or poisoning. The definition specifically excluded most disorders that would be seen as 'diseases', such as cancers and heart attacks.

- Deaths due to suicide were not included in this study, even if there appeared to be some direct connection with work.

- Non-fatal injuries were specifically excluded.

- Only deaths that occurred on or between January 1st 1989 and December 31st 1992 were included.

- There was no maximum time limit between when the incident occurred and when the death occurred.

- The deceased person could be of any age, sex or nationality.

- All incidents that occurred in Australia or adjacent international waters were included in the overall study.

Definitions Used for this Report

WORKERS

A person was considered to have been a worker if they were receiving pay, profit or payment in kind, including unpaid work in a family business or on a farm, for the services that they were performing at the time at which the fatal incident occurred, or which led to them being fatally injured (in cases where they were injured away from work).

Full-time and part-time (greater than one hour per week) work and ad-hoc work were included. In addition, all aspects of work were included, such as during a recess period[3], at an employer-sponsored social function, during training or during a non-work period if the incident arose because of work (for example, an employer murdered by an employee at home). However, persons fatally injured whilst travelling to or from work were not included in this report.

[2] The precise inclusion criterion was persons who had a cause of death that had been (or should have been) assigned an E-code (external causes code of ICD-9 (WHO, 1977)) by the Australian Bureau of Statistics (this was defined as an 'injury' for this study). In addition, the small number of persons with unknown cause of death (ICD-9 code 799.9) were included.

[3] A recess period is a break from work during working hours (eg a meal break).

BYSTANDERS

Workplace bystanders were persons who were not working but who were fatally injured as a result of workplace activities or by equipment which was present on the farm to perform work functions. Examples included children drowning in a farm dam and visitors run over by a tractor. These persons were included in the study because their deaths highlight breakdowns in the control of hazards in the work setting and also reflect some of the adverse effects of work on the general community.

(In the overall study, both workplace bystanders and road bystanders were included. For the analysis of work-related agricultural deaths presented in this report, only workplace bystanders have been included. Road bystanders were persons who were not working but who were fatally injured in a motor vehicle incident on a public road (or on public transport) as a result of other people's work, where the working vehicle was primarily 'at fault' in the incident.)

OTHER FARM PERSONS

Persons who were fatally injured on a farm, but not in connection with work activity or equipment, were included in this report as "other farm persons". An example would be people riding horses for recreation.

COMMUTING

There were 32 persons who were employed in the agriculture industry and who were fatally injured whilst travelling to or from work (commuting). As mentioned above, persons fatally injured whilst commuting were not included or considered further in this report.

HUNTING

Hunting activity on farms was presumed to be related to work unless there was specific information to show that it was not. In particular, all pig-hunting activity was deemed to be work-related.

MOTORCYCLES

Nearly all non-working persons fatally injured in incidents involving farm motorcycles were coded as bystanders to work activity, regardless of whether the bike was being ridden for recreation.

HORSE-RIDING FOR LEISURE

There is a similarity between horses and farm bikes, in that both can be used for farm work. However, there were clearly instances where horses were kept on a farm only for recreational riding, whereas it was assumed that farm motorcycles were always used primarily for work. Therefore, incidents involving recreational horse riding were not assumed to be work bystander events (they were instead included in the "other farm" category), unless the incident related to a specific farm equipment or environment hazard (eg a fence), in which case the incident was coded as a bystander to work activity.

VEHICLES

Any non-work incident involving a farm utility was classed as a bystander event and any non-work incident involving a sedan was coded as an “other farm” event.

IRRIGATION CHANNELS

Any drowning in an irrigation channel was coded as a bystander event.

CREEKS AND RIVERS

Any non-work drowning in a creek or river was coded as an “other farm” event.

HOMICIDES

Homicides of non-workers which occurred on farms were included in the work bystander category, unless it was clear that the weapon did not come from the farm. This was because it was considered that the proximity of weapons on the farm made their use, and the subsequent murder of persons, more likely.

Work-related homicides were excluded from the main analysis of the death of workers and are considered in Section 7 on intentional deaths. However, intentional deaths were included in the overall rates of death which were calculated for workers.

Methods Used for the Overall Study

CLASSIFICATION

Using the general coding definitions, each coronial file was classified at the time of data collection in order to identify work-relatedness and the category of work-relatedness. Deaths were included where the information in the file clearly indicated that the circumstances of the fatal incident met the study definitions. Deaths were excluded where the circumstances clearly did not meet the study definitions. When the available evidence meant that the classification could be little more than a guess, the circumstances were considered to be indeterminate and the death was excluded.

DATA SOURCES

Deaths Data

Nearly all traumatic deaths in Australia are investigated by a Coroner, so the Coroners should theoretically investigate virtually every work-related traumatic death. However, these work-related deaths are not easy to identify because the coronial offices in each jurisdiction do not have consistent coding systems to identify work-related deaths. Therefore, it was necessary to obtain a list of all external cause deaths and then use this list as the starting point for identifying coronial files that might be work-related.

A list of all deaths due to external causes, excluding only those due to suicide, was obtained from the Australian Bureau of Statistics (ABS). However, the persons on this list were identified only by a death registration number and the coronial records were identified only by a name. Therefore, this registration number was matched to a name using the computerised National Deaths Index of the Australian Institute of Health and Welfare (AIHW) (for all non-Northern Territory deaths) and the Northern Territory Death Registry records. Names were identified for 99.9% of the deaths on the ABS Deaths Data List.

In addition, a number of other data sources were used in an attempt to identify all potential work-related traumatic deaths that might have occurred but which did not appear on the list supplied by the ABS. These sources included the coronial indexes and state and territory OHS and compensation authorities.

Ethics Approvals and Authorisation for Access to Data

The overall study was approved by the then Research Standing Committee of NOHSC. This approval was granted following ethical approval by the Ethics Committee of the University of Sydney. During the organisational phase of the study, the study team was required to seek, and subsequently received, ethical approval from a number of ethics committees and authorities for access to relevant data. All ethical requirements for the study were complied with.

DATA COLLECTION METHODS

Research Officers

The information for the study was collected at coronial offices by research officers, usually working in pairs and with specific training for this study. The main task of the research officers was to accurately describe the circumstances of death and to delineate relevant deaths from non-relevant deaths, using the definitions of work-relatedness provided by the study coordinators. This was a crucial aspect of the study, because work-related deaths not identified by the research officers were not likely to be known about at all by the study coordinators, except through the description of circumstances recorded by the research officers.

File Selection

Files in each state or territory were inspected in random order (with some minor exceptions). This was done in an attempt to ensure that the data collection methods did not interfere with, or bias, the comparisons that were planned, such as between years, between states or territory and between studies (the first work-related traumatic fatalities study: WRFS 1; and the second work-related traumatic fatalities study: WRFS 2).

Collection of Coronial File Data

Having identified the relevant coronial file, this file was read and the definitions used to assess whether the death described was work-related or not. Following this assessment, a code was assigned. Some basic information about the deceased person was recorded, as well as information relevant to the data collection and a brief description of the circumstances of

death. This description was a short paragraph that was supposed to record in a concise, unambiguous manner how, when, where and why the death occurred. This description was used later by the study team to review the appropriateness of the classification and to gain a measure of the completeness of the ascertainment of relevant deaths by the research officers.

If the death was assessed as definitely not work-related, no further action was taken. If the death was assessed as definitely or probably work-related, relevant parts of the coronial file were identified and photocopied. If the death was assessed as indeterminate, it was discussed with the co-research officer and sometimes by phone with a member of the study team. A final determination about whether to photocopy the relevant file information was then made.

Material Copied from Coronial Files

Once a relevant death was identified, the research officer's task was to record all the pertinent information in the coronial file. Most information was recorded by photocopying the relevant parts of the file. Some written information was included in a summary booklet.

Coding

The photocopied information was subsequently coded directly into a computer database by members of the study team at the NOHSC office in Sydney. Nearly all information used for the classification and coding of material into the database came from the photocopied coronial file material or associated administrative data. Additional information for most deaths came from the ABS Deaths Data List, and for some deaths, information was obtained from the OHS or compensation authorities or other sources.

Deaths which occurred in circumstances which were difficult to classify were discussed with other study team members. Those that on review were deemed to not meet the study definitions were then excluded, either as being non work-related or as indeterminate. All confirmed work-related deaths were coded directly into the study's electronic database. The Farm Injury Optimal Data Set (Coleman, 1995) was used to code some of the information, particularly that related to the location of the incident and the agents involved.

Standardisation of Coding

Work-related deaths were coded in a random order across all states or territory. The coding team met regularly to discuss difficult coding decisions and to clarify approaches to coding. Also, the approach to coding was standardised by re-coding the same group of deaths at various times during the coding and identifying problem areas. Once all the deaths had been coded, the data were checked for inconsistencies and errors. A proportion of deaths were reviewed — those which had been identified as being difficult to classify, those which had been excluded during the coding process and those which were highlighted during the checking process as possibly having been incorrectly coded.

Occupation, Industry and Activity

The main focus of coding was on the occupation, industry and task (or activity) of the deceased person **at the time** of the fatal incident. A given occupation could involve a number of different tasks, but the appropriate coding of occupation was based on the position in which the deceased was employed, rather than the task that happened to be being performed at the

time of the incident. Thus, the **occupation** of a farmer killed in a plane crash while flying a plane to muster his cattle would have been coded as a farmer, not as a pilot. Similarly, his **industry** would have been coded as cattle grazing rather than air transport. However, his **activity** would have been coded as flying a plane (and mustering).

The Australian Standard Industrial Classification (ASIC) was used to code the industry of the working person and also the commodity group of the location of the fatal incident (ABS, 1985). Occupation was coded using the Australian Standard Classification of Occupations (ASCO: ABS, 1986).

Reporting by State, Territory and Commonwealth OHS and Compensation Agencies

One of the aims of the study was to use the information collected from the Coroners to assess the coverage of work-related death by the State, Territory and Commonwealth OHS and compensation agencies. These agencies were approached and asked to supply unit record information for all deaths which were identified by the state and territories as being due to non-suicide traumatic causes and which were identified by them as being work-related, using whatever definitions the agencies were using at the relevant time. For most state and territories, this encompassed two lists - one for deaths covered by the OHS agency or division and another for the compensation agency or division. The data supplied by these agencies was then compared to the data collected from the coronial offices.

WRFS 1 Information

The definitions used for WRFS 2 were developed to be as consistent as possible with those used for WRFS 1 and the methodology used for the current study was similar to that used in WRFS 1. This was done in an attempt to make data from the two studies as comparable as possible and because the available data systems had not changed greatly between the two studies. However, there were important differences between the methodology used for the two studies that need to be kept in mind when interpreting the results of any comparisons between them. In brief, it is likely that the identification of work-related deaths was more comprehensive in WRFS 2 than in WRFS 1, especially for bystander deaths, but the difference for working deaths is not likely to have been great. Except in some incidents involving aircraft and tractors, where some farm-related deaths were omitted as Erlich (1993) only included persons employed in the farm labour force. The first study did not have an equivalent to the “other farm person” category.

Summary of the Completeness of the Data Collection Procedure

Files were found for 99.7% of the 20,042 relevant coronial files. Other sources of information, such as OHS or compensation agency information, death certificate information, police reports and newspaper reports, were found for 16 of the remaining 68 (24.6%) persons for whom coronial files could not be located. There were also two medically certified deaths not in the coronial system for whom information was obtained that showed that the deaths met at least one of the study definitions of work-relatedness.

Of the original 22,957 deaths identified as due to non-suicide external (or unknown) causes on the basis of the ABS Deaths Data List, or found as 'Extras' in the coronial system, 3,627 (15.8%) were confirmed as being work-related, 17,808 (77.6%) were excluded as non-work related and 1,522 (6.6%) were excluded as indeterminate.

Analysis and Presentation of Results

RATES AND CONFIDENCE INTERVALS

Results presented as **numbers** of deaths of workers include all working persons identified as work-related deaths in this study. Results presented as **rates** of death of workers include only those deceased workers who were members of the Employed Civilian Labour Force (ECLF) and are expressed as deaths per 100,000 workers per year. The ECLF includes nearly all working persons aged 15 years or older, but specifically excludes members of the armed services. Ninety–five percent confidence intervals are included where appropriate.

Where appropriate, rates are also presented using the number of farm establishments (Tables 1.2 and 1.3). These rates include all fatally injured members of the relevant group (all farm deaths or all agricultural worker deaths).

DENOMINATOR DATA

In order to calculate rates, it was necessary to obtain appropriate denominator data. The denominators used for nearly all rates presented in this report were of the working population and were based on the relevant Labour Force Surveys conducted during 1989 to 1992 by the ABS (ABS, 1993). Rates based on the whole population were calculated using data from the 1991 National Census, also conducted by the ABS (ABS, 1992). Rates based on farm establishments were calculated using ABS data, with the Estimated Value of Agricultural Operations (EVAO) of rural properties having to exceed a certain level to be classified as a farm (ABS, 1999). There was a change in collection methodology by the ABS during the study period, with an EVAO cut-off of $20,000 used for 1989 and 1990, but an EVAO cut-off of $5,000 used after that. As a result, the number of "farms" identified by the ABS survey rose markedly between 1990 and 1991. Therefore, fatality rates based on farm establishment numbers for each of the years are based on 1991 establishment numbers (which are actually based on annual establishment numbers from April 1991 to March 1992).

PERCENTAGES

In some tables, percentages do not add up exactly to 100 because of rounding. However, for ease of interpretation, 100 is used as the total in all these tables, regardless of the effect of rounding.

INCIDENTS VERSUS DEATHS

Some fatal incidents involved more than one death. Most Sections of this report consider deaths rather than incidents, but in some circumstances it was more appropriate to use "incident" rather than "death" in the text description of the results. For example, it is not correct to say that "eleven of the deaths occurred in a paddock", because many of the injured persons died later at a different place. However, if the results are based on deaths rather than incidents, using "eleven of the incidents occurred in a paddock" may also not always be correct, since some incidents involved more than one death. The words used in the report have been chosen carefully, taking into account these concerns, and most of the incidents resulted in only one death, but the reader should keep in mind the distinction between the number of "deaths" and the number of "fatal incidents". Where the results are actually based on the number of incidents, this is clearly stated in the relevant Section.

INDUSTRY

The industry focus of this report is on agriculture and the commodity sub-groups within it. Where possible, the commodity sub-group of all injured workers and all involved farms was identified. However, for a considerable number of incidents there was insufficient information to allow a detailed industry code to be assigned. These have been grouped under the heading "agriculture" in the relevant tables.

INFORMATION ON SPECIFIC VARIABLES

For ease of presentation, most explanatory information has not been included within the body of tables or in footnotes. The main explanatory information is presented here.

Farm Agent

Although each fatal incident might have had more than one involved agent, the "farm agent" identified in this report was the most important object or substance involved in the fatal incident.

For the analysis, forklifts were included in the 'other equipment and materials' category, rather that the 'mobile farm machinery and plant' category. This is because the version of the farm injury optimal dataset that was used in this study included forklifts in the 'other equipment and materials' category.

Location of Fatal Incident

This report includes some deaths which were related to agriculture work but which did not occur on a farm. Examples included motor vehicle accidents on public roads whilst driving to a sales yard or to buy produce, and plane crashes whilst flying for mustering or crop dusting purposes. For these incidents, the location has been described as "not relevant".

Activity at Time of Fatal Incident

"Maintenance" includes restoration, repair and routine reviews of equipment, machinery or structures and "moving goods" includes loading, unloading and packing of goods, animals, equipment or machinery.

Pathophysiological Cause of Death

The pathophysiological cause of death was the major pathological condition or process that led directly to the person's death. "Neck injuries" includes damage to the cervical vertebrae. The category "medical complications" describes instances where the fatally injured person developed a medical problem secondary to the injuries sustained, and this problem became the direct cause of the death. Examples of medical complications were pulmonary embolus, sepsis, pneumonia, multi-organ failure, heart failure and cerebrovascular accident.

Visitor to the Farm

Persons are described as "visitors" if they did not usually reside on the farm where the incident occurred, and "residents" if they did usually reside on the farm. For incidents which occurred away from the farm, the visitor status was described as "not relevant".

Analysis

Analyses presented in the report were conducted using the Statistical Package for the Social Sciences, Version 9.0 (SPSS, 1999).

PRESENTATION OUTLINE

The non-intentional traumatic deaths of people at work on a farm, or performing agriculture work away from a farm ("working deaths"), provide the main focus of this report. The report also considers the traumatic deaths of bystanders to agriculture work ("bystander deaths"). The traumatic deaths of persons fatally injured on a farm in circumstances apparently not directly related to farm work or equipment are considered as a single group ("other farm deaths"). Deaths due to deliberately inflicted trauma ("intentional deaths") were excluded from each of the above groups for most analyses (unless specifically stated otherwise) and are considered in a separate Section of the report.

A brief overall description of the results, combining all groups, is initially presented. The results of detailed analyses of each group are then separately described. For each group, separate analyses for the main commodity groups, and by state and territory, are included. There is also a more detailed consideration of deaths associated with particular age groups, agents and mechanisms, as well as a comparison of study information with information provided by state and territory OHS and compensation agencies.

Brief descriptions of some of the fatal incidents have been included throughout the report to illustrate the circumstances.

Each Section has a brief introduction and ends with a summary of the main results.

CHAPTER 3: RESULTS

Section 1: Fatal Injuries on Farms

There were 607 farm-related fatalities during the four year period from 1989-1992. Of the 607 fatalities, 587 (96.7%) were unintentional fatalities and 20 (3.3%) fatalities were intentional (ie. homicides). The 20 homicides have been excluded from the main analysis, but have been included in the calculation of rates. For specific information regarding intentional fatalities see Section 7.

Of the 587 fatalities on farms between 1989 and 1992, 373 (63.5%) were of workers, 142 (24.2%) were of bystanders and 72 (12.3%) were of other farm fatalities (Table 1.1). For all unintentional farm fatalities, there were on average 147 fatalities per year during this period or approximately three fatalities per week. The 373 working fatalities over the four year period equate to 93 fatalities per year or approximately two fatalities per week.

Table 1.1 Number of fatalities per year by work status, farm-related fatalities, Australia, 1989-1992

Year	Working		Bystander		Other Farm		Total	
	n	%	n	%	n	%	n	%
1989	89	23.9	34	23.9	19	26.4	142	24.2
1990	94	25.2	34	23.9	15	20.8	143	24.4
1991	97	26.0	46	32.4	18	25.0	161	27.4
1992	93	24.9	28	19.7	20	27.8	141	24.0
Total	**373**	**100.0**	**142**	**100.0**	**72**	**100.0**	**587**	**100.0**

During the period 1989-1992, the collection of the number of agricultural establishments by the ABS changed from an EVAO of $20,000 to $5,000. Thus, the overall rate was calculated for the period using 1991 as the denominator (ABS, 1999). The fatality rate per 10,000 agricultural establishments for 1989 to 1992 was 9.8 per 10,000 establishments (Table 1.2).

Table 1.2 Fatality rate for agricultural establishment by year, farm-related fatalities, Australia, 1989-1992

Year	Frequency[a]	Number of agricultural establishments	Rate per 10,000 agricultural establishments
1989	147	129,539	9.5
1990	149	126,392	9.7
1991	163	154,380[b]	10.6
1992	148	151,966[b]	9.6
Overall[c]	**607**	**154,380[d]**	**9.8**

[a] Includes agricultural workers who were intentionally fatally injured.

[b] The change in numbers is due to the change in collection by the ABS from farms having an EVAO greater than or equal to $22,000 to an EVAO greater than or equal to $5,000.

[c] Per year.

[d] Based on the number of establishments in 1991.

Only taking into account the number of workers who were at risk of fatal injury during 1989 to 1992, the overall rate for workers employed in the agricultural industry was 20.6 per 100,000 workers per year (Table 1.3). This rate was four times the all industry rate for Australia of 5.5 per 100,000 workers per year during the same timeframe. The fatality rate per 10,000 agricultural establishments for workers was 5.3 (this was based on the number of establishments in 1991).

Table 1.3 Workers' fatality rate per year and by agricultural establishment, farm-related fatalities, Australia, 1989-1992

Year	Frequency[a]	Number working in Agriculture	Rate per 100,000 workers [d]	Number of agricultural establishments	Rate per 10,000 agricultural establishments
1989	78	395,994	19.7	129,539	5.1
1990	81	410,931	19.7	126,392	5.2
1991	84	393,512	21.3	154,380[b]	5.4
1992	82	376,648	21.8	151,966[b]	5.4
Overall[c]	**81**	**394,271**	**20.6**	**154,380[e]**	**5.2**

[a] Includes agricultural workers who were intentionally fatally injured.
[b] The change in numbers is due to the change in collection by the ABS (1999) from farms having an EVAO greater than or equal to $20,000 to an EVAO greater than or equal to $5,000.
[c] Per year.
[d] Incidence rate – deaths per 100,000 workers employed in the agricultural industry and in the ECLF.
[e] Based on the number of establishments in 1991.

Gender

The majority of farm-related fatalities were of males (522: 88.9%), with 65 (11.1%) females being fatally injured. For working, bystander and other farm fatalities the majority of persons killed were male (Table 1.4).

Table 1.4 Gender by work status, farm-related fatalities, Australia, 1989-1992

Gender	Working		Bystander		Other Farm		Total	
	n	%	n	%	n	%	n	%
Male	355	95.2	108	76.1	59	81.9	522	88.9
Female	18	4.8	34	23.9	13	18.1	65	11.1
Total	**373**	**100.0**	**142**	**100.0**	**72**	**100.0**	**597**	**100.0**

Age

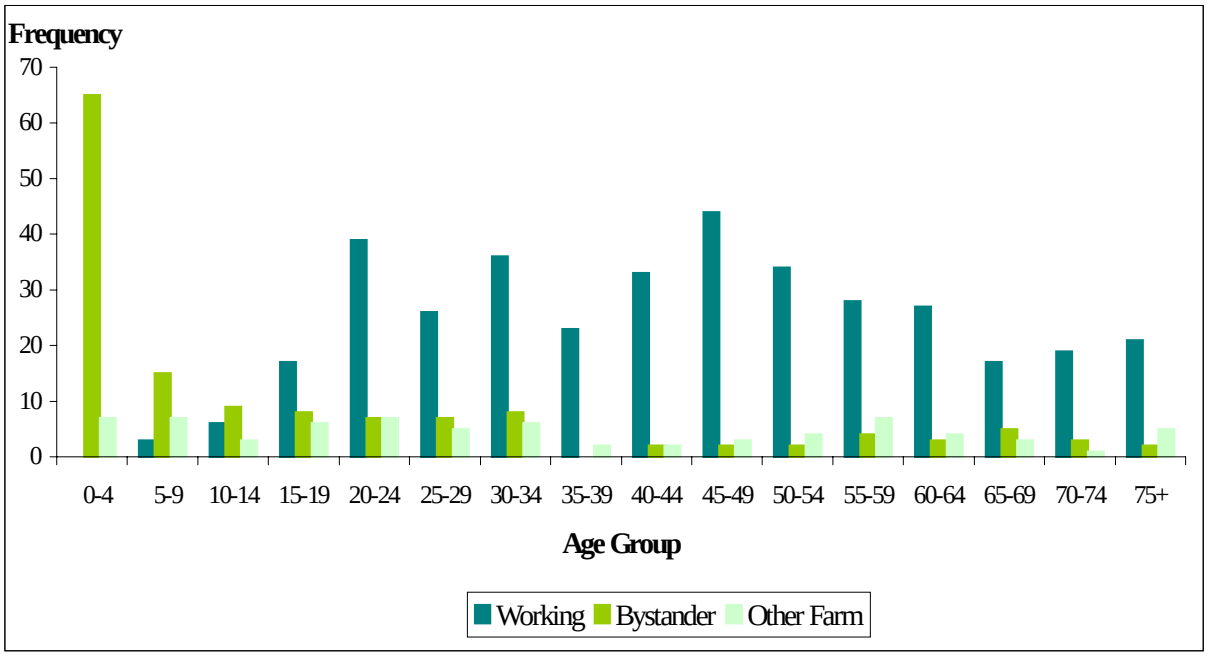
The average age for all persons killed in farm-related fatalities was 37 years (age range: one to 93 years). For males the average age was 38 years (age range: one to 93 years) and for females the average age was 25 years (age range: one to 72 years). The age group with the highest number of fatalities was the 0-4 year group, which largely consisted of bystander fatalities (Table 1.5 and Figure 1.1). The average age of working males and females was 45 and 39 years, respectively (age range one to 93 years). The average age of male and female bystanders was 18 and 15 years, respectively (age range one to 79 years). Bystanders were generally much younger compared to workers and other farm fatalities, with 89 (62.7%) less

than 15 years and 65 (45.8%) less than five years. The other farm persons came from a range of age groups. The average age of male and female other farm persons was 36 and 31 years, respectively (age range one to 91 years). Deaths of person by specific age group are examined in more detail in Section 4.

Table 1.5 Age group by work status, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	65	7	72	12.3
5 - 9	3	15	7	25	4.3
10 - 14	6	9	3	18	3.1
15 - 19	17	8	6	31	5.3
20 - 24	39	7	7	53	9.0
25 - 29	26	7	5	38	6.5
30 - 34	36	8	6	50	8.5
35 - 39	23	-	2	25	4.3
40 - 44	33	2	2	37	6.3
45 - 49	44	2	3	49	8.3
50 - 54	34	2	4	40	6.8
55 - 59	28	4	7	39	6.6
60 - 64	27	3	4	34	5.8
65 - 69	17	5	3	25	4.3
70 - 74	19	3	1	23	3.9
75+	21	2	5	28	4.8
Total	**373**	**142**	**72**	**587**	**100.0**

Figure 1.1 Age group by work status, farm-related fatalities, Australia, 1989-1992



Industry of Working Persons

Of the known industry groups whose workers were fatally injured in conjunction with farm work, the meat cattle (64: 17.2%), cereal grains, sheep, cattle and pigs (41: 11.0%) and the sheep (28: 7.5%) industry groups had the highest number of fatalities of working persons on Australian farms (Table 1.6). There were another 69 (18.5%) workers who were known to be employed in the agricultural industry, but for whom the industry group was unable to be determined due to lack of information in the coronial file. Forty-six (12.3%) of the working persons fatally injured on a farm were working in non-agricultural industries, most commonly in the construction industry (14: 3.8%).

Table 1.6 Industry of the working persons, farm-related fatalities, Australia, 1989-1992

Industry	Number	Percent (%)
Agriculture	**327**	**87.7**
Poultry	*1*	*0.3*
Fruit	*1*	*0.3*
Grapes	*2*	*0.5*
Plantation Fruit	*3*	*0.8*
Orchard and Other Fruit	*10*	*2.7*
Vegetables Including Potatoes	*17*	*4.8*
Cereal Grains, Sheep, Cattle, Pigs	*41*	*11.0*
Cereal Grains	*15*	*4.0*
Sheep, Cereal Grains	*3*	*0.8*
Meat Cattle, Cereal Grains	*6*	*1.6*
Sheep	*28*	*7.5*
Meat Cattle	*64*	*17.2*
Dairy	*11*	*2.9*
Pigs	*2*	*0.5*
Sugar Cane	*9*	*2.4*
Cotton	*5*	*1.3*
Nurseries	*3*	*0.8*
Agriculture NEC	*14*	*3.8*
Aerial Agricultural Services	*17*	*4.6*
Services to Agriculture NEC	*6*	*1.6*
Agriculture Not Known	*69*	*18.5*
Forestry and Logging	**8**	**2.1**
Hunting and Trapping	**5**	**1.3**
Mining	**3**	**0.8**
Manufacturing	**1**	**0.3**
Construction	**14**	**3.8**
Transport and Storage	**6**	**1.6**
Other	**8**	**2.1**
Not Known	**1**	**0.3**
Total	**373**	**100.0**

Occupation of Working Persons

Farmers and farm managers (213: 57.1%) and livestock and field crop farm hands (55: 14.7%) were the most common occupations of the fatally injured workers. Of the farmers and farm managers, beef cattle farmers (36: 9.7% of the total) and sheep farmers (17: 4.6% of the total) were the more common specific occupations. Aircraft pilots (18: 4.8%) were the most commonly fatally injured workers not employed in a farm-based occupation (Table 1.7).

Table 1.7 Occupation of the working person, farm-related fatalities, Australia, 1989-1992

Occupation	Number	Percent (%)
Managers and Administrators	**217**	**58.2**
Farmers and Farm Managers	*213*	*57.1*
Grain, Oilseed and Pasture Grower	7	1.9
Sugar, Cane Grower	7	1.9
Beef Cattle Farmer	36	9.7
Dairy Farmer	4	1.1
Sheep Farmer	17	4.6
Pig Farmer	2	0.5
Poultry Farmer	1	0.3
Horse Breeder	2	0.5
Mixed Farmer	12	3.2
Fruit and Nut Grower	10	3.2
Vegetable Grower	10	2.7
Apiarist	1	0.5
Trainee Farmer	1	0.3
Farmers and Farm Manager NEC	2	0.5
Type of Farmer Not Known	101	27.1
Professionals	**6**	**1.6**
Para-Professionals	**21**	**5.6**
Aircraft Pilot	18	4.8
Tradespersons	**13**	**3.5**
Animal Trainers	5	1.3
Clerks	**2**	**0.5**
Plant and Machine Operators, and Drivers	**17**	**4.6**
Heavy Truck Driver	5	1.3
Farm Machinery Operator	6	1.6
Labourers and Related Workers	**97**	**26.0**
Farm Hand and Assistants	12	3.2
Livestock and Field Crop Farm Hand	55	14.7
Fruit, Vegetable and Nut Farm Hand	6	1.6
Farm Hands and Assistants NEC	3	0.8
Supervisor, Logging Labourers	1	0.3
Tree Feller	5	1.3
Logging Worker	1	0.3
Nursery Assistant (Horticulture)	2	0.5
Shooter-Trapper	2	0.5
Fence Erector	1	0.3
Total	**373**	**100.0**

Who Found the Fatally Injured Worker and How

Of the 373 persons who were working on the farm when the incident occurred, 203 (54.4%) were working alone, 153 (41.0%) were working with other persons and for 17 (4.6%) it was not known if they were working alone or not.

The fatally injured worker was found alive (and later died) in 104 (27.9%) cases, was found deceased in 261 (70.0%) cases and in eight (2.1%) instances, it was not known if the worker was alive or dead when found.

The persons who commonly found the fatally injured worker were co-workers (102: 27.3%), relatives (89: 23.9%), someone who was both a co-worker and a relative (75: 20.1%), other persons (31: 8.3%) or friends (26: 7.0%). In one instance, the fatally injured worker was not found and in 49 (13.1%) cases the fatally injured worker was found by an other or unknown person.

The person who found the fatally injured worker was either nearby at the time of injury (182: 48.8%), deliberately searching for the injured person in the workplace (103: 20.2%), found the fatally injured person by chance (24: 6.4%), found the injured person in the course of their work duties (17: 4.6%), was searching for the injured person in a non-workplace (11: 2.9%) or had the injured person come to them (2: 0.5%). In 34 (9.1%) incidents, the fatally injured person was found in other or unknown circumstances.

State or Territory of Fatal Incident

Of the 587 fatalities, 185 (31.5%) were in New South Wales, 146 (24.9%) were in Queensland, 120 (20.4%) were in Victoria, 55 (9.4%) were in Western Australia, 41 (7.0%) were in South Australia, 30 (5.1%) were in Tasmania and ten (1.7%) were in the Northern Territory (Table 1.8). There were no relevant fatalities in the Australian Capital Territory. For detailed information regarding farm fatalities for workers and bystanders in each state or territory, see Section 3.

Table 1.8 State or Territory of incident per year by work status, farm-related fatalities, Australia, 1989-1992

State or Territory	1989			1990			1991			1992			Total	
	W	B	OF	W	B	OF	W	B	OF	W	B	OF	n	%
QLD	28	7	2	29	5	1	27	8	2	25	9	3	146	24.9
NSW	21	11	8	30	8	6	41	12	5	32	3	8	185	31.5
VIC	17	10	6	13	13	3	11	16	4	14	9	4	120	20.4
TAS	4	2	-	6	1	-	5	5	-	5	2	-	30	5.1
SA	11	2	-	5	3	1	6	2	1	10	-	-	41	7.0
WA	6	2	2	9	4	2	7	3	6	4	5	5	55	9.4
NT	2	-	1	2	-	2	-	-	-	3	-	-	10	1.7
Total	**89**	**34**	**19**	**94**	**34**	**15**	**97**	**46**	**18**	**93**	**28**	**20**	**587**	**100.0**

W = Working, B = Bystander, OF = Other Farm

Farm Enterprise

The eleven most common enterprise types where the fatal incident occurred were meat cattle (98: 16.7%), cereal grains, sheep, cattle and pigs (79: 13.5%), sheep, (48: 8.2%), sheep-meat cattle (27: 4.6%), cereal grains (23: 3.9%), dairy (23: 3.9%), vegetables including potatoes (22: 3.7%), orchard and other fruit (21: 3.6%), sugar cane (14: 2.4%), meat cattle-cereal grains (13: 2.2%) and sheep-cereal grains (11: 1.9%) (Table 1.9). These eleven commodity groups represent almost 50% of all farm-related fatalities. Further analysis of these specific enterprise types for working and bystander fatalities (excluding the combined enterprise type of cereal grains, sheep, cattle and pigs) can be found in Section 2.

Table 1.9 Farm enterprise by work status, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**358**	**133**	**72**	**563**	**95.9**
Poultry	*1*	*2*	*-*	*3*	*0.5*
Poultry for Meat	*2*	*-*	*-*	*2*	*0.3*
Fruit	*2*	*-*	*-*	*2*	*0.3*
Grapes	*3*	*2*	*1*	*6*	*1.0*
Plantation Fruit	*3*	*2*	*1*	*6*	*1.0*
Orchard and Other Fruit	*10*	*10*	*1*	*21*	*3.6*
Vegetables Including Potatoes	*18*	*4*	*-*	*22*	*3.7*
Cereal Grains, Sheep, Cattle, Pigs	*53*	*18*	*7*	*78*	*13.3*
Cereal Grains	*21*	*1*	*1*	*23*	*3.9*
Sheep, Cereal Grains	*10*	*1*	*-*	*11*	*1.9*
Meat Cattle, Cereal Grains	*12*	*-*	*1*	*13*	*2.2*
Sheep, Meat Cattle	*19*	*3*	*5*	*27*	*4.6*
Sheep	*29*	*12*	*7*	*48*	*8.2*
Meat Cattle	*77*	*13*	*8*	*98*	*16.7*
Dairy	*10*	*9*	*4*	*23*	*3.9*
Pigs	*4*	*2*	*-*	*6*	*1.0*
Other Agriculture	*1*	*-*	*-*	*1*	*0.2*
Sugar Cane	*11*	*1*	*2*	*14*	*2.4*
Cotton	*6*	*1*	*1*	*8*	*1.4*
Nurseries	*3*	*-*	*-*	*3*	*0.5*
Agriculture NEC	*16*	*2*	*5*	*23*	*3.9*
Aerial Agriculture Services	*3*	*-*	*-*	*3*	*0.5*
Services to Agriculture	*4*	*-*	*-*	*4*	*0.7*
Agriculture Not Known	*40*	*50*	*28*	*118*	*20.1*
Other	**14**	**-**	**-**	**14**	**2.4**
Not Known	**1**	**9**	**-**	**10**	**1.7**
Total	**373**	**142**	**72**	**587**	**100.0**

Location of Fatal Incident

The most common locations of farm fatalities were in paddocks, either under crop (78: 13.3%) or clear for grazing (68: 11.6%), roads and lanes (99: 16.9%) dams, water reservoirs and irrigation channels (66: 11.2%) and areas of natural vegetation (64: 10.9%). Fatal incidents to working persons commonly occurred in paddocks, either under crop or clear for

grazing (112: 30.0%) and on roads and lanes (64: 17.2%). Bystanders commonly drowned in dams, water reservoirs and irrigation channels (52: 36.8%) and were fatally injured in paddocks, either under crop or clear for grazing (28: 19.7%). Fatal incidents involving other farm persons commonly occurred on roads and lanes (10: 13.9%), in a farm residence (10: 13.9%) or in a farm yard or garden (10: 13.9%) (Table 1.10).

Table 1.10 Location on farm by work status, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Under Crop	64	12	2	78	13.3
Paddock Clear for Grazing	48	16	4	68	11.6
Natural Vegetation	47	10	7	64	10.9
Unspecified	7	1	-	8	1.4
Stockyards Including Horse Yards	15	3	4	22	3.7
Workshop	4	-	-	4	0.7
Roads, Lanes	64	25	10	99	16.9
Dam, Water Reservoir, Irrigation Channel	11	52	3	66	11.2
River, Creek	10	1	7	18	3.1
Hay Shed	5	-	1	6	1.0
Machinery Shed	6	-	-	6	1.0
Shed, Farm Building NEC	14	3	5	22	3.7
Dairy	1	1	-	2	0.3
Woolshed Shearing Shed	3	-	-	3	0.5
Piggery	1	-	-	1	0.2
Storage Shed Other	2	-	-	2	0.3
Disposal Pit	1	-	-	1	0.2
Windmill Including Troughs	4	-	-	4	0.7
Animal Shed Other Including Broiler Shed	1	-	-	1	0.2
Sorting / Packing Shed	1	-	-	1	0.2
Farm Excluding Residence NEC	21	4	3	28	4.8
Farm Residence	2	1	10	13	2.2
Farm Yard or Garden	11	9	10	30	5.1
Shearers Quarters	-	-	2	2	0.3
Farm Residence NEC	2	-	3	5	0.9
Other Place Associated with Agricultural Work	12	2	1	15	2.6
Grain Handling Facilities	1	-	-	1	0.2
Not Relevant	15	2	-	17	2.9
Total	**373**	**142**	**72**	**587**	**100.0**

Agent of Fatal Incident

The most common agents involved in fatal farm incidents were farm vehicles (commonly aircraft and cars) (171: 29.1%), mobile farm machinery and plant (mainly tractors) (123: 21.0%) and farm structures (mainly dams) (121: 20.6%). Fatal incidents to working persons commonly involved tractors (68: 18.2%) and aircraft (46: 12.3%). Agents commonly involved in bystander fatalities were dams (44: 31.0%), tractors (19: 13.4%), utilities (11: 7.7%) and cars (10: 7.0%). Fatal incidents involving other farm persons commonly involved fire or smoke (13: 18.1%) (Table 1.11 and Figure 1.2). Specific agents are examined in more detail in Section 5.

Figure 1.2 Agent of fatal incident, farm-related fatalities, Australia, 1989-1992

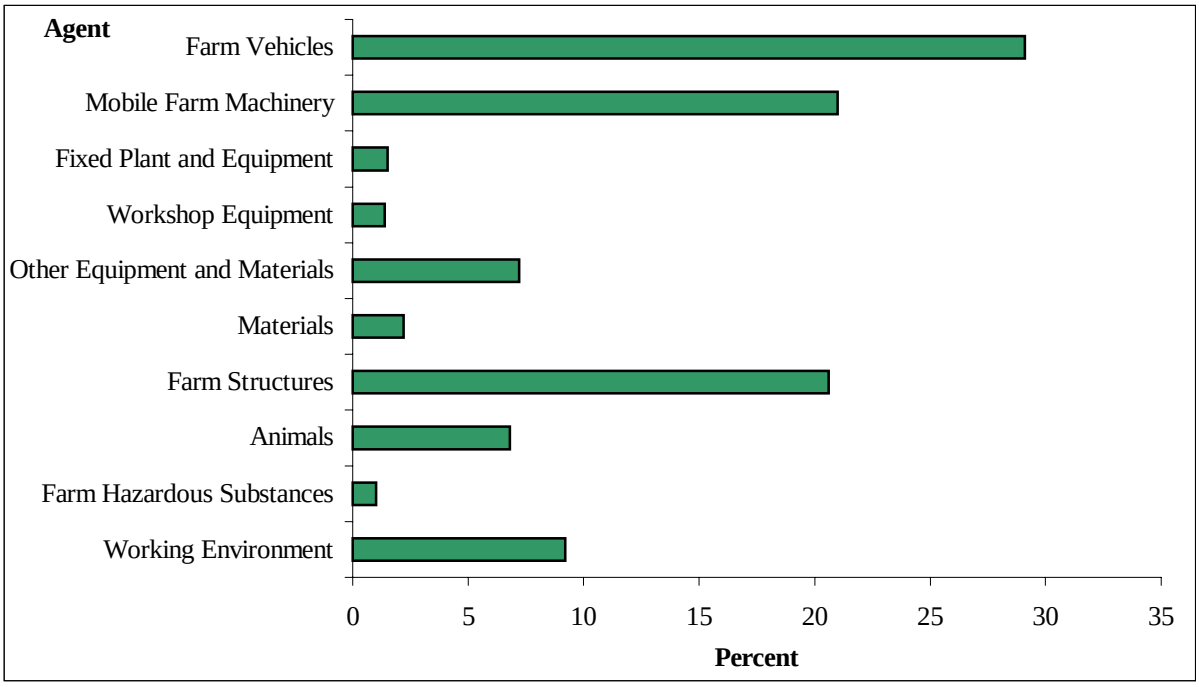


Figure 1.3 Mechanism of fatal incident, farm-related fatalities, Australia, 1989-1992

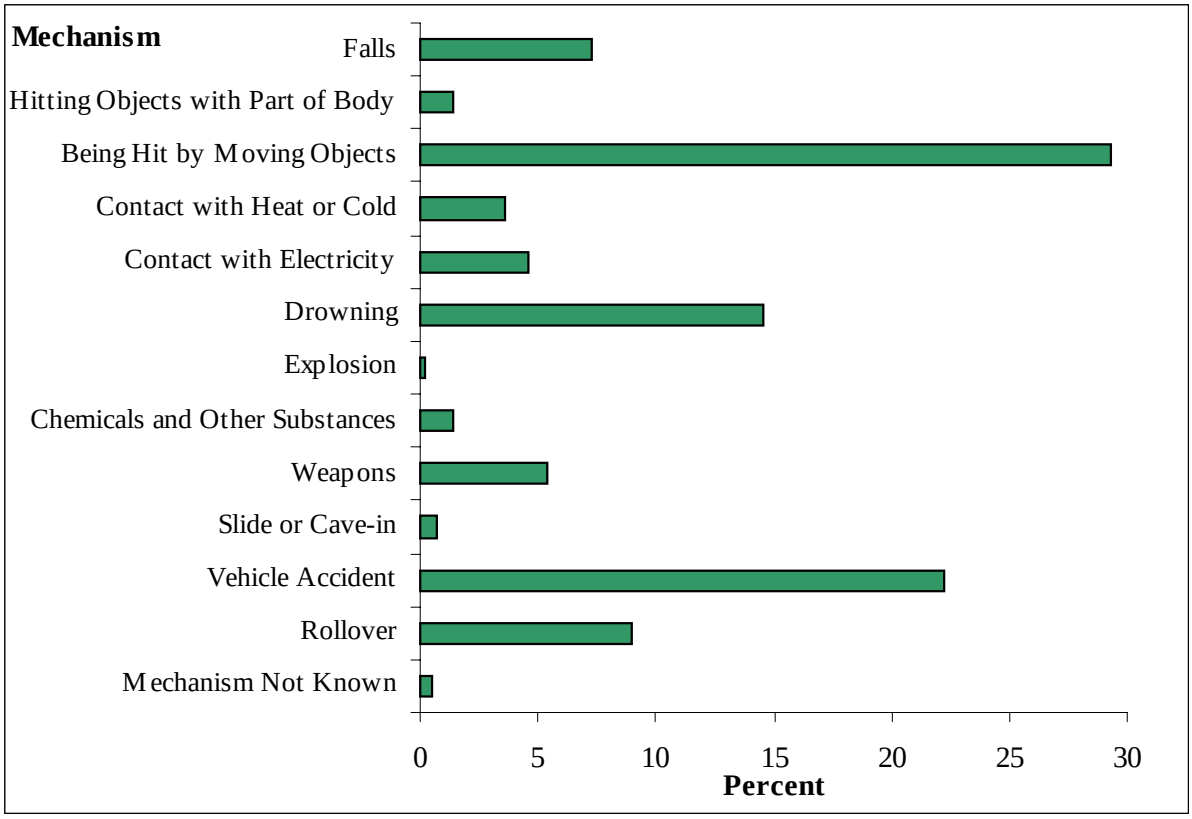


Table 1.11 Agent of fatal incident by work status, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Other Farm	Total	%
Farm Vehicles					
Truck	19	3	1	23	3.9
Utility	6	11	3	20	3.4
Car	17	10	5	32	5.5
Trailer	1	7	-	8	1.4
Motorcycle 2 Wheel	14	9	1	24	4.1
Motorcycle 3 Wheel	4	1	-	5	0.9
Motorcycle 4 Wheel	1	2	1	4	0.7
Aircraft	46	-	-	46	7.8
Bicycle	-	-	1	1	0.2
Other Farm Vehicle NEC	8	-	1	9	2.3
Total Farm Vehicles	**116**	**43**	**13**	**172**	**29.3**
Mobile Farm Machinery and Plant					
Tractor	68	19	-	87	14.8
Linkage	-	1	-	1	0.2
Tillage Seeder	2	1	-	3	0.5
Fertiliser Spreader	2	-	-	2	0.3
Earth Moving Equipment	3	-	-	3	0.5
Harvesting Machine	2	-	-	2	0.3
Grain Auger	6	-	-	6	1.0
Slasher	2	1	-	3	0.5
Hay Baler	1	-	-	1	0.2
Posthole Digger	4	-	-	4	0.7
Other Mobile Farm Machinery and Plant NEC	8	2	-	8	1.4
Total Mobile Farm Machinery and Plant	**98**	**24**	**-**	**122**	**20.8**
Fixed Plant and Equipment					
Pump	3	-	-	3	0.5
Generator	1	-	-	1	0.2
Feed Mixer	1	-	-	1	0.2
Other Fixed Plant Equipment NEC	4	-	-	4	0.7
Total Fixed Plant and Equipment	**9**	**-**	**-**	**9**	**1.5**
Workshop Equipment					
Welder	1	-	-	1	0.2
Gas Bottles	1	-	-	1	0.2
Ladder Excluding Ladder Attached to Structure	1	-	1	2	0.3
Electric Drill	2	-	1	3	0.5
Other Workshop Equipment NEC	1	-	-	1	0.2
Total Workshop Equipment	**6**	**-**	**2**	**8**	**1.4**
Other Equipment and Materials					
Forklift	2	-	-	2	0.3
Knife	1	-	1	2	0.3
Gun, Rifle, Shotgun	18	5	4	27	4.6
Other Equipment and Materials NEC	5	1	5	11	1.9
Total Other Equipment and Materials	**26**	**6**	**10**	**42**	**7.2**

Table 1.11 Agent of fatal incident by work status, farm-related fatalities, Australia, 1989-1992 (cont)

Agent	Working	Bystander	Other Farm	Total	%
Materials					
Wire Other	1		-	1	0.2
Steel	2	-	-	2	0.3
Timber	2	-	-	2	0.3
Round Bales	3	-		3	0.5
Hay Bales Other	2	-	-	2	0.3
Other Materials NEC	2	-	1	3	0.5
Total Materials	**12**	**-**	**1**	**13**	**2.2**
Farm Structures					
House Yard	1	-	-	1	0.2
Swimming Pool	1	-	1	2	0.3
Tank	1	5	2	8	1.4
Fence	-	1	-	1	0.2
Dam	7	44	-	51	8.7
Windmill	3	-	-	3	0.5
Creek, River	8	2	9	19	3.2
Embankment	3	-	-	3	0.5
Irrigation Channel	1	4	-	5	0.9
Silo Grain	1	1	-	2	0.3
Field Bin	1	-	-	1	0.2
Rail Tracks	-	-	1	1	0.2
Powerlines	11	-	1	12	2.0
Other Farm Structure NEC	8	3	1	12	2.0
Total Farm Structures	**46**	**60**	**15**	**121**	**20.6**
Animals					
Horse	21	3	9	33	5.6
Cattle	2	-	-	2	0.3
Sheep	-	1	-	1	0.2
Snake	2	-	1	3	0.5
Insect	1	-	-	1	0.2
Total Animals	**26**	**4**	**10**	**40**	**6.8**
Farm Hazardous Substances					
Pesticides	1	1	-	2	0.3
Farm Chemicals	-	-	1	1	0.2
Fuel	-	-	1	1	0.2
Gases	2	-	-	2	0.3
Total Farm Hazardous Substances	**3**	**1**	**2**	**6**	**1.0**
Working Environment					
Fire or Smoke	4	-	13	17	2.9
Ground, Rock, Stump	5	-	3	8	1.4
Lumber	2	1	-	3	0.5
Heat	1	-	1	2	0.3
Trees Being Felled	17	3	2	22	3.7
Other Working Environment NEC	2	-	-	2	0.3
Total Working Environment	**31**	**4**	**19**	**54**	**9.2**
Total	**373**	**142**	**72**	**587**	**100.0**

Mechanism of Fatal Incident

The most common mechanisms involved in fatal farm incidents were vehicle accidents (131: 22.3%), drowning (86: 14.7%), being hit by moving objects (83: 14.1%), being hit by falling objects (43: 7.3%) and falling from a height (42: 7.2%). For working fatalities, the three most common mechanisms were vehicle accidents (96, 25.7%), being hit by moving objects (usually vehicles or mobile machinery) (56: 15.0%) and rollovers of mobile machinery (commonly tractors) (43: 11.5%). For bystander fatalities, the three most common mechanisms were drowning (56: 39.4%), vehicle accidents (27: 19.0%) and being hit by moving objects (23: 16.2%). For other farm fatalities, contact with flames or heat (14: 19.4%) and drowning (11: 15.3%) were the two most common mechanisms of fatal injury (Table 1.12 and Figure 1.3). Specific mechanisms are examined in more detail in Section 6.

Table 1.12 Mechanism of fatal incident by work status, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Other Farm	Total	%
Falls From a Height	29	5	8	42	7.2
Falls on the Same Level	1	-	-	1	0.2
Hitting Objects with a Part of the Body Unspecified	-	-	1	1	0.2
Hitting Stationary Objects	4	2	1	7	1.2
Being Hit by Falling Objects	31	6	6	43	7.3
Being Bitten by an Animal	2	-	1	3	0.5
Being Hit by an Animal	13	3	4	20	3.4
Being Trapped by Moving Machinery	14	1	-	15	2.6
Being Trapped Between Stationary and Moving Objects	8	1	-	9	1.5
Being Hit by Moving Objects	56	23	4	83	14.1
Contact with Flames or Heat	4	-	14	18	3.1
Exposure to Environmental Heat	1	-	1	2	0.3
Exposure to Environmental Cold	1	-	-	1	0.2
Contact with Electricity	22	1	4	27	4.6
Drowning	19	56	11	86	14.7
Explosion	1	-	-	1	0.2
Single Contact with Chemical or Substance	3	1	3	7	1.2
Insect and Spider Bites and Stings	1	-	-	1	0.2
Shot by Firearm	18	5	4	27	4.6
Stabbed by Knife	1	-	1	2	0.3
Slide or Cave-In	3	1	-	4	0.7
Vehicle Accident	96	27	8	131	22.3
Rollover	43	10	-	53	9.0
Mechanism Not Known	2	-	1	3	0.5
Total	**373**	**142**	**72**	**587**	**100.0**

Activity at Time of Fatal Incident

The most common activities being performed at the time of the fatal incident were transport (including both road and air transport), either for work purposes, recreation or transport for reasons not specified (146: 24.9%), recreation or playing activities (105: 17.9%), working with animals (55: 9.4%), maintenance activities (52: 8.9%) and working with crops (49: 8.3%). The activities performed by the fatally injured person were closely related to their working status. Transport for work purposes (including, both road and air transport) (98: 26.3%), working with animals (51: 13.7%), working with crops (49: 13.1%) and maintenance activities (45: 12.1%) were the most common activities being performed at the time of the fatal incident by working persons. The most common activities being performed at the time of the fatal incident by bystanders were recreation or playing activities (85: 59.9%) and transport (38: 28.8%). Recreation or playing activities (21: 29.2%) and transport (13: 18.1%) were the most common activities being performed at the time of the fatal incident by persons fatally injured in other farm fatalities (Table 1.13).

Table 1.13 Activity at time of fatal incident by work status, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	98	-	-	98	16.7
Transport for Recreation	-	27	11	38	6.5
Transport NEC	-	11	2	13	2.2
Constructing or Installing	11	-	2	13	2.2
Maintenance	45	-	7	52	8.9
Earthmoving or Digging	11	-	-	11	1.9
Slaughtering, Gutting or Shelling	3	-	1	4	0.7
Milling	1	-	-	1	0.2
Felling Trees or Clearing Land	31	-	2	33	5.6
Firefighting	2	-	-	2	0.3
Hunting	12	-	5	17	2.9
Working with Animals	51	-	3*	54	9.2
Working with Crops	49	-	-	49	8.3
Mining Activities	1	-	-	1	0.3
Monitoring, Observing, Inspecting	16	3	1	20	3.4
Moving Goods	29	-	-	29	4.9
Rescuing	2	-	1	3	0.5
Work Break	2	-	-	2	0.3
Recreation or Playing	-	85	21	106	18.1
Household Domestic Work or Gardening	2	-	5	7	1.2
Assault	-	1	-	1	0.2
Working – Context Unclear	1	-	-	1	0.2
Other	3	12	8	23	3.9
Not Known / Not Stated	3	3	3	9	1.5
Total	**373**	**142**	**72**	**587**	**100.0**

* Three other farm fatalities were clearly involved in recreational activities with horses at the time of the fatal incident.

In 43 (30.3%) fatal incidents involving bystanders, a working person was also involved at the time. The most common activity of the worker was operating a tractor (17: 12.0%), driving a utility (8: 5.6%), driving a truck (2: 1.4%) and felling a tree (2: 1.4%). For the majority of incidents involving bystanders (99: 69.7%) the fatal incident occurred following contact with equipment or farm structures which were present on the farm to perform work functions.

Multiple Incidents

The 587 persons were killed in 566 incidents. There were 17 incidents on a farm that resulted in more than one person being killed. Fifteen incidents involved the fatalities of two people, one incident involved the death of three persons and one incident involved the death of five persons. All other incidents involved single fatalities.

Of the 15 incidents involving two people, five incidents involved motor vehicle accidents, five incidents involved aircraft crashes, two incidents involved helicopter crashes, one incident involved a trench cave-in, one incident involved two people moving a grain auger that contacted overhead powerlines; and one incident involved two people drowning while swimming in a water hole. Three persons were killed when their aircraft hit overhead power lines and five people were killed when their aircraft crashed.

Pathophysiological Cause of Death

In 25 (4.3%) instances, the injured person did not die directly from the injuries they received, but from a pathological process that occurred as a result of the injuries (for example, pulmonary embolism and pneumonia). For these few cases, the cause of death was coded to the pathological process, not to the original injuries.

Overall, head injuries (155: 26.4%), drowning (90: 15.3%), multiple injuries (86: 14.7%) and injuries to the chest (58: 9.9%) were the most common causes of death. Twenty five (4.3%) persons died following medical complications resulting from their injuries. Head injuries (95: 25.5%), multiple injuries (75: 20.1%) and injuries to the chest (46: 12.3%) were the most common types of injuries for working persons. Drowning (commonly young children drowning in dams) (57: 40.1%) and head injuries (43: 30.3%) were the most common causes of death for bystanders. Head injuries (17: 23.6%) and drowning (11: 15.3%) were the common causes of death for persons fatally injured in other farm incidents (Table 1.14).

Table 1.14 Pathophysiological cause of death by work status, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	95	43	17	155	26.4
Neck Injuries	13	4	1	18	3.1
Chest Injuries	46	6	6	58	9.9
Trunk Injuries	17	3	4	24	4.1
Abdominal Injuries	10	4	2	16	2.7
Limb Injuries	5	1	1	7	1.2
Multiple Injuries to Head and Other Body Parts	25	5	-	30	5.1
Multiple Injuries - Other	50	5	1	56	9.5
Drowning	22	57	11	90	15.3
Crush Asphyxia	28	6	3	37	6.3
Electrocution	21	1	4	26	4.4
Burns	6	-	8	14	2.4
Inhalation of a Chemical Substance	3	-	4	7	1.2
Suffocation	2	2	1	5	0.8
Fat Embolism Crush Injury Syndrome	3	-	-	3	0.5
Chemical Substance Ingestion	-	1	2	3	0.5
Envenomation	1	-	1	2	0.3
Dehydration	1	-	1	2	0.3
Acute Drug Toxicity	-	-	1	1	0.2
Hypothermia	1	-	-	1	0.2
Aspiration	-	1	-	1	0.2
Not Known	4	1	1	6	1.0
Medical Complications	20	2	3	25	4.3
Total	**373**	**142**	**72**	**587**	**100.0**

Blood Alcohol Content and Other Drugs

Overall, 338 (57.6%) fatally injured persons had a blood alcohol test conducted. Of the persons who had a blood alcohol test, 272 (80.5%) had a nil blood alcohol reading, 21 (6.2%) had a blood alcohol reading between 0.001% and 0.05%, and 45 (13.3%) had a blood alcohol reading of 0.05% or greater. In 170 (30.0%) fatalities, a screen for the presence of other drugs was conducted. There were three fatalities where other drugs were thought to contribute to the fatal incident occurring.

For working persons, 238 (63.8%) had a blood alcohol test conducted. Of the workers who had a blood alcohol test, 206 (86.6%) had a nil blood alcohol reading, 16 (6.7%) had a blood alcohol reading between 0.001% and 0.05%, and 16 (6.7%) had a blood alcohol reading of 0.05% or greater. In 108 (29.0%) working fatalities, a screen for cannabis was conducted, with only two people giving a positive reading for cannabis. For working persons, 112 (30.0%) were tested for other drug compounds and in eight cases, other drugs were found (such as diazepam, codeine and tegretol), but it did not appear that the presence of these other drugs contributed to the fatal incident occurring.

For bystanders fatally injured, 60 (42.3%) had a blood alcohol test conducted. Of the bystanders who had a blood alcohol test, 41 (68.3%) had a nil blood alcohol reading, three (5.0%) had a blood alcohol reading between 0.001% and 0.05%, and 16 (26.7%) had a blood alcohol reading of 0.05% or greater. In 30 (21.1%) bystander fatalities, a screen for cannabis

was conducted, with only one person giving a positive reading for cannabis. There were 36 (25.4%) bystanders tested for other drug compounds and in five cases other drugs were found (such as prescription drugs), but it did not appear that the presence of these other drugs contributed to the fatal incident occurring.

For persons fatally injured in other farm incidents, 40 (55.6%) had a blood alcohol test conducted. Of the persons who had a blood alcohol test, 25 (62.5%) had a nil blood alcohol reading, two (5.0%) had a blood alcohol reading between 0.001% and 0.05%, and 13 (32.5%) had a blood alcohol reading of 0.05% or greater. It was thought in 15 incidents that the level of blood alcohol probably contributed to the fatal incident occurring. In 22 (30.6%) of the other farm fatalities, people were tested for other drug compounds and in five cases other drugs were found (such as benzodiazepines, codeine, desipramine). In three cases, it appeared that the presence of these other drugs contributed to the fatal incident occurring.

Month of Fatal Incident

The number of fatal incidents per month did not vary greatly. However, the months with the highest number of fatalities were December (61: 10.4%), January (57: 9.7%) and November (53: 9.0%) (Table 1.15).

Table 1.15 Month of incident by work status, farm-related fatalities, Australia, 1989-1992

Month	Working	Bystander	Other Farm	Total	%
January	33	16	8	57	9.7
February	22	13	4	39	6.6
March	38	8	5	51	8.7
April	41	8	3	52	8.9
May	34	12	4	50	8.5
June	28	12	5	45	7.7
July	29	11	6	46	7.8
August	23	11	8	42	7.2
September	28	14	7	49	8.3
October	25	12	5	42	7.2
November	37	10	6	53	9.0
December	35	15	11	61	10.4
Total	**373**	**142**	**72**	**587**	**100.0**

Day of Fatal Incident

Working fatalities occurred slightly more frequently during the week than weekends. Bystanders were more likely to be fatally injured during the weekend than during the week. Other farm fatal incidents did not have a significant daily variation (Table 1.16).

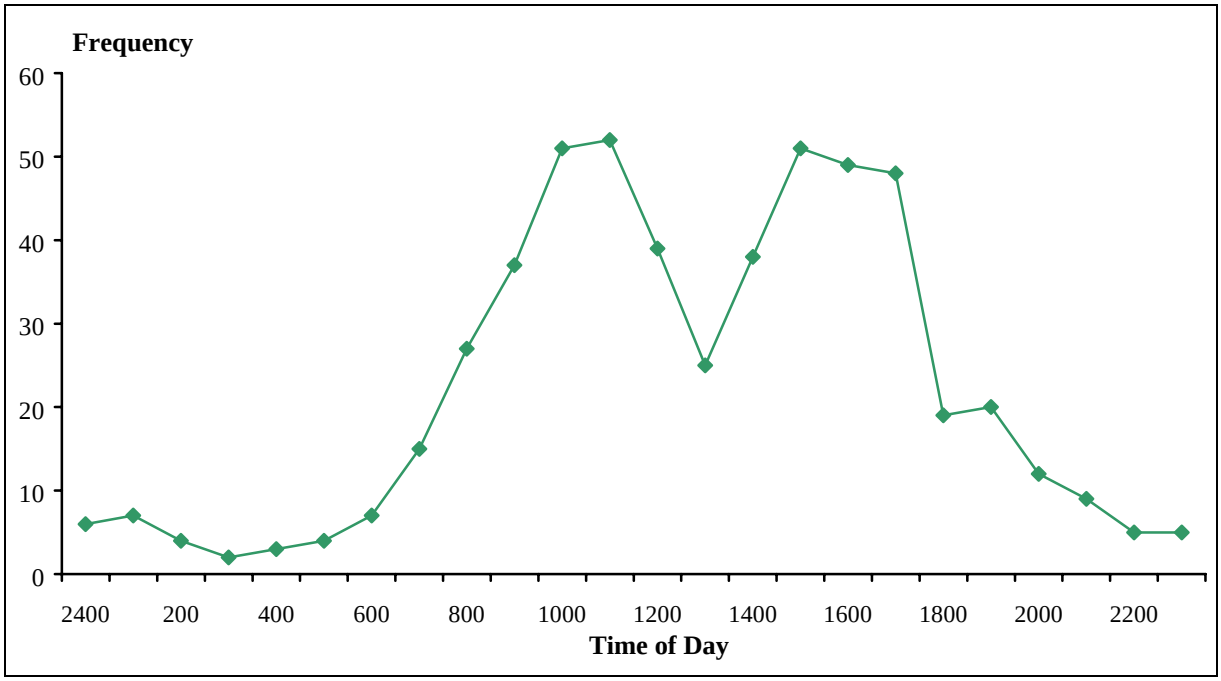
Table 1.16 Day of incident by work status, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	44	28	9	81	13.8
Monday	64	14	13	91	15.5
Tuesday	52	18	4	74	12.6
Wednesday	53	15	15	83	14.1
Thursday	54	11	4	69	11.8
Friday	43	17	13	73	12.4
Saturday	56	38	13	107	18.2
Not Known	7	1	1	9	1.5
Total	**373**	**142**	**72**	**587**	**100.0**

Time of Fatal Incident

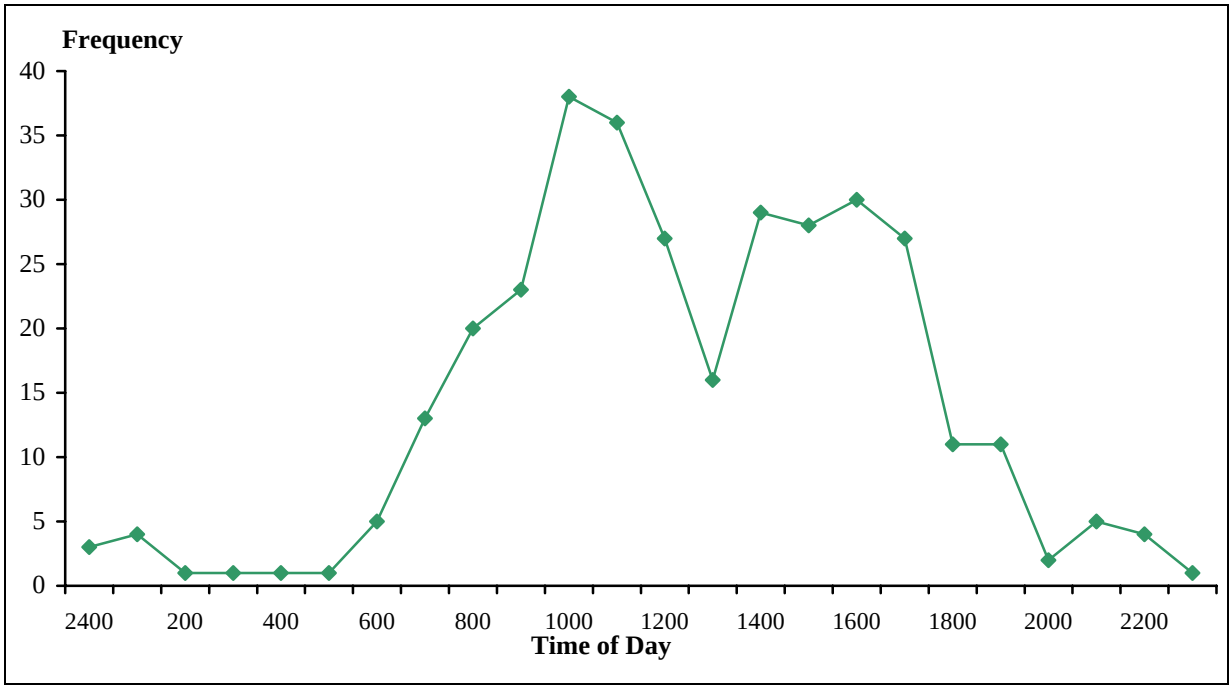
There were a total of 587 people fatally injured on a farm or while working in the agricultural industry. These 587 people were killed in 566 fatal incidents. In 31 (5.3%) of the fatalities, the time of the incident was not known. Where the time of the fatal incident was known, the frequency of fatal incidents peaked between 0700 and 1300 hours and between 1400 and 1900 hours (Figure 1.4).

Figure 1.4 Time of incident, farm-related fatalities, Australia, 1989-1992 (n=535)



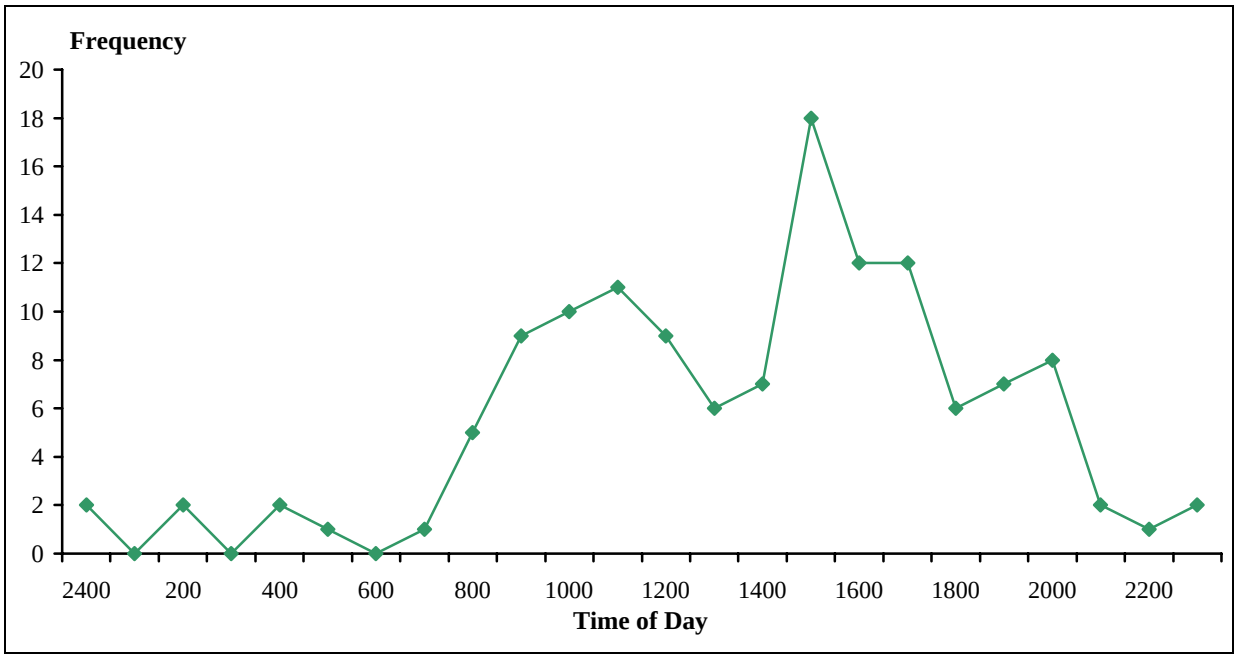
There were 373 workers who were fatally injured either working in the agricultural industry or who were working in an other industry, but were fatally injured on a farm. The 373 workers were killed in 356 fatal incidents. In 19 (5%) of the incidents, the time that the incident occurred was not known. Where the time of the fatal incident was known, the frequency of fatal incidents peaked between 0700 and 1300 hours and between 1400 and 1700 hours (Figure 1.5).

Figure 1.5 Time of incident, working farm-related fatalities, Australia, 1989-1992 (n=337)



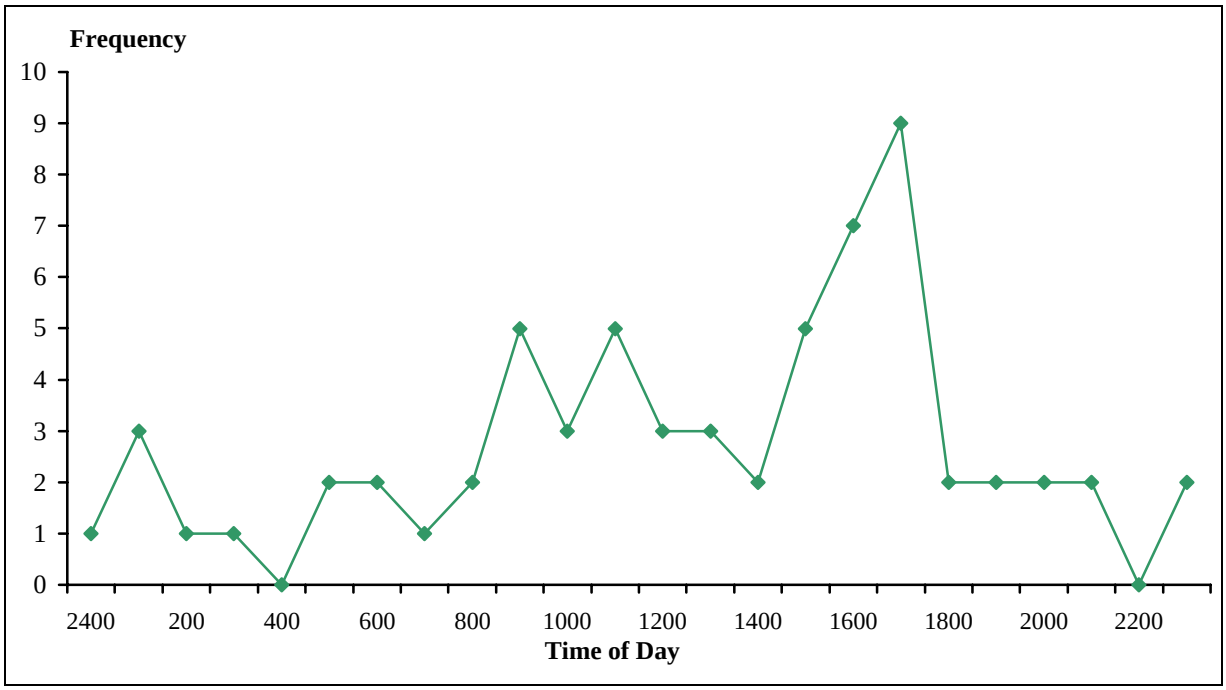
There were a total of 142 bystanders to farm work who were fatally injured on a farm. The 142 bystanders were killed in 140 fatal incidents. In seven (4.9%) of the incidents, the time that the incident occurred was not known. Where the time of the fatal incident was known, the frequency of fatal incidents rose around 0900 hours, remained high until 1700 hours and then declined in the late evening (Figure 1.6).

Figure 1.6 Time of incident, bystander farm-related fatalities, Australia, 1989-1992 (n=133)



There were a total of 72 persons who were fatally injured in other farm fatalities on a farm. These 72 people were killed in 70 fatal incidents. In five (7%) of the incidents, the time that the incident occurred was not known. Where the time of the fatal incident was known, the frequency of fatal incidents increased between 0900 and 1300 hours, rose between 1500 and 1800 hours and then declined in the early evening (Figure 1.7).

Figure 1.7 Time of incident, other farm-related fatalities, Australia, 1989-1992 (n=65)



Visitor to the Farm

Of the 522 males who were fatally injured on Australian farms between 1989 and 1992, 157 (30.1%) were visitors to the farm, 331 (63.4%) were residents and for 34 (6.5%) it was not known or not relevant, if they were visitors. For the 65 females, 18 (27.7%) were visitors, 40 (61.5%) were residents and for seven (10.8%) it was not known or not relevant, if they were visitors. Of the 373 fatalities to people working, 98 (26.3%) were visitors, 252 (67.6%) were residents and for 23 (6.2%) it was not known or not relevant, if they were visitors. Of the 142 bystanders to work on Australian farms, 48 (33.8%) were visitors, 82 (57.7%) were residents and for 12 (8.5%) it was not known or not relevant, if they were visitors. Of the 72 other farm fatalities on Australian farms, 29 (40.3%) were visitors, 37 (51.4%) were residents and for six (8.3%) it was not known or not relevant, if they were visitors.

SUMMARY SECTION 1

- There were 607 farm-related fatalities between 1989 and 1992. Of these, 587 (96.7%) were unintentional fatalities (unintentional fatalities are examined in detail in this report, except in Section 7, which focuses on intentional fatalities).
- The rate per 10,000 establishments for all fatal farm incidents based on the 1991 agricultural census was 9.8.
- Workers employed in the agricultural industry and who were in the ECLF at the time of the fatal incident made up the majority of farm-related fatalities and had a fatality rate of 20.6 per 100,000 workers per year. This rate was four times the all industry rate.
- Comprehensive information regarding bystander and other farm fatalities has previously not been collected at a national level. There were 142 bystanders and 72 other persons on farms fatally injured in farm-related incidents between 1989-1992.
- The majority of farm-related fatalities across work status (working, bystander and other farm) were of males.
- The average age of people fatally injured in farm-related fatal incidents was 37 years. There were 115 children fatally injured in farm-related fatal incidents. The majority of bystander deaths involved children less than 15 years (89: 62.7%).
- The industry groups with the highest number of farm-related fatalities for workers were meat cattle; and cereal grains, sheep, cattle and pigs. There were 46 workers who were not employed in the agricultural industry, but were fatally injured on a farm. The most common non-agricultural industry employing workers was the construction industry.
- Farmers and farm managers and livestock and field crop farm hands were the most common occupations of the fatally injured workers. Aircraft pilots were the most common fatally injured workers not employed in a farm-based occupation.
- Workers were most commonly working alone at the time of the fatal incident. Workers were commonly found by co-workers; relatives; and people who were both a co-worker and a relative.
- The states with the highest number of farm-related fatalities for the four year period were New South Wales, Queensland and Victoria.
- The most common farm enterprises where the fatal incident occurred were meat cattle; cereal grains, sheep, cattle and pigs; and sheep.
- The most common locations of farm-related fatalities were paddocks, either under crop or clear for grazing; roads and lanes; dams, water reservoirs and irrigation channels; and areas of natural vegetation.
- The most common groups of agents involved in the fatal incident were farm vehicles; mobile farm machinery; and farm structures. Fatal incidents involving workers commonly involved tractors and aircraft. Incidents involving bystanders commonly involved dams; tractors; utilities; and cars. Fatal incidents involving other persons on farms commonly involved fire or smoke; cattle; and creeks or rivers.
- The three most common mechanisms involved in the fatal incident were vehicle accidents; drowning; and being hit by moving objects. Vehicle accidents for workers, drowning for bystanders, and contact with flames or heat for other persons on farms were the most common mechanisms of the fatal incident.

- The activity that the fatally injured person was performing at the time of the incident was closely related to their work status. For workers, transport for work purposes; working with animals; working with crops; and maintenance activities were the most common activities. Bystanders were commonly involved in recreation or playing activities. Other farm persons were commonly involved in recreation or playing; and transport activities.
- There were 566 incidents that resulted in the 587 farm-related fatalities. The number of persons killed in multiple incidents ranged from two to five, with a total of 38 persons killed in 17 multiple incidents.
- The most common types of fatal injuries for workers were head injuries; multiple injuries; and injuries to the chest. Bystanders and other farm persons commonly died as a result of drowning or following head injuries.
- There were 66 people with an alcohol reading greater than zero and 45 with a blood alcohol reading of 0.05%. There were three fatalities where drugs contributed to the fatal incident.
- Overall, information regarding the month and day of the fatal incident did not show much variation. However, workers were involved in slightly more incidents during the week than on weekends and bystanders were more likely to be fatally injured on the weekend than during the week.
- For workers, the time that the fatal incident occurred peaked between 0700 and 1300 hours and between 1400 and 1700 hours. For bystanders, the number of fatal incidents rose around 0900 and remained high until 1700 hrs, and for other farm fatalities the number of fatal incidents rose between 0900 and 1300 hours and between 1500 and 1800 hours.
- The majority of persons fatally injured in farm-related incidents were residents of the farm.

Section 2: Fatal Injuries on Farms by Specific Agricultural Enterprise

This Section examines fatalities in the ten most common agricultural enterprise (commodity) groups for both working and bystander fatalities. The commodity groups examined are: orchard and other fruit, vegetables including potatoes, cereal grains, sheep-cereal grains, meat cattle-cereal grains, sheep-meat cattle, sheep, meat cattle, dairy and sugar cane.

ORCHARD AND OTHER FRUIT

Between 1989 and 1992, there were 20 fatalities related to Australian orchard and other fruit farms. This is an average of five fatalities per year. Of the 20 fatalities related to orchard and other fruit farms, ten (50.0%) were of persons working at the time of the incident and ten (50.0%) were of bystanders (Table 2.1).

Table 2.1 Number of fatalities per year by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	1	3	4	20.0
1990	1	4	5	25.0
1991	4	2	6	30.0
1992	4	1	5	25.0
Total	**10**	**10**	**20**	**100.0**

Gender and Age

The highest number of fatally injured workers was in the 15-24 year age range, though workers from 15 to 77 years were involved. Most of the bystanders were young, with seven (70.0%) less than five years, and eight (80.0%) less than 15 years (Table 2.2). All of the workers and most of the bystanders (6: 60.0%) were male.

Table 2.2 Age group by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	7	7	35.0
5 - 14	-	1	1	5.0
15 - 24	4	-	4	20.0
25 - 34	-	1	1	5.0
35 - 44	2	-	2	10.0
55 - 64	3	-	3	15.0
65 - 74	-	1	1	5.0
75+	1	-	1	5.0
Total	**10**	**10**	**20**	**100.0**

State or Territory of Fatal Incident

New South Wales and Victoria (both with 5: 25.0%), and Queensland and Western Australia (both with 4: 20.0%) were the states with the largest number of fatalities related to orchard and other fruit farms. New South Wales (4: 40.0%) and Victoria (3: 30.0%) had the largest number of working fatalities, while Queensland (4: 40%) and Western Australia (3: 30%) had the largest number of bystander fatalities (Table 2.3).

Table 2.3 State or Territory of incident by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	-	4	4	20.0
NSW	4	1	5	25.0
VIC	3	2	5	25.0
TAS	2	-	2	10.0
WA	1	3	4	20.0
Total	**10**	**10**	**20**	**100.0**

Location of Fatal Incident

Paddocks (9: 45%), mainly those under crop, and dams (5: 25%) were the most common locations of fatal incidents related to orchard and other fruit farms. Paddocks (5: 50%) were the main location for working incidents, while dams (5: 50%) and paddocks (4: 40%) were the main locations for bystander incidents (Table 2.4).

Table 2.4 Location on farm by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	4	4	8	40.0
Paddock Clear for Grazing	1	-	1	5.0
Workshop	1	-	1	5.0
Roads, Lanes	1	1	2	10.0
Dam, Water Reservoir, Irrigation Channel	-	5	5	25.0
Sorting / Packing Shed	1	-	1	5.0
Farm Yard or Garden	1	-	1	5.0
Other Place Associated with Agricultural Work	1	-	1	5.0
Total	**10**	**10**	**20**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agents involved in working incidents related to orchard and other fruit farms were tractors (4: 40.0%) and firearms (2*:* 20.0%). Dams (3: 20.0%) were the most common agent involved in bystander incidents (Table 2.5).

Table 2.5 Agent of fatal incident by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Motorcycle 2 Wheel	1	-	1	5.0
Trailer	-	2	2	10.0
Total Farm Vehicles	**1**	**2**	**3**	**15.0**
Mobile Farm Machinery and Plant				
Tractor	4	2	6	30.0
Slasher	-	1	1	5.0
Total Mobile Farm Machinery and Plant	**4**	**3**	**7**	**35.0**
Workshop Equipment				
Ladder Excluding Ladder Attached to Structure	1	-	1	5.0
Total Workshop Equipment	**1**	**-**	**1**	**5.0**
Other Equipment and Materials				
Gun, Rifle, Shotgun	2	-	2	10.0
Total Other Equipment and Materials	**2**	**-**	**2**	**10.0**
Farm Structures				
House Yard	1	-	1	5.0
Dam	-	3	3	15.0
Irrigation channel	-	2	2	10.0
Total Farm Structures	**1**	**5**	**6**	**30.0**
Working Environment				
Lumber	1	-	1	5.0
Total Working Environment	**1**	**-**	**1**	**5.0**
Total	**10**	**10**	**20**	**100.0**

Being hit by moving objects (tractors and timber) (3: 30.0%), falls from a height (including a fall from a ladder) (2: 20.0%), being shot by a firearm (2: 20.0%) and rollovers of mobile machinery (tractors) (2: 20.0%) were the most common mechanisms of the fatal incident for workers on orchard and other fruit farms. Bystanders commonly drowned in dams (3: 30.0%) or irrigation channels (2: 20.0%) or were hit by moving objects (including tractors and trailers) (4: 40.0%) (Tables 2.6).

Table 2.6 Mechanism of fatal incident by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	2	-	2	10.0
Being Trapped by Moving Machinery	-	1	1	5.0
Being Hit by Moving Objects	3	4	7	35.0
Shot by Firearm	2	-	2	10.0
Drowning	-	5	5	25.0
Vehicle Accident	1	-	1	5.0
Rollover	2	-	2	10.0
Total	**10**	**10**	**20**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were working with crops (4: 40.0%) and maintenance activities (3: 30.0%). Nine of the ten (90.0%) bystander fatalities involved persons who were performing recreation activities or playing (Table 2.7).

Table 2.7 Activity at time of fatal incident by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	1	-	1	5.0
Transport for Recreation	1	1	2	10.0
Maintenance	3	-	3	15.0
Hunting	1	-	1	5.0
Working With Crops	4		4	20.0
Recreation or Playing	-	9	9	45.0
Total	**10**	**10**	**20**	**100.0**

TRACTOR OVERTURN IN AN ORCHARD

A part-time orchard hand was driving a tractor, towing spraying equipment, to spray insecticide in a peach orchard. The tractor had a retractable ROPS which was in the horizontal position. The orchard hand had the tractor in neutral and as he turned the tractor into a new row (which was steep), he lost control of the tractor and it skidded 55 metres down a hill. When the tractor got to the bottom of the hill, the orchard hand tried to turn the tractor sideways to avoid a fence. Due to the tractor's forward momentum and the weight of a full spray unit, the tractor continued in a forward direction and overturned, crushing the orchard workers hand.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological causes of death of persons fatally injured in incidents related to orchard and other fruit farms were head injuries (6: 30.0%) and drowning (5: 25.0%). Head injuries (3: 30.0%) and trunk injuries (2: 20.0%) were the main causes of death for workers, while drowning (5: 50.0%) and head injuries (3: 30.0%) were the main causes of death for bystanders (Table 2.8).

Table 2.8 Pathophysiological cause of death by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	3	3	6	30.0
Neck Injuries	1	1	2	10.0
Chest Injuries	1	-	1	5.0
Trunk Injuries	2	-	2	10.0
Abdominal Injuries	1	-	1	5.0
Multiple Injuries to Head and Other Body Parts	1	-	1	5.0
Multiple Injuries - Other	-	1	1	5.0
Drowning	-	5	5	25.0
Medical Complications	1	-	1	5.0
Total	**10**	**10**	**20**	**100.0**

Blood alcohol readings were available for eight (80.0%) of the fatally injured workers and three (30.0%) of the bystanders. Of those with available blood alcohol readings, none of the workers and two (66.7%) of the bystanders had a blood alcohol level greater than 0.05g/100ml.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the occurrence of fatalities related to orchard and other fruit farms (Table 2.9). However, January and October each with three (15.0%) fatalities were the most common months that the fatal incident occurred.

Table 2.9 Month of incident per year, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	1	-	1	3	15.0
February	-	-	1	1	2	10.0
April	-	1	-	1	2	10.0
May	1	-	1	-	2	10.0
June	1	1	-	-	2	10.0
July	-	1	-	-	1	5.0
September	1	-	-	1	2	10.0
October	-	-	2	1	3	15.0
November	-	1	1	-	2	10.0
December	-	-	1	-	1	5.0
Total	**4**	**5**	**6**	**5**	**20**	**100.0**

There was no consistent daily variation in the number of fatal incidents on orchard and other fruit farms. However, the most common days of the week for farm fatalities on orchard and other fruit farms were Sunday and Monday, each with five (25.0%) fatalities (Table 2.10).

Table 2.10 Day of incident by work status, orchard and other fruit, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	2	3	5	25.0
Monday	3	2	5	25.0
Tuesday	1	2	3	15.0
Wednesday	1	1	2	10.0
Thursday	2	1	3	15.0
Friday	1	-	1	5.0
Saturday	-	1	1	5.0
Total	**10**	**10**	**20**	**100.0**

Visitor to the Farm

Of the 20 fatalities where the commodity was orchard and other fruit, five (25.0%) were of visitors and 15 (75.0%) were of residents. For people working, two (20.0%) were visitors and eight (80.0%) were residents. For bystanders, there were three (30.0%) visitors and seven (70.0%) residents.

VEGETABLES INCLUDING POTATOES

Between 1989 and 1992, there were 21 fatalities on Australian vegetable including potato farms. This is an average of five fatalities per year. Of the 21 fatalities on vegetable including potato farms, 18 (85.7%) were of persons working at the time of the incident and three (14.3%) were of bystanders (Table 2.11).

Table 2.11 Number of fatalities per year by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	5	2	7	33.3
1990	5	-	5	23.8
1991	4	1	5	23.8
1992	4	-	4	19.1
Total	**18**	**3**	**21**	**100.0**

Gender and Age

Most of the fatally injured workers were aged between 35 and 64 years, though workers from 18 to 74 years were involved. The three bystanders were young girls aged one or two years (Table 2.12). Most of the workers (17: 94.4%) were male.

Table 2.12 Age group by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	3	3	14.3
15 - 24	2	-	2	9.5
25 - 34	2	-	2	9.5
35 - 44	4	-	4	19.0
45 - 54	4	-	4	19.0
55 - 64	5	-	5	23.8
65 - 74	1	-	1	4.8
Total	**18**	**3**	**21**	**100.0**

State or Territory of Fatal Incident

Queensland (9: 42.9%) and New South Wales (5: 23.8%) were the states with the largest number of total fatalities and, along with Victoria, working fatalities related to vegetable including potato farms. The bystander incidents occurred in New South Wales (2: 66.7%) and Queensland (1: 33.3%) (Table 2.13).

Table 2.13 State or Territory of incident by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	8	1	9	42.9
NSW	3	2	5	23.8
VIC	3	-	3	14.3
TAS	1	-	1	4.8
SA	2	-	2	9.5
WA	1	-	1	4.8
Total	**18**	**3**	**21**	**100.0**

Location of Fatal Incident

Paddocks (7: 33.3%), whether under crop or clear for grazing, were the most common locations of fatal incidents related to vegetable including potato farms (Table 2.14).

Table 2.14 Location on farm by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	4	1	5	23.8
Paddock Clear for Grazing	2	-	2	9.5
Stockyards Including Horse Yards	1	-	1	4.8
Roads, Lanes	1	-	1	4.8
Dam, Water Reservoir, Irrigation Channel	1	1	2	9.5
Hay Shed	1	-	1	4.8
Machinery Shed	1	-	1	4.8
Shed, Farm Building NEC	2	1	3	14.3
Farm Excluding Residence NEC	1	-	1	4.8
Farm Yard or Garden	2	-	2	9.5
Other Place Associated with Agricultural Work	1	-	1	4.8
Not Relevant	1	-	1	4.8
Total	**18**	**3**	**21**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agents involved in working incidents related to vegetable including potato farms were tractors (4: 22.2%), trucks (2: 11.1%) and powerlines (2: 11.1%) (Table 2.15).

Table 2.15 Agent of fatal incident by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	2	-	2	9.5
Car	1	-	1	4.8
Total Farm Vehicles	**3**	**-**	**3**	**14.3**
Mobile Farm Machinery and Plant				
Tractor	4	1	5	23.8
Tillage Seeder	-	1	1	4.8
Posthole Digger	1	-	1	4.8
Other Mobile Farm Machinery and Plant NEC	1	-	1	4.8
Total Mobile Farm Machinery and Plant	**6**	**2**	**8**	**38.1**
Workshop Equipment				
Electric Drill	1	-	1	4.8
Other Workshop Equipment NEC	1	-	1	4.8
Total Workshop Equipment	**2**	**-**	**2**	**9.5**
Other Equipment and Materials				
Forklift	1	-	1	4.8
Total Equipment and Materials				
Farm Structures				
Dam	1	1	2	9.5
Embankment	1	-	1	4.8
Powerlines	2	-	2	9.5
Total Farm Structures	**3**	**1**	**5**	**23.8**
Animals				
Horse	1	-	1	4.8
Snake	1	-	1	4.8
Total Animals	**2**	**-**	**2**	**9.5**
Total	**18**	**3**	**21**	**100.0**

Being hit by moving objects (including tractors and farm vehicles) (5: 27.8%) and contact with electricity (including overhead powerlines and an electric drill) (4: 22.2%) were the most common mechanisms of the fatal incident for workers on vegetable including potato farms. Of the three bystanders, one was hit by a tractor, the second fell from a tillage seeder and the third drowned in a dam (Table 2.16)

Table 2.16 Mechanism of fatal incident by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	-	1	1	4.8
Being Hit by Falling Objects	1	-	1	4.8
Being Bitten by an Animal	1	-	1	4.8
Being Hit by an Animal	1	-	1	4.8
Being Trapped by Moving Machinery	1	-	1	4.8
Being Hit by Moving Objects	5	1	6	28.6
Contact with Electricity	4	-	4	19.0
Drowning	1	1	2	9.5
Slide or Cave-in	1	-	1	4.8
Vehicle Accident	1	-	1	4.8
Rollover	2	-	2	9.5
Total	**18**	**3**	**21**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were moving goods (4: 22.2%), transport for work purposes (3: 16.7%), maintenance activities (3: 16.7%) and working with crops (3: 16.7%). The three bystanders were involved in recreation or playing (2: 66.7%) and transport for recreation (1: 33.3%). (Table 2.17).

Table 2.17 Activity at time of fatal incident by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	3	-	3	14.3
Transport for Recreation	-	1	1	4.8
Constructing or Installing	2	-	2	9.5
Maintenance	3	-	3	14.3
Earthmoving or Digging	2	-	2	9.5
Working with Animals	1	-	1	4.8
Working with Crops	3	-	3	14.3
Moving Goods	4	-	4	19.0
Recreation or Playing	-	2	2	9.5
Total	**18**	**3**	**21**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological causes of death of workers fatally injured in incidents related to vegetable including potato farms were head injuries (5: 27.8%), electrocution (4: 22.2%) and crush asphyxia (3: 16.7%). The causes of death for bystanders were head injuries (1: 33.3%), multiple injuries (3: 33.3%) and drowning (1: 33.3%) (Table 2.18).

Table 2.18 Pathophysiological cause of death by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	5	1	6	28.6
Neck Injuries	1	-	1	4.8
Chest Injuries	2	-	2	9.5
Multiple Injuries to Head and Other Body Parts	1	-	1	4.8
Multiple Injuries - Other	1	1	2	9.5
Drowning	1	1	2	9.5
Crush Asphyxia	3	-	3	14.3
Electrocution	4	-	4	19.0
Total	**18**	**3**	**21**	**100.0**

Blood alcohol readings were available for ten (55.6%) of the fatally injured workers. Of those with available blood alcohol readings, one (10.0%) of the workers had an alcohol level greater than 0.05g/100ml. The only bystander with an available blood alcohol level had a zero reading.

FAULTY EXTENTION CORD CAUSES ELECTRIC SHOCK

A mushroom farmer was using an electric drill, which was connected to an extension cord, to drill a hole in a steel beam in order to erect a fire extinguisher bracket. The extension cord the mushroom farmer was using was in poor condition, due to having wires exposed. The farmer received an electric shock when he touched the extension cord as there was water on the ground following recent rain. Following the fatality, all extension leads around the farm were changed and portable earth leakage circuit breakers purchased and used.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the occurrence of fatalities related to vegetable including potato farms. However, March, May, August and October, each with three (14.3%) fatalities, were the most common months that the fatal incident occurred (Table 2.19).

Table 2.19 Month of incident per year, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	1	-	-	2	9.5
February	-	-	1	-	1	4.8
March	2	-	-	1	3	14.3
April	-	-	1	-	1	4.8
May	1	-	2	-	3	14.3
July	-	1	-	1	2	9.5
August	1	2	-	-	3	14.3
September	-	-	-	1	1	4.8
October	2	-	-	1	3	14.3
November	-	-	1	-	1	4.8
December	-	1	-	-	1	4.8
Total	**7**	**5**	**5**	**4**	**21**	**100.0**

There was no consistent daily variation in the number of fatal incidents on vegetable including potato farms. However, the most common days of the week for farm fatalities on vegetable including potato farms were Tuesday, Wednesday and Saturday, each with four (19.0%) fatalities (Table 2.20).

Table 2.20 Day of incident by work status, vegetables including potatoes, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	1	2	3	14.3
Monday	3	-	3	14.3
Tuesday	4	-	4	19.0
Wednesday	3	1	4	19.0
Thursday	3	-	3	14.3
Saturday	4	-	4	19.0
Total	**18**	**3**	**21**	**100.0**

Visitor to the Farm

Of the 21 fatalities where the commodity was vegetables including potatoes, three (14.3%) were of visitors, 17 (81.0%) were of residents and for one (4.8%) person, their visitor status was not relevant. For people working, two (11.1%) were visitors, 15 (83.3%) were residents and for one (5.6%) worker their visitor status was not relevant. For bystanders, there was one (33.3%) visitor and two (66.7%) residents.

CEREAL GRAINS

Between 1989 and 1992, there were 22 fatalities on Australian cereal grain farms. This is an average of 5.5 fatalities per year. Of the 22 fatalities on cereal grains farms, 21 (95.5%) were of persons working at the time of the incident and one (4.5%) was of a bystander (Table 2.21).

Table 2.21 Number of fatalities per year by work status, cereal grains, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	6	-	6	27.3
1990	7	-	7	31.8
1991	3	1	4	18.2
1992	5	-	5	22.7
Total	**21**	**1**	**22**	**100.0**

Gender and Age

The highest number of fatally injured workers was in the 45-54 year age range, though workers from nine to 86 years were involved. The bystander was an eight-year-old boy (Table 2.22). All of the workers were male.

Table 2.22 Age group by work status, cereal grains, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
5 - 14	1	1	2	9.1
15 - 24	4	-	4	18.2
25 - 34	3	-	3	13.6
35 - 44	4	-	4	18.2
45 - 54	6	-	6	27.3
55 - 64	2	-	2	9.1
74+	1	-	1	4.5
Total	**21**	**1**	**22**	**100.0**

State or Territory of Fatal Incident

New South Wales (8: 36.4%) and Queensland (5: 22.7%) were the states with the largest number of total fatalities and working fatalities related to cereal grains farms. The one bystander fatality occurred in South Australia (Table 2.23).

Table 2.23 State or Territory of incident by work status, cereal grains, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	5	-	5	22.7
NSW	8	-	8	36.4
VIC	4	-	4	18.2
SA	3	1	4	18.2
WA	1	-	1	4.5
Total	**21**	**1**	**22**	**100.0**

Location of Fatal Incident

Paddocks (13: 59.0%), mainly those under crop, were the most common locations of fatal incidents related to cereal grain farms. The single bystander fatality occurred in a paddock under crop (Table 2.24).

Table 2.24 Location on farm by work status, cereal grains, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	11	1	12	54.5
Paddock Clear for Grazing	1	-	1	4.5
Workshop	1	-	1	4.5
Roads, Lanes	2	-	2	9.1
Machinery Shed	1	-	1	4.5
Shed, Farm Building NEC	3	-	3	13.6
Grain Handling Facilities	1	-	1	4.5
Not Relevant	1	-	1	4.5
Total	**21**	**1**	**22**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agents involved in working incidents related to cereal grain farms were aircraft (7: 33.3%), augers (3: 14.3%) and powerlines (3: 14.3%). The single bystander fatality involved a cave-in of grain in a silo (Table 2.25).

Table 2.25 Agent of fatal incident by work status, cereal grains, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	1	-	1	4.5
Car	1	-	1	4.5
Aircraft	7	-	7	31.8
Other Farm Vehicle NEC	1	-	1	4.5
Total Farm Vehicles	**10**	**-**	**10**	**45.5**
Mobile Farm Machinery and Plant				
Tractor	1	-	1	4.5
Harvesting Machine	2	-	2	9.1
Grain Auger	3	-	3	13.6
Other Mobile Farm Machinery and Plant NEC	1	-	1	4.5
Total Mobile Farm Machinery and Plant	**7**	**-**	**7**	**31.8**
Workshop Equipment				
Electric Drill	1	-	1	4.5
Total Workshop Equipment				
Farm Structures				
Silo Grain	-	1	1	4.5
Powerlines	3	-	3	13.6
Total Farm Structures	**3**	**1**	**4**	**18.2**
Total	**21**	**1**	**22**	**100.0**

GRAIN AUGER FATALITY

A farmer was in a grain bin clearing out grain (either caught or wet wheat) with a shovel. The auger, which ran the length of the bin, was operating. The farmer slipped on the sloping floor and his left foot went under the cover of the auger (the auger guard). The auger was idling over slowly and caught the farmer's leg and severed it below the hip. The auger cover was installed in the 130 mm position and the gap between the cover and bottom of the bin measured 135 mm.

Vehicle accidents (mainly aircraft) (9: 42.9%), contact with electricity (5: 23.8%) and being trapped by moving machinery (including two grain augers and a harvesting machine) (3: 14.3%) were the most common mechanisms of the fatal incident (Table 2.26).

Table 2.26 Mechanism of fatal incident by work status, cereal grains, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Being Hit by Falling Objects	1	-	1	4.5
Being Trapped by Moving Machinery	3	-	3	13.6
Being Trapped Between Stationary and Moving Objects	1	-	1	4.5
Being Hit by Moving Objects	1	-	1	4.5
Slide or Cave-In		1	1	4.5
Contact with Electricity	5	-	5	22.7
Vehicle Accident	9	-	9	40.9
Rollover	1	-	1	4.5
Total	**21**	**1**	**22**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were working with crops (9: 42.9%), transport for work purposes (7: 33.3%), and maintenance activities (5: 23.8%). The bystander was fatally injured whilst engaged in recreation or play (Table 2.27).

Table 2.27 Activity at time of fatal incident by work status, cereal grains, working, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	7	-	7	31.8
Maintenance	5	-	5	22.7
Working with Crops	9	-	9	40.9
Recreation or Playing	-	1	1	4.5
Total	**21**	**1**	**22**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological causes of death of workers fatally injured in incidents related to cereal farms, were multiple injuries and electrocution (both 5: 23.8%), and head injuries and chest injuries (both 3: 14.3%) (Table 2.28).

Table 2.28 Pathophysiological cause of death by work status, cereal grains, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	3	-	3	13.6
Chest Injuries	3	-	3	13.6
Trunk Injuries	1	-	1	4.5
Limb Injuries	2	-	2	9.1
Multiple Injuries - Other	5	-	5	22.7
Electrocution	5	-	5	22.7
Burns	1	-	1	4.5
Suffocation	-	1	1	4.5
Fat Embolism Crush Injury Syndrome	1	-	1	4.5
Total	**21**	**1**	**22**	**100.0**

Blood alcohol readings were available for 19 (90.5%) of the fatally injured workers. None of those with available blood alcohol readings had a level greater than 0.05g/100ml. The one bystander did not have an available blood alcohol reading.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the occurrence of fatalities related to cereal grain farms. However, November (5: 22.7%) and December (4: 18.2%) were the most common months that the fatal incident occurred (Table 2.29).

Table 2.29 Month of incident per year, cereal grains, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	1	-	-	1	4.5
February	1	-	-	1	2	9.1
March	2	1	-	-	3	13.6
April	-	-	-	2	2	9.1
May	1	-	-	-	1	4.5
July	-	-	1	-	1	4.5
August	1	-	-	-	1	4.5
October	-	1	-	1	2	9.1
November	-	4	1	-	5	22.7
December	1	-	2	1	4	18.2
Total	**6**	**7**	**4**	**5**	**22**	**100.0**

There was no consistent daily variation in the number of fatal incidents on cereal grain farms. However, the most common days of the week for farm fatalities on cereal grain farms were Tuesday (5: 22.7%), Thursday and Friday (each with 4: 18.2%) (Table 2.30).

Table 2.30 Day of incident by work status, cereal grains, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	1	-	1	4.5
Monday	2	-	2	9.1
Tuesday	5	-	5	22.7
Wednesday	3	-	3	13.6
Thursday	4	-	4	18.2
Friday	3	1	4	18.2
Saturday	3	-	3	13.6
Total	**21**	**1**	**22**	**100.0**

TRAPPED UNDER EQUIPMENT

A grazier was employed on contract to harvest wheat on a neighbour's property. The farmer was performing maintenance on a 1960's header on the property. The farmer raised the comb of the header to its full height (about one metre from the ground) and climbed underneath the comb in order to release the stone guard. Whilst under the comb, a hydraulic hose released, causing the comb to lower to the ground, trapping the farmer. There was a mechanical locking device on the header that prevented the raised comb from falling in the event of a hydraulic hose or cylinder failure. However, the farmer was not using the locking device.

Visitor to the Farm

Of the 22 fatalities where the commodity was cereal grains, seven (31.8%) were of visitors, 14 (63.6%) were of residents, and for one (4.5%) person their visitor status was not relevant. For people working, six (28.6%) were visitors, 14 (66.7%) were residents and for one (4.8%) worker their visitor status was not relevant. The bystander to work was a visitor.

SHEEP - CEREAL GRAINS

Between 1989 and 1992 there were eleven fatalities on Australian sheep-cereal grain farms. This is an average of approximately three fatalities per year. Of the eleven fatalities on sheep-cereal grain farms, ten (90.9%) were of persons working at the time of the incident and one (9.1%) was of a bystander (Table 2.31).

Table 2.31 Number of fatalities per year by work status, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	4	-	4	36.4
1990	2	-	2	18.2
1991	4	1	5	45.5
1992	-	-	-	-
Total	**10**	**1**	**11**	**100.0**

Gender and Age

The highest number of fatally injured workers was in the 25-34 year age range, though workers from 22 to 58 years were involved (Table 2.32). All of the workers were male. The only bystander was a two year old boy.

Table 2.32 Age group by work status, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	1	1	9.1
15 - 24	2	-	2	18.2
25 - 34	5	-	5	45.5
35 - 44	2	-	2	18.2
55 - 64	1	-	1	9.1
Total	**10**	**1**	**11**	**100.0**

State or Territory of Fatal Incident

Western Australia (5: 45.5%) was the state with the largest number of total fatalities and working fatalities related to sheep-cereal grains farms. The one bystander fatality occurred in Victoria (Table 2.33).

Table 2.33 State or Territory of incident by work status, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
NSW	2	-	2	18.2
VIC	2	1	3	27.3
SA	1	-	1	9.1
WA	5	-	5	45.5
Total	**10**	**1**	**11**	**100.0**

Location of Fatal Incident

Paddocks (3: 30.0%), all under crop, and areas of natural vegetation (2: 20.0%) were the most common locations of working fatal incidents related to sheep-cereal grain farms. The bystander incident occurred in a paddock under crop (Table 2.34).

Table 2.34 Location on farm by work status, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	3	1	4	36.4
Natural Vegetation	2	-	2	18.2
Stockyards Including Horse Yards	1	-	1	9.1
Roads, Lanes	1	-	1	9.1
Hay Shed	1	-	1	9.1
Shed, Farm Building NEC	1	-	1	9.1
Windmill Including Troughs	1	-	1	9.1
Total	**10**	**1**	**11**	**100.0**

Agent and Mechanism of Fatal Incident

Each incident had a different agent involved for working fatalities, except two (20.0%) incidents that involved tractors. The fatality to the bystander resulted from being hit by a moving tractor (Table 2.35).

Table 2.35 Agent of fatal incident by work status, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Motorcycle 3 Wheel	1	-	1	9.1
Aircraft	1	-	1	9.1
Total Farm Vehicles	**2**	**-**	**2**	**18.2**
Mobile Farm Machinery and Plant				
Tractor	2	1	3	27.3
Grain Auger	1	-	1	9.1
Hay Baler	1	-	1	9.1
Total Mobile Farm Machinery and Plant	**4**	**1**	**5**	**45.5**
Other Equipment and Materials				
Gun, Rifle, Shotgun	1	-	1	9.1
Other Equipment and Materials NEC	1	-	1	9.1
Total Other Equipment and Materials	**2**	**-**	**2**	**18.2**
Farm Hazardous Substances				
Gases	1	-	1	9.1
Total Farm Hazardous Substances	**1**	**-**	**1**	**9.1**
Working Environment				
Fire or Smoke	1	-	1	9.1
Total Working Environment	**1**	**-**	**1**	**9.1**
Total	**10**	**1**	**11**	**100.0**

FARM HAY BALER

A farm labourer died instantly from injuries received when a hay baler was accidentally activated. The labourer was working with two other farm workers to compress hay bales using a portable baling press. Before a work break, the machine was turned off and the trapped hay cleared out by someone leaning into the machine and clearing the hay. On this occasion, the labourer decided to clean out some trapped hay from the machine and leant in without first turning off the power. At the same time, one of the other workers was standing on the pile of hay bales throwing the bales down to be put into the machine. One of the bales landed on the hand lever of the baling press, causing the gates to shut onto the labourer who was clearing out the hay.

Vehicle accidents were the most common mechanism of the fatal incident for workers (Table 2.36). The three (30.0%) vehicle accidents involved a three-wheeled motorcycle, an aircraft and a tractor.

Table 2.36 Mechanism of fatal incident by work status, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Being Trapped by Moving Machinery	1	-	1	9.1
Being Trapped Between Stationary and Moving Objects	1	-	1	9.1
Being Hit by Moving Objects	1	1	2	18.2
Contact With Flames or Heat	1	-	1	9.1
Contact with Electricity	1	-	1	9.1
Single Contact with Electricity or Substance	1	-	1	9.1
Shot by Firearm	1	-	1	9.1
Vehicle Accident	3	-	3	27.3
Total	**10**	**1**	**11**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were transport for work purposes, working with crops, and moving goods (each 2: 20.0%). The bystander was fatally injured while engaged in recreation or playing (Table 2.37).

Table 2.37 Activity at time of fatal incident, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	2	-	2	18.2
Firefighting	1	-	1	9.1
Hunting	1	-	1	9.1
Working with Crops	2	-	2	18.2
Monitoring, Observing, Inspecting	1	-	1	9.1
Moving Goods	2	-	2	18.2
Other	1	-	1	9.1
Recreation or Playing	-	1	1	9.1
Total	**10**	**1**	**11**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death of workers fatally injured in incidents related to sheep-cereal grains farms was head injuries (3: 30.0%). The bystander died as a result of multiple injuries (Table 2.38).

Table 2.38 Pathophysiological cause of death by work status, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	3	-	3	27.3
Neck Injuries	1	-	1	9.1
Chest Injuries	1	-	1	9.1
Multiple Injuries to Head and Other Body Parts	1	1	2	18.2
Crush Asphyxia	1	-	1	9.1
Electrocution	1	-	1	9.1
Burns	1	-	1	9.1
Inhalation of a Chemical Substance	1	-	1	9.1
Total	**10**	**1**	**11**	**100.0**

Blood alcohol readings were available for seven (70.0%) of the fatally injured workers. Of those with available blood alcohol readings, one (10.0%) of the workers had a blood alcohol level greater than 0.05g/100ml. There was no blood alcohol reading available for the bystander.

ACCIDENTAL SHOOTING

A farmer accidentally shot himself fatally when either getting a 0.22 rifle out of, or putting the rifle back into, his utility from behind the driver's seat (which was folded forward). The farmer had been fixing a plough, and was probably shooting foxes immediately prior to the event. His wife found him lying beside his utility.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the occurrence of fatalities related to sheep-cereal grains farms. However, June (3: 27.3%) and January (2: 18.2%) were the most common months that the fatal incident occurred (Table 2.39).

Table 2.39 Month of incident per year, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	Total	%
January	2	-	-	2	18.2
February	-	-	1	1	9.1
April	-	-	1	1	9.1
May	1	-	-	1	9.1
June	-	1	2	3	27.3
August	-	1	-	1	9.1
September	-	-	1	1	9.1
December	1	-	-	1	9.1
Total	**4**	**2**	**5**	**11**	**100.0**

There was no consistent daily variation in the number of fatal incidents on sheep-cereal grain farms. However, the most common days of the week for farm fatalities on sheep-cereal grain farms were Monday (3: 27.3%), and Tuesday, Wednesday and Saturday (each with 2: 18.2%) (Table 2.40).

Table 2.40 Day of incident by work status, sheep-cereal grains, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	1	-	1	9.1
Monday	2	1	3	27.3
Tuesday	2	-	2	18.2
Wednesday	2	-	2	18.2
Friday	1	-	1	9.1
Saturday	2	-	2	18.2
Total	**10**	**1**	**11**	**100.0**

Visitor to the Farm

Of the eleven fatalities where the commodity was sheep-cereal grains, one (9.1%) was of a visitor and ten (90.9%) were of residents. All but one of the workers were residents and the bystander was a resident of the farm.

MEAT CATTLE - CEREAL GRAINS

Between 1989 and 1992, there were 12 fatalities related to Australian meat cattle-cereal grains farms. This is an average of three fatalities per year. Of the 12 fatalities on meat cattle-cereal grains farms, all were working at the time of the incident (Table 2.41).

Table 2.41 Number of fatalities per year by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Year	Working	%
1989	-	-
1990	4	33.3
1991	2	16.7
1992	6	50.0
Total	**12**	**100.0**

Gender and Age

Workers were fairly evenly distributed between age groups from 25 to 74 years, with workers from 30 to 93 years being involved (Table 2.42). All of the workers were male.

Table 2.42 Age group by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Age Group	Working	%
25 - 34	3	25.0
35 - 44	3	25.0
55 - 64	2	16.7
65 - 74	3	25.0
75+	1	8.3
Total	**12**	**100.0**

State or Territory of Fatal Incident

Queensland (4: 33.3%) and Victoria (4: 33.3%) were the two states with the largest number of working fatalities related to meat cattle-cereal grains farms (Table 2.43).

Table 2.43 State or Territory of incident by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	%
QLD	4	33.3
NSW	2	16.7
VIC	4	33.3
TAS	1	8.3
SA	1	8.3
Total	**12**	**100.0**

Location of Fatal Incident

Paddocks (3: 25.0%), whether under crop or clear for grazing, and road and lanes (3: 25.0%) were the most common locations of fatal working incidents related to meat cattle-cereal grains farms (Table 2.44).

Table 2.44 Location on farm by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	%
Paddock Under Crop	2	16.7
Paddock Clear for Grazing	1	8.3
Natural Vegetation	1	8.3
Stockyards Including Horse Yards	1	8.3
Roads, Lanes	3	25.0
Hay Shed	1	8.3
Shed, Farm Building NEC	1	8.3
Farm Excluding Residence NEC	1	8.3
Other Place Associated with Agricultural Work	1	8.3
Total	**12**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agent involved in working incidents related to meat cattle-cereal grains farms was a firearm (2: 16.7%). This was the only agent involved in more than one incident (Table 2.45).

Table 2.45 Agent of fatal incident by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Agent	Working	%
Farm Vehicles		
Car	1	8.3
Other Farm Vehicle NEC	1	8.3
Total Farm Vehicles	**2**	**16.7**
Mobile Farm Machinery and Plant		
Tractor	1	8.3
Total Mobile Farm Machinery and Plant	**1**	**8.3**
Fixed Plant and Equipment		
Feed Mixer	1	8.3
Total Fixed Plant and Equipment	**1**	**8.3**
Other Equipment and Materials		
Gun, Rifle, Shotgun	2	16.7
Total Other Equipment and Materials	**2**	**16.7**
Materials		
Round Bales	1	8.3
Hay Bales Other	1	8.3
Total Materials	**2**	**16.7**
Farm Structures		
Creek, River	1	8.3
Powerlines	1	8.3
Total Farm Structures	**2**	**16.7**
Animals		
Horse	1	8.3
Total Animals	**1**	**8.3**
Working Environment		
Ground, Rock, Stump	1	8.3
Total Working Environment	**1**	**8.3**
Total	**12**	**100.0**

Falls from a height (3: 25.0) and being shot with a firearm (2: 16.7%) were the most common mechanisms of the fatal incident for workers (Table 2.46).

Table 2.46 Mechanism of fatal incident by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	%
Falls From a Height	3	25.0
Being Hit by Falling Objects	1	8.3
Being Trapped by Moving Machinery	1	8.3
Being Hit by Moving Objects	1	8.3
Contact with Electricity	1	8.3
Drowning	1	8.3
Shot by Firearm	2	16.7
Vehicle Accident	1	8.3
Rollover	1	8.3
Total	**12**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were working with animals (3: 25.0%), transport for work purposes, hunting and moving goods (each with 2: 16.7%) (Table 2.47).

Table 2.47 Activity at time of fatal incident by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Activity	Working	%
Transport for Work Purposes	2	16.7
Maintenance	1	8.3
Hunting	2	16.7
Working with Animals	3	25.0
Working with Crops	1	8.3
Monitoring, Observing, Inspecting	1	8.3
Moving Goods	2	16.7
Total	**12**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death of workers fatally injured in incidents related to meat cattle-cereal grains farms was head injuries (3: 25.0%) (Table 2.48).

Table 2.48 Pathophysiological cause of death by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	%
Head Injuries	3	25.0
Neck Injuries	1	8.3
Chest Injuries	1	8.3
Multiple Injuries to Head and Other Body Parts	1	8.3
Drowning	1	8.3
Crush Asphyxia	1	8.3
Electrocution	1	8.3
Fat Embolism Crush Injury Syndrome	1	8.3
Medical Complications	2	16.7
Total	**12**	**100.0**

Blood alcohol readings were available for half of the workers and all had a zero blood alcohol level.

THROWN FROM HORSE

A cattle farmer was attempting to break in a horse when the horse bucked him off. The farmer fell heavily to the ground and received a fractured pelvis. The incident occurred in a horse yard on a cattle farm. The farmer was an experienced rider. He was taken by ambulance to hospital, where he died a day later of a cardiac arrest caused by a fat embolism.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the occurrence of fatalities related to meat cattle-cereal grains farms. However, November (3: 25.0%), and March, April and September (each with 2: 16.7%) were the most common months that the fatal incident occurred (Table 2.49).

Table 2.49 Month of incident per year, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Month	1990	1991	1992	Total	%
January	-	1	-	1	8.3
March	1	1	-	2	16.7
April	1	-	1	2	16.7
July	1	-	-	1	8.3
August	-	-	1	1	8.3
September	1	-	1	2	16.7
November	-	-	3	3	25.0
Total	**4**	**2**	**6**	**12**	**100.0**

There was no consistent daily variation in the number of fatal incidents on meat cattle-cereal grains farms. However, the most common days of the week for farm fatalities on meat cattle-cereal grains farms were Sunday and Monday (each with 3: 20.0%) (Table 2.50).

Table 2.50 Day of incident by work status, meat cattle-cereal grains, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	%
Sunday	3	25.0
Monday	3	25.0
Tuesday	2	16.7
Wednesday	1	8.3
Thursday	1	8.3
Saturday	2	16.7
Total	**12**	**100.0**

Visitor to the Farm

Of the 12 fatalities where the commodity was meat cattle-cereal grains, one (8.3%) was of a visitor, ten (83.3%) were of residents, and for one (8.3%) person, their visitor status was not relevant.

SHEEP - MEAT CATTLE

Between 1989 and 1992 there were 22 fatalities on Australian sheep-meat cattle farms. This is an average of 5.5 fatalities per year. Of the 22 fatalities on sheep-meat cattle farms, 19 (86.4%) were of persons working at the time of the fatal incident and three (13.6%) were of bystanders (Table 2.51).

Table 2.51 Number of fatalities per year by work status, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	7	-	7	31.8
1990	1	-	1	4.5
1991	7	1	7	31.8
1992	4	2	4	18.2
Total	**19**	**3**	**22**	**100.0**

Gender and Age

The highest number of fatally injured workers was in the 25-34 year age range, though workers from 21 to 83 years were involved. The three bystanders were young, aged one to ten years (Table 2.52). All the workers and bystanders were male.

Table 2.52 Age group by work status, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	1	1	4.5
5 - 14	-	2	2	9.1
15 - 24	2	-	2	9.1
25 - 34	6	-	6	27.3
35 - 44	3	-	3	13.6
45 - 54	2	-	2	9.1
55 - 64	3	-	3	13.6
65 - 74	1	-	1	4.5
75+	2	-	2	9.1
Total	**19**	**3**	**22**	**100.0**

State or Territory of Fatal Incident

New South Wales (8: 36.4%) and Queensland (6: 27.3%) were the two states with the largest number of total fatalities and working fatalities related to sheep-meat cattle farms. Two of the three bystander fatalities occurred in Queensland (Table 2.53).

Table 2.53 State or Territory of incident by work status, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	4	2	6	27.3
NSW	8	-	8	36.4
VIC	3	1	4	18.2
TAS	2	-	2	9.1
SA	1	-	1	4.5
NT	1	-	1	4.5
Total	**19**	**3**	**22**	**100.0**

Location of Fatal Incident

Paddocks (8: 36.4%), both those under crop or clear for grazing, and areas of natural vegetation (3: 13.6%) were the most common locations of fatal incidents related to sheep-meat cattle farms. This was also the case for working fatalities. However, two of the three bystander fatalities occurred on roads or lanes (Table 2.54).

Table 2.54 Location on farm by work status, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	4	-	4	18.2
Paddock Clear for Grazing	4	-	4	18.2
Natural Vegetation	3	-	3	13.6
Unspecified	1	-	1	4.5
Stockyards Including Horse Yards	2	-	2	9.1
Roads, Lanes	2	2	4	18.2
Dam, Water Reservoir, Irrigation Channel	1	1	2	9.1
Machinery Shed	1	-	1	4.5
Not Relevant	1	-	1	4.5
Total	**19**	**3**	**22**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agents involved in working incidents related to sheep-meat cattle farms were tractors (5: 26.3%) and aircraft (3*:* 15.8%). Two of the three bystander fatalities involved utilities (Table 2.55).

Table 2.55 Agent of fatal incident by work status, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	1	-	1	4.5
Utility	-	2	2	9.1
Car	1	-	1	4.5
Motorcycle 2 Wheel	1	-	1	4.5
Aircraft	3	-	3	13.6
Total Farm Vehicles	**6**	**2**	**8**	**36.4**
Mobile Farm Machinery and Plant				
Tractor	5	-	5	22.7
Other Mobile Farm Machinery and Plant NEC	1	-	1	4.5
Total Mobile Farm Machinery and Plant	**6**	**-**	**6**	**27.3**
Other Equipment and Materials				
Gun, Rifle, Shotgun	1	-	1	4.5
Total Other Equipment and Materials	**1**	**-**	**1**	**4.5**
Farm Structures				
Dam	1	1	2	9.1
Other Farm Structure NEC	1	-	1	4.5
Total Farm Structures	**2**	**1**	**3**	**13.6**
Animals				
Horse	2	-	2	9.1
Total Animals	**2**	**-**	**2**	**9.1**
Working Environment				
Ground, Rock, Stump	1	-	1	4.5
Trees Being Felled	1	-	1	4.5
Total Working Environment	**2**	**-**	**2**	**9.1**
Total	**19**	**3**	**22**	**100.0**

Vehicle accidents (commonly aircraft) (5: 26.3%), rollovers of mobile farm equipment (mainly tractors) (4: 21.1%) and being hit by moving objects (commonly tractors) (3: 15.8%) were the most common mechanisms of fatal incident for workers on sheep-meat cattle farms. The three bystanders were fatally injured in three separate circumstances – a person drowning in a dam, a person being hit by a utility and a person falling from a utility (Table 2.56).

Table 2.56 Mechanism of fatal incident by work status sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	2	1	3	13.6
Being Hit by Falling Objects	2	-	2	9.1
Being Hit by an Animal	1	-	1	4.5
Being Hit by Moving Objects	3	1	4	18.2
Drowning	1	1	2	9.1
Shot by Firearm	1	-	1	4.5
Vehicle Accident	5	-	5	22.7
Rollover	4	-	4	18.2
Total	**19**	**3**	**22**	**100.0**

Activity at time of Fatal Incident

The most common activities of workers at the time of the fatal incident were working with crops (5: 26.3%) and transport for work purposes (4: 21.1%). Two of the bystanders were involved in transport for recreation (Table 2.57).

Table 2.57 Activity at time of fatal incident by work status, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	4	-	4	18.2
Transport for Recreation	-	2	2	9.1
Maintenance	2	-	2	9.1
Slaughtering, Gutting or Shelling	1	-	1	4.5
Felling Trees or Clearing Land	2	-	2	9.1
Hunting	1	-	1	4.5
Working with Animals	2	-	2	9.1
Working with Crops	5	-	5	22.7
Monitoring, Observing, Inspecting	1	-	1	4.5
Moving Goods	1	-	1	4.5
Recreation or Playing	-	1	1	4.5
Total	**19**	**3**	**22**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death of persons fatally injured in incidents related to sheep-meat cattle farms were multiple injuries, for workers (7: 36.8%), and head injuries, both for workers (6: 31.6%) and bystanders (2: 66.7%) (Table 2.58).

Table 2.58 Pathophysiological cause of death by work status, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	6	2	8	36.4
Chest Injuries	2	-	2	9.1
Trunk Injuries	1	-	1	4.5
Multiple Injuries to Head and Other Body Parts	3	-	3	13.6
Multiple Injuries - Other	4	-	4	18.2
Drowning	1	1	2	9.1
Crush Asphyxia	1	-	1	4.5
Medical Complications	1	-	1	4.5
Total	**19**	**3**	**22**	**100.0**

Blood alcohol readings were available for 12 (63.2%) of the fatally injured workers. Of those with available blood alcohol readings, one (8.3%) had a blood alcohol level greater than 0.05g/100ml. Blood alcohol readings were not available for bystanders.

FELL FROM A UTILITY TRAY

A nine year old boy was riding in the rear tray of a utility on a private access road on a farm. The driver of the utility was slowing down in order to allow the child to open a closed gate. The child jumped down from the tray, whilst the vehicle was still in motion, lost his footing, fell to the ground and was run over by the utility.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the occurrence of fatalities related to sheep-meat cattle farms. However, September (4: 18.2%) and June (3: 13.6%) were the most common months when the fatal incident occurred (Table 2.59).

Table 2.59 Month of incident per year, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	-	-	1	1	4.5
February	1	-	-	1	2	9.1
March	-	-	2	-	2	9.1
April	1	-	1	-	2	9.1
May	2	-	-	-	2	9.1
June	-	-	1	2	3	13.6
August	2	-	-	-	2	9.1
September	-	-	4	-	4	18.2
October	1	1	-	-	2	9.1
November	-	-	-	1	1	4.5
December	-	-	-	1	1	4.5
Total	**7**	**1**	**8**	**6**	**22**	**100.0**

There was no consistent daily variation in the number of fatal incidents on sheep-meat cattle farms. However, the most common days of the week for farm fatalities on sheep-meat cattle farms were Sunday (7: 31.8%) and Thursday (4: 18.2%) (Table 2.60).

Table 2.60 Day of incident by work status, sheep-meat cattle, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	5	2	7	31.8
Monday	2	-	2	9.1
Tuesday	3	-	3	13.6
Wednesday	2	-	2	9.1
Thursday	4	-	4	18.2
Friday	1	-	1	4.5
Saturday	2	1	3	13.6
Total	**19**	**3**	**22**	**100.0**

Visitor to the Farm

Of the 22 fatalities where the commodity was sheep-meat cattle, four (18.2%) were of visitors, 14 (63.6%) were of residents and for four (18.2%) persons, their visitor status was not relevant. For people working, four (21.1%) were visitors, eleven (57.9%) were residents and for four (21.1%) workers their visitor status was not relevant. The three bystanders were all residents of the farm.

SHEEP

Between 1989 and 1992, there were 41 fatalities related to Australian sheep farms involving working and bystander fatalities. This is an average of ten fatalities per year. Of the 41 fatalities related to sheep farms, 29 (70.7%) were of persons working at the time of the incident and 12 (29.3%) were of bystanders (Table 2.61).

Table 2.61 Number of fatalities per year by work status, sheep, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	9	3	12	29.3
1990	8	1	9	22.0
1991	6	4	10	24.4
1992	6	4	10	24.4
Total	**29**	**12**	**41**	**100.0**

Gender and Age

There was no dominant age group for the fatally injured workers, with workers aged from 17 to 81 years involved. Most of the bystanders were young, with eight (66.7%) less than 15 years, and ten (83.3%) less than 25 years (Table 2.62). Most of the workers (27: 93.1%) and bystanders (9: 75.0%) were male.

Table 2.62 Age group by work status, sheep, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	5	5	12.2
5 - 14	-	3	3	7.3
15 - 24	6	2	8	19.5
25 - 34	3	-	3	7.3
35 - 44	4	-	4	9.8
45 - 54	6	-	6	14.6
55 - 64	5	1	6	14.6
65 - 74	3	-	3	7.3
75+	2	1	3	7.3
Total	**29**	**12**	**41**	**100.0**

State or Territory of Fatal Incident

New South Wales (14: 34.1%) and Victoria (11: 26.8%) were the two states with the largest number of total fatalities and working fatalities related to sheep farms. This was also the case for bystanders, of which there were four (33.3%) in both New South Wales and Victoria (Table 2.63).

Table 2.63 State or Territory of incident by work status, sheep, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	3	-	3	7.3
NSW	10	4	14	34.1
VIC	7	4	11	26.8
TAS	3	1	4	9.8
SA	5	1	6	14.6
WA	1	2	3	7.3
Total	**29**	**12**	**41**	**100.0**

Location of Fatal Incident

Paddocks (11: 26.8%), mainly those clear for grazing, and roads and lanes (10: 24.4%) were the most common locations of fatal incidents related to sheep farms. This was the case for both working and bystander fatalities, although two bystander fatalities (16.7%) occurred at each of roads and lanes, dams, and farm yards or gardens (Table 2.64).

Table 2.64 Location on farm by work status, sheep, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	-	1	1	2.4
Paddock Clear for Grazing	7	3	10	24.4
Natural Vegetation	2	1	3	7.3
Stockyards Including Horse Yards	1	1	2	4.9
Roads, Lanes	8	2	10	24.4
Dam, Water Reservoir, Irrigation Channel	-	2	2	4.9
River, Creek	1	-	1	2.4
Shed, Farm Building NEC	1	-	1	2.4
Woolshed Shearing Shed	3	-	3	7.3
Windmills Including Troughs	1	-	1	2.4
Farm Excluding Residence NEC	2	-	2	4.9
Farm Yard or Garden	1	2	3	7.3
Not Relevant	2	-	2	4.9
Total	**29**	**12**	**41**	**100.0**

Agent and Mechanism of Fatal Incident

Overall, the most common agent for fatalities occurring on sheep farms was two-wheel motorcycles (6: 14.6%). For working fatalities, the most common agents were two-wheel motorcycles (4: 13.8%) and aircraft, tractor and firearms involved in three (7.3%) incidents each. Bystander fatalities on sheep farms commonly involved utilities (3: 25.0%) and two-wheel motorcycles (2: 16.7%) (Table 2.65).

Table 2.65 Agent of fatal incident by work status, sheep, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	2	1	3	7.3
Utility	1	3	4	9.8
Car	-	1	1	2.4
Motorcycle 2 Wheel	4	2	6	14.6
Aircraft	3	-	3	7.3
Farm Vehicle	1	-	1	2.4
Total Farm Vehicles	**11**	**7**	**18**	**43.9**
Mobile Farm Machinery and Plant				
Tractor	3	-	3	7.3
Locomotive	1	-	1	2.4
Total Mobile Farm Machinery and Plant	**4**	**-**	**4**	**9.8**
Fixed Plant and Equipment				
Other Fixed Plant and Equipment NEC	2	-	2	4.9
Total Fixed Plant and Equipment	**2**	**-**	**2**	**4.9**
Other Equipment and Materials				
Forklift	1	-	1	2.4
Gun, Rifle, Shotgun	3	1	4	9.8
Other Equipment and Materials NEC	1	-	1	2.4
Total Other Equipment and Materials	**5**	**1**	**6**	**14.6**
Materials				
Steel	1	-	1	2.4
Materials Other NEC	1	-	1	2.4
Total Materials	**2**	**-**	**2**	**4.9**
Farm Structures				
Windmill	1	-	1	2.4
Tank	-	1	1	2.4
Fence	-	1	1	2.4
Dam	-	1	1	2.4
Creek, River	2	-	2	4.9
Total Farm Structures	**3**	**3**	**6**	**14.6**
Animals				
Horse	1	1	2	4.9
Total Animals	**1**	**1**	**2**	**4.9**
Working Environment				
Ground, Rock, Stump	1	-	1	2.4
Total Working Environment	**1**	**-**	**1**	**2.4**
Total	**29**	**12**	**41**	**100.0**

Vehicle accidents were the most common mechanism of the fatal incident for both workers (9: 31.0%) and bystanders (4: 33.3%). Falls from a height (4: 13.8%) and being hit by moving objects (4: 13.8%) were other common mechanisms for workers. For bystanders, other common mechanisms included being hit by moving objects (mainly from vehicles) (3: 25.0%) and drowning (2: 16.7%) (Table 2.66).

Table 2.66 Mechanism of fatal incident by work status, sheep, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	4	-	4	9.8
Falls on the Same Level	1	-	1	2.4
Hitting Stationary Objects	1	-	1	2.4
Being Hit by Falling Objects	-	1	1	2.4
Being Hit by an Animal	-	1	1	2.4
Being Trapped by Moving Machinery	2	-	2	4.9
Being Trapped Between Stationary and Moving Objects	2	-	2	4.9
Being Hit by Moving Objects	4	3	7	17.1
Drowning	2	2	4	9.8
Shot by Firearm	3	1	4	9.8
Vehicle Accident	9	4	13	31.7
Rollover	1	-	1	2.4
Total	**29**	**12**	**41**	**100.0**

MOTORBIKE COLLISION

A farm hand was the rider of a motorbike who was driving some sheep across a paddock when it commenced to rain. The farm hand had been riding the motorbike along a farm track and collided with a stock crate that was on the track. It appears the farm hand was wearing a cloth cap at the time of the incident and may have been tilting his head downwards to escape rain getting onto his face and as a result had not observed the stock crate. The farm hand was not wearing a helmet at the time of the incident.

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were transport for work purposes (9: 31.0%), working with animals (7: 24.1%) and maintenance activities (5: 17.2%). Of the 12 bystander fatalities, the two most common activities at the time of the incidents were recreation or playing (6: 50.0%) and transport for recreation (3: 25.0%) (Table 2.67).

Table 2.67 Activity at time of fatal incident by work status, sheep, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	9	-	9	22.0
Transport for Recreation	-	3	3	7.3
Constructing or Installing	1	-	1	2.4
Maintenance	5	-	5	12.2
Slaughtering, Gutting or Shelling	1	-	1	2.4
Felling Trees or Clearing Land	1	-	1	2.4
Hunting	-	2	2	4.9
Working with Animals	7	-	7	17.1
Monitoring, Observing, Inspecting	1	1	2	4.9
Moving Goods	4	-	4	9.8
Recreation or Playing	-	6	6	14.6
Total	**29**	**12**	**41**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death of persons fatally injured in incidents related to sheep farms was head injuries, both for workers (9: 31.0%) and bystanders (5: 41.7%). Other of the more common causes of death for workers were multiple injuries (6: 20.7%) and chest injuries (5: 17.2%). Drowning (2: 16.7%) was the only other cause of more than one death for bystanders (Table 2.68).

Table 2.68 Pathophysiological cause of death by work status, sheep, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	9	5	14	34.1
Neck Injuries	1	-	1	2.4
Chest Injuries	5	-	5	12.2
Trunk Injuries	-	1	1	2.4
Abdominal Injuries	-	1	1	2.4
Multiple Injuries to Head and Other Body Parts	2	1	2	4.9
Multiple Injuries - Other	4	1	4	9.8
Drowning	2	2	2	4.9
Crush Asphyxia	3	-	3	7.3
Suffocation	-	1	1	2.4
Not Known	1	-	1	2.4
Medical Complications	2	-	2	4.9
Total	**29**	**12**	**41**	**100.0**

Blood alcohol readings were available for 23 (79.3%) of the fatally injured workers and six (50.0%) of the bystanders. Of those with available blood alcohol readings, one (4.3%) of the workers and three (50.0%) of the bystanders had a blood alcohol level greater than 0.05g/100ml.

FALL FROM WINDMILL

A farmer fell from a windmill after attempting to repair the tail section of the windmill which had been damaged. The top of the windmill was approximately seven metres from the ground and the tail section of the windmill was broken and hanging down. The fan portion was not turning and several blades on the fan were missing. There was a steel ladder, constructed on one side of the windmill, which extended from the ground to the platform (five metres above the ground). At the time of the incident, the weather was wet, with steady rain falling and there was also a strong wind blowing. The farmer was wearing leather riding boots and the sole on these boots were well worn and very smooth and slippery.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the number of fatal incidents on sheep farms. However, February and May (each with 6: 14.6%) and March, April, June, July and August (each with 4: 9.8%) were the most common months that the fatal incident occurred (Table 2.69).

Table 2.69 Month of incident per year, sheep, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	-	-	-	1	2.4
February	2	2	1	1	6	14.6
March	-	2	1	1	4	9.8
April	1	2	1	-	4	9.8
May	1	2	2	1	6	14.6
June	1	-	1	2	4	9.8
July	3	-	1	-	4	9.8
August	2	1	-	1	4	9.8
September	-	-	2	1	3	7.3
October	1	-	-	2	3	7.3
November	-	-	1	-	1	2.4
December	-	-	-	1	1	2.4
Total	**12**	**9**	**10**	**10**	**41**	**100.0**

There was no consistent daily pattern in the occurrence of fatalities related to sheep farms, although 26 (63.4%) of the fatal incidents occurred on Thursday, Friday or Saturday (Table 2.70).

Table 2.70 Day of incident by work status, sheep, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%

Sunday	2	1	3	7.3
Monday	3	-	3	7.3
Tuesday	5	1	6	14.6
Wednesday	2	-	2	4.9
Thursday	5	3	8	19.5
Friday	8	3	11	26.8
Saturday	3	4	7	17.1
Not known	1	-	1	2.4
Total	**29**	**12**	**41**	**100.0**

Visitor to the Farm

Of the 41 fatalities where the commodity was sheep, six (14.6%) of the persons were visitors, 32 (78.0%) were residents and for three (7.3%) persons their visitor status was not relevant. For people working, three (10.3%) were visitors, 23 (79.3%) were residents and for three (10.3%) workers their visitor status was not relevant. For bystanders, there were three (25.0%) visitors and nine (75.0%) residents fatally injured.

MEAT CATTLE

Between 1989 and 1992, there were 90 fatalities related to Australian meat cattle farms involving working and bystander fatalities. This is an average of approximately 22 fatalities per year or about two fatalities every month. Of the 90 fatalities related to meat cattle farms, 77 (85.6%) were of persons working at the time of the incident and 13 (14.4%) were of bystanders (Table 2.71).

Table 2.71 Number of fatalities per year by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	19	3	22	24.4
1990	23	4	27	30.0
1991	20	4	24	26.7
1992	15	2	17	18.9
Total	**77**	**13**	**90**	**100.0**

Gender and Age

The fatally injured workers were commonly in the 45-54 year age range, though workers from 13 to 78 years were involved. Most of the bystanders were young, with seven (53.8%) aged less than 15 years and eleven (84.6%) aged less than 35 years (Table 2.72). Most of the workers (71: 92.2%) and bystanders (10: 76.9%) were male.

Table 2.72 Age group by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	4	4	4.4
5 - 14	2	3	5	5.6
15 - 24	12	2	14	15.6
25 - 34	12	2	14	15.6
35 - 44	11	-	11	12.2
45 - 54	21	1	22	24.4
55 - 64	7	-	7	7.8
65 - 74	8	1	9	10.0
75+	4	-	4	4.4
Total	**77**	**13**	**90**	**100.0**

State or Territory of Fatal Incident

Queensland (35: 38.9%) and New South Wales (26: 28.9%) were the two states with the largest number of both total fatalities and working fatalities related to meat cattle farms. Queensland had the largest number of bystander fatalities related to meat cattle farms (Table 2.73).

Table 2.73 State or Territory of incident by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	28	7	35	38.9
NSW	25	1	26	28.9
VIC	6	4	10	11.1
TAS	1	1	2	2.2
SA	6	-	6	6.7
WA	6	-	6	6.7
NT	5	-	5	5.6
Total	**77**	**13**	**90**	**100.0**

Location of Fatal Incident

Paddocks (30: 33.3%), whether under crop or clear for grazing, areas of natural vegetation (14: 15.6%) and roads and lanes (13: 14.4%) were the most common locations of fatal incidents related to meat cattle farms. This was the case for both working and bystander fatalities, along with dams or other water sources for bystanders (Table 2.74).

Table 2.74 Location on farm by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	9	-	9	10.0
Paddock Clear for Grazing	18	3	21	23.3
Natural Vegetation	10	4	14	15.6
Unspecified	2	-	2	2.2
Stockyards Including Horse Yards	3	1	4	4.4
Roads, Lanes	11	2	13	14.4
Dam, Water Reservoir, Irrigation Channel	4	2	6	6.7
River, Creek	7	-	7	7.8
Hay Shed	1	-	1	1.1
Machinery Shed	1	-	1	1.1
Windmills Including Troughs	1	-	1	1.1
Farm Excluding Residence NEC	4	-	4	4.4
Farm Yard or Garden	-	1	1	1.1
Other Place Associated with Agricultural Work	3	-	3	3.3
Not Relevant	3	-	3	3.3
Total	**77**	**13**	**90**	**100.0**

HELICOPTER CRASH

A helicopter pilot and a stock inspector were undertaking a survey of stock and a planned culling of buffalo and cattle when their helicopter crashed. Investigations at the scene revealed that the helicopter was under power at the time it hit the ground, that the main rotor blades had hit the upper branches of a 14 metre tree prior to impact, but that the impact with the branches was not big enough to have significantly affected the flight of the aircraft. This suggested that the aircraft may not have been under control in the final stages of the flight. Inspection found that the helicopter had a broken engine cooling drive belt, which suggests that there had perhaps been a mechanical failure, but because of the state of the wreckage it was not possible to determine whether the incident occurred because of mechanical failure, pilot error or some other cause. Dead cattle in the immediate area indicated that the culling had been continuing immediately prior to the incident occurring.

Agent and Mechanism of Fatal Incident

The most common agents involved in working incidents related to meat cattle farms were aircraft (16: 20.8%) and tractors (13: 16.9%). Five (38.5%) of the bystander fatalities involved vehicles and four (30.8%) bystanders drowned in a dam, tank or other farm structure (Table 2.75).

Table 2.75 Agent of fatal incident by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	1	1	2	2.2
Utility	1	1	2	2.2
Car	3	-	3	3.3
Trailer	-	1	1	1.1
Motorcycle 2 Wheel	6	2	8	8.9
Motorcycle 3 Wheel	1	-	1	1.1
Aircraft	16	-	16	17.8
Total Farm Vehicles	**28**	**5**	**33**	**36.7**
Mobile Farm Machinery and Plant				
Tractor	13	2	15	16.7
Earth Moving Equipment	1	-	1	1.1
Total Mobile Farm Machinery and Plant	**14**	**2**	**16**	**17.8**
Fixed Plant and Equipment				
Pump	2	-	2	2.2
Other Fixed Farm Equipment NEC	1	-	1	1.1
Total Fixed Plant and Equipment	**3**	**-**	**3**	**3.3**
Other Equipment and Materials				
Knife	1	-	1	1.1
Gun, Rifle, Shotgun	3	1	4	4.4
Total Other Equipment and Materials	**4**	**1**	**5**	**5.6**
Materials				
Timber	1	-	1	1.1
Total Materials	**1**	**-**	**1**	**1.1**
Farm Structures				
Tank	-	1	1	1.1
Dam	2	2	4	4.4
Windmill	1	-	1	1.1
Creek, River	5	-	5	5.6
Embankment	2	-	2	2.2
Powerlines	1	-	1	1.1
Other Farm Structure NEC	1	1	2	2.2
Total Farm Structures	**12**	**4**	**16**	**17.8**
Animals				
Horse	7	1	8	8.9
Cattle	2	-	2	2.2
Total Animals	**9**	**1**	**10**	**11.1**
Working Environment				
Fire or Smoke	2	-	2	2.2
Ground, Rock, Stump	1	-	1	1.1
Trees Being Felled	3	-	3	3.3
Total Working Environment	**6**	**-**	**6**	**6.7**
Total	**77**	**13**	**90**	**100.0**

Vehicle accidents (26: 33.8%), rollovers of mobile machinery (usually tractors) (8: 10.4%), being hit by moving objects (7: 9.1%) and drowning (7: 9.1%) were the most common

mechanisms of the fatal incident for workers on meat cattle farms. Bystanders were commonly involved in vehicle accidents (4: 30.78%) or drowned (4: 30.8%) (Table 2.76).

Table 2.76 Mechanism of fatal incident by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	5	2	7	7.8
Hitting Stationary Objects	2	-	2	2.2
Being Hit by Falling Objects	4	-	4	4.4
Being Hit by an Animal	5	-	5	5.6
Being Trapped Between Stationary and Moving Objects	2	-	2	2.2
Being Hit by Moving Objects	7	1	8	8.9
Contact with Flames or Heat	2	-	2	2.2
Contact with Electricity	2	-	2	2.2
Drowning	7	4	11	12.2
Shot by Firearm	3	1	4	4.4
Stabbed by Knife	1	-	1	1.1
Slide or Cave-In	2	-	2	2.2
Vehicle Accident	26	4	30	33.3
Rollover	8	1	9	10.0
Mechanism Not Known	1	-	1	1.1
Total	**77**	**13**	**90**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were transport for work purposes (31: 40.3%) and working with animals (17: 22.1%). Of the 13 bystander fatalities, the two most common activities at the time of the incidents were transport for recreation (6: 46.2%) and recreation or playing (4: 30.8%) (Table 2.77).

For the working group on meat cattle properties, fatalities that occurred while undertaking the activity, transport for work purposes, involved several types of vehicles – aircraft (including helicopters) (8: 25.8%), motorcycles (8: 25.8%), tractors (7: 22.6%), cars (including utilities) (5: 16.1%), ultralight aircraft (2: 6.5%) and trucks (1: 3.2%).

Table 2.77 Activity at time of fatal incident by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	31	1	32	35.6
Transport for Recreation	-	6	6	6.7
Constructing or Installing	2	-	2	2.2
Maintenance	7	-	7	7.8
Earthmoving or Digging	1	-	1	1.1
Slaughtering, Gutting or Shelling	1	-	1	1.1
Felling Trees or Clearing Land	5	-	5	5.6
Hunting	2	1	3	3.3
Working with Animals	17	-	17	18.9
Working with Crops	1	-	1	1.1
Monitoring, Observing, Inspecting	5	-	5	5.6
Moving Goods	1	-	1	1.1
Rescuing	1	-	1	1.1
Recreation or Playing	1	4	5	5.6
Not Known / Not Stated	2	1	3	3.3
Total	**77**	**13**	**90**	**100.0**

ATTACKED BY BULL

A farmer was attempting to put cattle in a yard, in readiness for them to be transported to market, when he was attacked by a bull, causing severe injuries. The bull had been identified by the farmer and co-workers as dangerous and had jumped a fence apparently wanting to get back into the paddock with the other cattle. The incident occurred after the farmer climbed a fence and struck the bull across the head with a length of timber. The bull then trotted out into the paddock with the farmer chasing it on foot. The farmer caught the bull and ran around in front of it to turn the bull around and back into the cattle yards. The bull did not turn around, instead charging the farmer.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death of workers fatally injured in incidents related to meat cattle farms was head injuries (21: 27.3%). Other of the more common causes of deaths for workers were multiple injuries (17: 22.1%), chest injuries (10: 13.0%) and drowning (7: 9.1%). For bystanders, drowning and head injuries (4: 30.8%) were the most common pathophysiological cause of death (Table 2.78).

Table 2.78 Pathophysiological cause of death by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	21	4	25	27.8
Neck Injuries	3	1	4	4.4
Chest Injuries	10	1	11	12.2
Trunk Injuries	1	-	1	1.1
Abdominal Injuries	2	-	2	2.2
Limb Injuries	1	-	1	1.1
Multiple Injuries to Head and Other Body Parts	6	-	6	6.7
Multiple Injuries - Other	11	-	11	12.2
Drowning	7	4	11	12.2
Crush Asphyxia	5	2	7	7.8
Electrocution	2	-	2	2.2
Burns	1	-	1	1.1
Inhalation of a Chemical Substance	1	-	1	1.1
Suffocation	2	-	2	2.2
Fat Embolism Crush Injury Syndrome	1	-	1	1.1
Medical Complications	3	1	4	4.4
Total	**77**	**13**	**90**	**100.0**

Blood alcohol readings were available for just under half (37: 48.1%) of the fatally injured workers and four (30.8%) of the bystanders. Of those with available blood alcohol readings, four (10.8%) of the workers and three (75.0%) of the bystanders had a blood alcohol level greater than 0.05g/100ml.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the number of fatal incidents on meat cattle farms. However, April (11: 12.2%), and May, July and December (each with 10: 11.1%) were the most common months that the fatal incident occurred (Table 2.79).

Table 2.79 Month of incident per year, meat cattle, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	2	4	-	-	6	6.7
February	3	3	-	1	7	7.8
March	1	3	2	3	9	10.0
April	-	3	6	2	11	12.2
May	-	5	4	1	10	11.1
June	2	1	1	3	7	7.8
July	4	3	2	1	10	11.1
August	-	2	2	1	5	5.6
September	3	1	1	-	5	5.6
October	3	-	2	-	5	5.6
November	1	1	1	2	5	5.6
December	3	1	3	3	10	11.1
Total	**22**	**27**	**24**	**17**	**90**	**100.0**

For workers on meat cattle farms, Monday (16: 20.8%), Thursday (12: 15.6%), Sunday (12: 15.6%) and Wednesday (11: 14.3%) were the most common days of the week that the fatal incident occurred. Bystanders were commonly fatally injured on Saturday (4: 30.8%) and had more fatalities per day on the weekend than during the week (Table 2.80).

Table 2.80 Day of incident by work status, meat cattle, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	12	2	14	15.6
Monday	16	2	18	20.0
Tuesday	8	2	10	11.1
Wednesday	11	1	12	13.3
Thursday	12	1	13	14.4
Friday	8	-	8	8.9
Saturday	7	4	11	12.2
Not Known	3	1	4	4.4
Total	**77**	**13**	**90**	**100.0**

Visitor to the Farm

Of the 90 fatalities where the commodity was meat cattle, 29 (32.2%) of the persons were visitors, 58 (64.4%) were residents and for three (3.3%) persons their visitor status was not relevant. For people working, 22 (28.6%) were visitors, 52 (67.5%) were residents and for three (3.9%) workers their visitor status was not relevant. For bystanders, there were seven (53.8%) visitors and six (46.2%) residents.

DAIRY

Between 1989 and 1992, there were 19 fatalities on Australian dairy farms. This is an average of approximately five fatalities per year. Of the 19 fatalities on dairy farms, ten (52.6%) were of persons working at the time of the incident and nine (47.4%) were of bystanders (Table 2.81).

Table 2.81 Number of fatalities per year by work status, dairy, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	4	1	5	26.3
1990	1	2	3	15.8
1991	2	4	6	31.6
1992	3	2	5	26.3
Total	**10**	**9**	**19**	**100.0**

Gender and Age

The highest number of fatally injured workers was in the 15-24 year age range, though workers from eight to 73 years were involved. All of the bystanders were young, with five (55.6%) less than five years and all less than 15 years (Table 2.82). All but one of the workers, and five (55.6%) of the bystanders, were male.

Table 2.82 Age group by work status, dairy, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	5	5	26.3
5 - 14	2	4	6	31.6
15 - 24	3	-	3	15.8
25 - 34	1	-	1	5.3
35 - 44	2	-	2	10.5
45 - 54	1	-	1	5.3
65 - 74	1	-	1	5.3
Total	**10**	**9**	**19**	**100.0**

State or Territory of Fatal Incident

Victoria (10: 52.6%) and New South Wales (5: 26.3%) were the two states with the largest number of total fatalities and working fatalities related to dairy farms. Six (66.7%) of the nine bystander fatalities occurred in Victoria (Table 2.83).

Table 2.83 State or Territory of incident by work status, dairy, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	1	1	2	10.5
NSW	4	1	5	26.3
VIC	4	6	10	52.6
SA	1	1	2	10.5
Total	**10**	**9**	**19**	**100.0**

Location of Fatal Incident

Paddocks (7: 36.9%), mostly clear for grazing, and dams or other water sources (4: 21.1%) were the most common locations of fatal incidents related to dairy farms. This was the case for both working and bystander fatalities, except that more working incidents occurred on roads and lanes than in dams or other water sources (Table 2.84).

Table 2.84 Location on farm by work status, dairy, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	1	-	1	5.3
Paddock Clear for Grazing	3	3	6	31.6
Workshop	1	-	1	5.3
Roads, Lanes	2	1	3	15.8
Dam, Water Reservoir, Irrigation Channel	1	3	4	21.1
Shed, Farm Building NEC	-	1	1	5.3
Dairy	1	1	2	10.5
Farm Excluding Residence NEC	1	-	1	5.3
Total	**10**	**9**	**19**	**100.0**

Agent and Mechanism of Fatal Incident

There were no common agents involved in working incidents related to dairy farms. Trailers and dams (each with three: 33.3%) were the most common agents involved in bystander incidents (Table 2.85).

Table 2.85 Agent of fatal incident by work status, dairy, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	1	-	1	5.3
Utility	1	-	1	5.3
Motorcycle 4 Wheel	1	-	1	5.3
Trailer	-	3	3	15.8
Total Farm Vehicles	**3**	**3**	**6**	**31.6**
Mobile Farm Machinery and Plant				
Fertiliser Spreader	1	-	1	5.3
Other Mobile Farm Machinery and Plant NEC	-	1	1	5.3
Total Mobile Farm Machinery and Plant	**1**	**1**	**2**	**10.5**
Fixed Plant and Equipment				
Other Fixed Plant and Equipment NEC	1	-	1	5.3
Total Fixed Plant and Equipment	**1**	**-**	**1**	**5.3**
Materials				
Laden Bag	1	-	1	5.3
Total Materials	**1**	**-**	**1**	**5.3**
Farm Structures				
Dam	1	3	4	21.1
Irrigation Channel	-	1	1	5.3
Other Farm Structures NEC	2	1	3	15.8
Total Farm Structures	**3**	**5**	**8**	**42.1**
Working Environment				
Other Working Environment NEC	1	-	1	5.3
Total Working Environment	**1**	**-**	**1**	**5.3**
Total	**10**	**9**	**19**	**100.0**

Being hit by falling objects (2: 20.0%), drowning (either in a dam or other farm structure) (2: 20.0%) or vehicle accidents (a utility and a four wheel motorcycle) (2: 20.0%) were the most common mechanisms of the fatal incident for workers. Drowning, either in dams (3: 33.3%) or in an irrigation channel (1: 11.1%), was the most common mechanism of the fatal incident for bystanders (Table 2.86)

Table 2.86 Mechanism of fatal incident by work status, dairy, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	-	1	1	5.3
Being Hit by Falling Objects	2	-	2	10.5
Being Trapped Between Stationary and Moving Objects	-	1	1	5.3
Being Trapped by Moving Machinery	1	-	1	5.3
Being Hit by Moving Objects	1	1	2	10.5
Exposure to Environmental Cold	1	-	1	5.3
Contact with Electricity	-	1	1	5.3
Drowning	2	4	6	31.6
Vehicle Accident	2	-	2	10.5
Mechanism Not Known	1	1	2	10.5
Total	**10**	**9**	**19**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incident were moving goods (3: 30.0%), transport for work purposes (2: 20.0%) and working with animals (2: 20.0%). Of the nine bystander fatalities, eight (88.9%) were engaged in recreation or play (Table 2.87).

Table 2.87 Activity at time of fatal incident by work status, dairy, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	2	-	2	10.5
Transport for Recreation	-	1	1	5.3
Constructing or Installing	1	-	1	5.3
Working with Animals	2	-	2	10.5
Working with Crops	1	-	1	5.3
Moving Goods	3	-	3	15.8
Recreation or Playing	-	8	8	42.1
Not Known / Not Stated	1	-	1	5.3
Total	**10**	**9**	**19**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death of persons fatally injured in incidents related to dairy farms were drowning (6: 31.6%) and head injuries (5: 26.3%). This was the case for both workers (both 2: 20.0%) and bystanders (drowning 4: 44.4%; head injuries 3: 33.3%) (Table 2.88).

Table 2.88 Pathophysiological cause of death by work status, dairy, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	2	3	5	26.3
Chest Injuries	1	1	2	10.5
Limb Injuries	1	-	1	5.3
Drowning	2	4	6	31.6
Crush Asphyxia	1	-	1	5.3
Electrocution	-	1	1	5.3
Hypothermia	1	-	1	5.3
Not Known	1	-	1	5.3
Medical Complications	1	-	1	5.3
Total	**10**	**9**	**19**	**100.0**

Blood alcohol readings were available for half of the workers and all had a zero blood alcohol level. None of the bystanders had available blood alcohol readings.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the occurrence of fatalities related to dairy farms. However, June (4: 21.1%) and January, March, May, September and December (each with 2: 10.5%) were the most common months that the fatal incident occurred (Table 2.89).

Table 2.89 Month of incident per year, dairy, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	1	-	1	2	10.5
February	-	-	1	-	1	5.3
March	-	1	-	1	2	10.5
May	1	1	-	-	2	10.5
June	1	-	1	2	4	21.1
July	-	-	-	1	1	5.3
August	1	-	-	-	1	5.3
September	-	-	2	-	2	10.5
October	1	-	-	-	1	5.3
November	-	-	1	-	1	5.3
December	1	-	1	-	2	10.5
Total	**5**	**3**	**6**	**5**	**19**	**100.0**

There was no consistent daily variation in the number of fatal incidents on dairy farms. However, the most common days of the week for fatalities on dairy farms to occur were Tuesday (5: 26.3%) and Thursday (3: 15.8%) (Table 2.90).

Table 2.90 Day of incident by work status, dairy, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	1	1	2	10.5
Monday	1	-	1	5.3
Tuesday	3	2	5	26.3
Wednesday	-	1	1	5.3
Thursday	3	-	3	15.8
Friday	1	1	2	10.5
Saturday	1	4	5	26.3
Total	**10**	**9**	**19**	**100.0**

CRUSHED WHILE MOVING EQUIPMENT

A dairy worker was helping a co-worker to move a pasteurising machine into a workshop on a dairy. The co-worker was driving a forklift, with one of the forks under the pasteurising machine, pushing the machine into the shed, whilst the worker stood at the side guiding the machine into the shed. One of the legs on the machine dug into the ground, causing the machine to fall off the forklift. The machine fell towards the worker, striking him on the head. Following the fatal incident, appropriate handling gear (a jib attachment) was fitted to the forklift for future movement of equipment.

Visitor to the Farm

Of the 19 fatalities where the commodity was dairy, three (15.8%) were of visitors, 15 (78.9%) were of residents and for one (5.3%) person their visitor status was not known. For people working, two (20.0%) were visitors, seven (70.0%) were residents and for one (10.0%) worker their visitor status was not known. For bystanders, there was one (11.1%) visitor and eight (88.9%) residents.

SUGAR CANE

Between 1989 and 1992, there were 12 fatalities on Australian sugar cane farms. This is an average of three fatalities per year. Of the 12 fatalities on sugar cane farms, eleven (91.7%) were of persons working at the time of the incident and one (8.3%) was of a bystander (Table 2.91).

Table 2.91 Number of fatalities per year by work status, sugar cane, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	3	-	3	25.0
1990	2	1	3	25.0
1991	2	-	2	16.7
1992	4	-	4	33.3
Total	**11**	**1**	**12**	**100.0**

Gender and Age

Workers were fairly evenly distributed between age groups from 15 to 64 years, with workers from 18 to 61 years being involved (Table 2.92). Most of the workers (10: 90.9%) were male. The one bystander involved was a 17 year old male.

Table 2.92 Age group by work status, sugar cane, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
15 - 24	2	1	3	25.0
25 - 34	2	-	2	16.7
35 - 44	1	-	1	8.3
45 - 54	3	-	3	25.0
55 - 64	3	-	3	25.0
Total	**11**	**1**	**12**	**100.0**

State or Territory of Fatal Incident

All of the fatal incidents occurred in Queensland.

Location of Fatal Incident

Paddocks (4: 33.3%), all under crop, and roads and lanes (4: 33.3%) were the most common locations of working fatal incidents related to sugar cane farms. The fatality of the bystander occurred on a road or lane (Table 2.93).

Table 2.93 Location on farm by work status, sugar cane, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	4	-	4	33.3
Natural Vegetation	1	-	1	8.3
Roads, Lanes	4	1	5	41.7
Machinery Shed	1	-	1	8.3
Farm House	1	-	1	8.3
Total	**11**	**1**	**12**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agent involved in working incidents related to sugar cane farms was a tractor, and all such incidents were due to rollovers (5: 45.5%). The bystander fatality occurred due to a vehicle accident involving a two-wheel motorcycle (Table 2.94).

Table 2.94 Agent of fatal incident by work status, sugar cane, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	1	-	1	8.3
Motorcycle 2 Wheel	-	1	1	8.3
Motorcycle 3 Wheel	1	-	1	8.3
Total Farm Vehicles	**2**	**1**	**3**	**25.0**
Mobile Farm Machinery and Plant				
Tractor	5	-	5	41.7
Tillage Seeder	1	-	1	8.3
Slasher	1	-	1	8.3
Total Mobile Farm Machinery and Plant	**7**	**-**	**7**	**58.3**
Materials				
Steel	1	-	1	8.3
Total Materials	**1**	**-**	**1**	**8.3**
Farm Structures				
Powerlines	1	-	1	8.3
Total Farm Structures	**1**	**-**	**1**	**8.3**
Total	**11**	**1**	**12**	**100.0**

Rollovers of mobile machinery (mainly tractors) (5: 41.7%) and falls from a height (2: 16.7%) were the most common mechanisms of the fatal incident for workers (Table 2.95).

Table 2.95 Mechanism of fatal incident by work status, sugar cane, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	2	-	2	16.7
Being Hit by Falling Objects	1	-	1	8.3
Being Hit by Moving Objects	1	-	1	8.3
Contact with Electricity	1	-	1	8.3
Vehicle Accident	1	1	2	16.7
Rollover	5	-	5	41.7
Total	**11**	**1**	**12**	**100.0**

Activity at Time of Fatal Incident

The most common activities of workers at the time of the fatal incidents were working with crops (3: 27.3%), transport for work purposes, maintenance activities, and monitoring, observing or inspecting (each with 2: 18.2%) (Table 2.96). The bystander was fatally injured while engaged in transport.

Table 2.96 Activity at time of fatal incident by work status, sugar cane, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	2	-	2	18.2
Transport for Recreation	-	1	1	9.1
Maintenance	2	-	2	18.2
Earthmoving or Digging	1	-	1	9.1
Felling Trees or Clearing Land	1	-	1	9.1
Working with Crops	3	-	3	27.3
Monitoring, Observing, Inspecting	2	-	2	18.2
Total	**11**	**1**	**12**	**100.0**

HYDRAULIC FAILURE

A cane farmer was working alone, replacing the blades on a slasher that was connected to a tractor. The slasher was supported by the tractor hydraulics and also by a trestle. The hydraulic supports on the tractor slowly crept down, putting more stress on the trestle, which eventually slipped, allowing the slasher to fall onto the farmer's chest, pinning him to the ground. It appears the hydraulics on the tractor were not working properly and were shown later to creep nine centimetres in one minute. This problem was apparently known by the farmer.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death of workers fatally injured in incidents related to sugar cane farms were crush asphyxia (4: 36.4%) and head injuries (2: 18.2%). The pathophysiological cause of death for the bystander was abdominal injuries (Table 2.97).

Table 2.97 Pathophysiological cause of death by work status, sugar cane, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	2	-	2	16.7
Chest Injuries	1	-	1	8.3
Trunk Injuries	1	-	1	8.3
Abdominal Injuries	-	1	1	8.3
Multiple Injuries to Head and Other Body Parts	1	-	1	8.3
Multiple Injuries - Other	1	-	1	8.3
Crush Asphyxia	4	-	4	33.3
Electrocution	1	-	1	8.3
Total	**11**	**1**	**12**	**100.0**

Blood alcohol readings were available for four (36.4%) of the fatally injured workers, one of whom had a reading greater than 0.05g/100ml. The bystander had a zero blood alcohol reading.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the occurrence of fatalities related to sugar cane farms. However, March (3: 27.3%), and October and November (each with 2: 18.2%) were the most common months that the fatal incident occurred (Table 2.98).

Table 2.98 Month of incident per year, sugar cane, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	1	-	-	1	8.3
February	-	-	1	-	1	8.3
March	-	1	1	1	3	25.0
June	-	-	-	1	1	8.3
August	1	-	-	-	1	8.3
September	1	-	-	-	1	8.3
October	1	-	-	1	2	16.7
November	-	1	-	1	2	16.7
Total	**3**	**3**	**2**	**4**	**12**	**100.0**

There was no consistent daily variation in the number of fatal incidents on sugar cane farms. However, the most common days of the week for farm fatalities on sugar cane farms were Saturday (4: 33.3%) and Tuesday (3: 25.0%) (Table 2.99).

Table 2.99 Day of incident by work status, sugar cane, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	2	-	2	16.7
Monday	1	-	1	8.3
Tuesday	3	-	3	25.0
Friday	2	-	2	16.7
Saturday	3	1	4	33.3
Total	**11**	**1**	**12**	**100.0**

Visitor to the Farm

Of the 12 fatalities where the commodity was sugar cane, three (25%) were of visitors, seven (58.3%) were of residents and for two (16.7%) persons their visitor status was not known or not relevant. For people working, three (27.3%) were visitors, seven (63.6%) were residents and for one (9.1%) worker their visitor status was not relevant. For the one bystander their visitor status was not known.

SUMMARY SECTION 2

For working and bystander work status, the commodity groups examined were: orchard and other fruit, vegetables including potatoes, cereal grains, sheep-cereal grains, meat cattle-cereal grains, sheep-meat cattle, sheep, meat cattle, dairy and sugar cane.

Orchard and Other Fruit

- There were 20 fatalities on orchard and other fruit farms between 1989 and 1992. Half of these were of workers.
- The most common states or territory where the fatal incident on orchard and other fruit farms occurred were New South Wales and Victoria.
- The most common locations of the fatal incident on orchard and other fruit farms for workers and bystanders were paddocks. Dams were also common locations for bystanders.
- The most common agents and mechanisms of the fatal incident on orchard and other fruit farms for workers were being hit by a tractor or fatally injured in a tractor rollover, falling from a ladder and being shot by a firearm. For bystanders, the most common agents and mechanisms were drowning in dams or irrigation channels.
- Common activities of workers on orchard and other fruit farms were working with crops and maintenance activities. For bystanders, recreation or playing was the most common activity.
- The majority of people fatally injured on orchard and other fruit farms were residents of the farm.

Vegetables Including Potatoes

- There were 21 fatalities between 1989 and 1992 on Australian vegetable including potato farms. The majority of these were of workers. All of the bystanders were under the age of five years.
- The most common states or territory were the fatal incident occurred on vegetable including potato farms were Queensland and New South Wales.
- The most common locations of the fatal incident on vegetable including potato farms were paddocks, either under crop or clear for grazing.
- The most common agents and mechanisms of the fatal incident on vegetable including potato farms for workers were being hit by a tractor, or a farm vehicle; and contact with electricity, through contacting overhead powerlines.
- The most common activities performed at the time of the fatal incident on vegetable including potato farms for workers were moving goods, transport for work purposes, maintenance activities and working with crops.
- The majority of people fatally injured on vegetable including potato farms were residents of the farm.

Cereal Grains

- There were 22 fatalities on cereal grain farms between 1989 and 1992. All except one of the fatalities were of workers.
- The most common state or territory of the fatal incident on cereal grain farms was New South Wales.
- The most common location of the fatal incident on cereal grain farms was paddock under crop.
- The most common agents and mechanisms of the fatal incident on cereal grain farms for workers were aircraft crashes; contract with electricity, through overhead powerlines; and being trapped by moving machinery, such as grain augers.
- The most common activities performed by workers at the time of the fatal incident on cereal grain farms were working with crops, transport for work purposes and maintenance activities.
- The majority of people fatally injured on cereal grain farmers were residents of the farm.

Sheep-Cereal Grains

- There were eleven fatalities on sheep-cereal grain farms between 1989 and 1992. All but one of the fatalities were of persons working at the time of the fatal incident.
- The state or territory with the highest number of fatal incidents on sheep-cereal grain farms was Western Australia.
- The most common locations of the fatal incident on sheep-cereal grain farms were paddocks under crop and areas of natural vegetation.
- For fatalities on sheep-cereal grain farms, each fatal incident had a different mechanism and agent involved.
- The most common activities performed by workers at the time of the fatal incident on sheep-cereal grain farms were working with crops, transport for work purposes and moving goods.
- The majority of people fatally injured on sheep-cereal grain farms were residents.

Meat Cattle-Cereal Grains

- There were 12 fatalities on meat cattle-cereal grain farms between 1989 and 1992. All of the fatalities were of workers.
- The states or territory with the highest number of fatal incidents on meat cattle-cereal grain farms were Queensland and Victoria.
- The most common locations of the fatal incident on meat cattle-cereal grain farms were roads and lanes; and paddocks.
- The most common agent of the fatal incident for workers on meat cattle-cereal grain farms was being shot by a firearm. Falls from a height (from a horse, from a hay bale and down an embankment/ravine) was the most common mechanism of the fatal incident on meat cattle-cereal grain farms.

- The most common activity performed at the time of the fatal incident on meat cattle-cereal grain farms for workers was working with animals.
- The majority of the fatalities on meat cattle-cereal grain farms were of people who were residents of the farm.

Sheep-Meat Cattle

- There were 22 fatalities between 1989 and 1992 on sheep-meat cattle farms. The majority of fatalities were of workers.
- The states or territory with the highest number of fatal incidents on sheep-meat cattle farms were New South Wales and Queensland.
- The most common location of the fatal incident for workers were paddocks, either under crop or clear for grazing on sheep-meat cattle farms. For bystanders, roads and lanes; and a dam were the locations of the fatal incident
- The most common agents and mechanisms of the fatal incident on sheep-meat cattle farms for workers were aircraft crashes; rollovers of tractors; and being hit by tractors.
- The most common activities being performed at the time of the fatal incident on sheep-meat cattle farms for workers were working with crops and transport for work purposes.
- The majority of people fatally injured on sheep-meat cattle were residents of the farm.

Sheep

- There were 41 fatalities on sheep farms between 1989 and 1992. The majority of fatalities were of workers and just under one-third of the total fatalities on sheep farms were of bystanders.
- The majority of the fatal incidents on sheep farms occurred in New South Wales and Victoria.
- The most common locations of the fatal incident on sheep farms for workers were roads and lanes; and paddocks clear for grazing. Paddocks clear for grazing was also the most common location of the fatal incidents involving bystanders.
- Common agents and mechanisms of the fatal incident on sheep farms for working fatalities were vehicle accidents involving two-wheel motorcycles, aircraft crashes, and being hit by tractors. Bystander fatalities commonly involved vehicle accidents in utilities and either being hit by, or involved in a vehicle accident with, a two-wheel motorcycle.
- The activities that workers on sheep farms were commonly engaged in at the time of the fatal incident on sheep farms were transport for work purposes, working with animals, or maintenance. Bystanders were commonly involved in recreation or playing activities at the time of the fatal incident.
- The majority of people fatally injured on sheep farms were residents of the farm.

Meat Cattle

- There were 90 fatalities on meat cattle farms between 1989 and 1992. The majority of fatalities were of workers.
- The states and territory with the largest number of fatal incidents on meat cattle farms were Queensland and New South Wales.
- The common locations of the fatal incident on meat cattle farms for workers and bystanders were paddocks clear for grazing; roads and lanes; and areas of natural vegetation.
- Common agents and mechanisms of the fatal incident on meat cattle farms for workers were aircraft crashes and tractor rollovers. Bystanders were commonly fatally injured in vehicle accidents or drowned in dams or other water storage areas.
- The most common activities performed on meat cattle farms by workers at the time of the fatal incident were transport for work purposes and working with animals. Bystanders were commonly involved in transport for recreation or recreation and playing activities at the time of the fatal incident.
- The majority of people fatally injured on meat cattle farms were residents of the farm, with a third of the fatalities being of visitors to the farm.

Dairy

- There were 19 fatalities on dairy farms between 1989 and 1992. There were almost equal number of workers and bystanders fatally injured.
- The state or territory with the largest number of fatal incidents on dairy farms was Victoria.
- The most common location of the fatal incident involving workers and bystanders on dairy farms was paddocks clear for grazing. Dams, water reservoirs and irrigation channels was also a common location of the fatal incident for bystanders.
- Each fatal incident on dairy farms had a different agent involved for working deaths. The more common mechanisms of working deaths were being hit by falling objects, drowning and vehicle accidents. Bystanders commonly drowned in dams or other water storage areas.
- The most common activity at the time of the fatal incident on dairy farms for workers was moving goods, and almost all of the bystanders were engaged in recreation or playing activities.
- The majority of people fatally injured on dairy farms were residents of the farm.

Sugar Cane

- There were 12 fatalities on sugar cane farms between 1989 and 1992. The majority of fatalities were of workers.
- All of the fatal incidents on sugar cane farms occurred in Queensland.

- The most common location of the fatal incident on sugar cane farms for workers were paddocks under crop; and roads and lanes.
- The most common agent and mechanism of the fatal incident on sugar cane farms were tractor rollovers.
- The most common activity on sugar cane farms performed by workers at the time of the fatal incident was working with crops.
- The majority of people fatally injured on sugar cane farms were residents of the farm, although a quarter were visitors to the farm.

Section 3: Farm Fatalities in the States and the Northern Territory

Unintentional farm-related fatalities in each of the states and the Northern Territory are examined in detail in this Section for both working and bystander deaths. There were no deaths in the Australian Capital Territory that were agricultural-related or occurred on farms between 1989 and 1992.

Between 1989 and 1992, there were 216 fatalities of farmers, with a rate of 20.6 per 100,000 per year. There were 74 deaths of farm hands during this period, with a rate of 18.1 per 100,000 farm hands per year. The rate for each of the states for farmers varied between 13.9 for Victoria to 39.8 per 100,000 per year for Tasmania. The rate for farm hands varied from 3.3 for Western Australia to 24.1 per 100,000 per year for Queensland. It was not possible to calculate rates for Tasmania, South Australia and Western Australia due to the low number of deaths.

For 1989 to 1992, the rates for all farm workers by state and territory varied between 12.1 for Victoria to 35.4 per 100,000 per year in the Northern Territory (Table 3.1a).

Table 3.1a Rate of fatalities[a] by state or territory for farmers, farm hands and all farm workers, farm-related fatalities, Australia, 1989-1992

State or	Farmer		Farm Hand		All Farm Workers	
Territory	n	Rate per 100,000 workers[b]	n	Rate per 100,000 workers[c]	n	Rate per 100,000 workers[d]
QLD	59	28.7	23	24.1	95	28.7
NSW	68	25.1	26	20.3	105	23.5
VIC	39	13.9	11	14.4	48	12.1
TAS	12	39.8	4	*	16	30.6
SA	22	19.5	4	*	30	17.4
WA	16	16.6	5	3.3	26	16.0
NT	-	-	1	*	5	35.4
AUSTRALIA	216	20.6	74	18.1	325	20.6

[a] Due to the low number of fatalities in some of the states and the Northern Territory there may be some problems with the stability of this rate. Includes agricultural workers who were intentionally fatally injured.
[b] Incidence rates - deaths per 100,000 farmers per year in agriculture industry
[c] Incidence rates - deaths per 100,000 farm hands per year in agriculture industry
[d] Incidence rates - deaths per 100,000 farm workers per year in agriculture industry
* No rate calculated due to the low number of deaths

The rate for Australia for farm related fatalities by establishments has been calculated for 1989 to 1992 based on the number of establishments in 1991. This was because there was a change in the collection of establishments by the ABS over the study period and 1991 was felt to most accurately reflect the true number of establishments in Australia during this period. The change involved the cut-off for the Estimated Value of Agricultural Output (EVAO) changing from $20,000 during 1989 and 1990 to $5,000 during 1991 and 1992.

During 1989 to 1992, the rate by establishment varied between 5.9 for South Australia to 82.8 per 10,000 establishments per year for the Northern Territory. The rate for Australia was 9.8 per 10,000 establishments per year (Table 3.1b).

Table 3.1b Rate of fatalities [a] by state or territory by establishments, farm-related fatalities, Australia, 1991-1992

State or Territory	n	Number of Establishments [b]	Rate per 10,000 Establishments
QLD	151	33,181	11.4
NSW	193	44,443	10.9
VIC	125	39,170	8.0
TAS	30	4,884	15.4
SA	41	17,511	5.9
WA	57	14,790	9.6
NT	10	302	82.8
AUSTRALIA	607	154,380	9.8

[a] Due to the low number of fatalities in some of the states and the Northern Territory there may be some problems with the stability of this rate. Includes agricultural workers who were intentionally fatally injured.
[b] Rates based on the 1991 agricultural census.

QUEENSLAND

Between 1989 and 1992, there were 138 farm-related fatalities in Queensland. This is an average of 34 fatalities per year. Of the 138 fatalities in Queensland, 109 (80.1%) were of persons working at the time of the incident and 27 (19.9%) were of bystanders (Table 3.2).

Of the 109 people working, 59 (54.1%) were farmers who were employed in the agricultural industry. This was a rate for farmers of 28.7 per 100,000 per year. There were also 23 (21.1%) farm hands and assistants who were employed in the agricultural industry and fatality injured at work. This was a rate for farm hands and assistants of 24.1 per 100,000 per year.

Table 3.2 Number of fatalities per year by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	28	7	35	25.4
1990	29	5	34	24.6
1991	27	8	35	25.4
1992	25	9	34	24.6
Total	**109**	**29**	**138**	**100.0**

Gender and Age

The age of people who were fatally injured is displayed in Table 3.3. Of the 138 fatalities, 25 (18.1%) were of children less than 15 years. The age group with the highest number of fatalities was the 45-54 age group, with 29 (21.0%) fatalities. For working fatalities, there were two workers under the age of 15 years fatally injured and the age group with the highest number of fatalities was the 45-54 year age group (28: 25.7%). All of the bystander fatalities were of people aged less than 35 years of age, with 17 (58.6%) of the bystanders aged less than five years.

Table 3.3 Age group by work status, Queensland, farm-related fatalities, Australia 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	17	17	12.3
5 - 14	2	6	8	5.8
15 - 24	17	4	21	15.2
25 - 34	17	-	17	12.3
35 - 44	17	-	17	12.3
45 - 54	28	1	29	21.0
55 - 64	14	1	15	7.2
65 - 74	10	-	10	7.2
75+	4	-	4	2.9
Total	**109**	**29**	**138**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 123 (89.1%) incidents. The meat cattle (35: 25.4%), cereal grains, sheep, cattle and pigs (15: 10.9%) and sugar cane (12: 8.7%) enterprises had the highest number of fatal incidents. For working fatalities, meat cattle (28: 25.7%), cereal grains, sheep, cattle and pigs (13: 11.9%) and sugar cane (11: 10.1%) enterprises had the highest number of fatal incidents. For bystander fatalities, meat cattle (7: 24.1%) and orchard and other fruit (4: 13.8%) enterprises had the highest number of fatal incidents (Table 3.4).

Table 3.4 Farm enterprise by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Total	%
Agriculture	**98**	**27**	**125**	**90.6**
Poultry	*1*	*1*	*2*	*1.4*
Fruit	*1*	*-*	*1*	*0.7*
Plantation Fruit	*1*	*1*	*2*	*1.4*
Orchard and Other Fruit	*-*	*4*	*4*	*2.9*
Vegetables Including Potatoes	*8*	*1*	*9*	*6.5*
Cereal Grains, Sheep, Cattle, Pigs	*13*	*2*	*15*	*10.9*
Cereal Grains	*5*	*-*	*5*	*3.6*
Meat Cattle, Cereal Grains	*4*	*-*	*4*	*2.9*
Sheep, Meat Cattle	*4*	*2*	*6*	*4.3*
Sheep	*3*	*-*	*3*	*2.2*
Meat Cattle	*28*	*7*	*35*	*25.4*
Dairy	*1*	*1*	*2*	*1.4*
Pigs	*1*	*1*	*2*	*1.4*
Sugar Cane	*11*	*1*	*12*	*8.7*
Cotton	*1*	*-*	*1*	*0.7*
Nurseries	*1*	*-*	*1*	*0.7*
Agriculture NEC	*3*	*-*	*3*	*2.2*
Aerial Agriculture Services	*2*	*-*	*2*	*1.4*
Services to Agriculture NEC	*1*	*-*	*1*	*0.7*
Agriculture Not Known	*9*	*6*	*15*	*10.9*
Other	**11**	**2**	**13**	**9.4**
Total	**109**	**29**	**138**	**100.0**

Location of Fatal Incident

The most common locations where people were fatally injured were roads and lanes (25: 18.4%); paddocks under crop (24: 17.6%); and areas of natural vegetation (22: 15.9%). For people who were working at the time of the fatal incident, the most common locations of the fatal incident were paddocks under crop (19: 17.4%); areas of natural vegetation (17: 15.6%); and roads and lanes (17: 15.6% each). For bystander fatalities, there were eight locations where the fatal incident occurred. The most common locations of the fatal incident for bystanders were roads and lanes (8: 29.6%); and dams, water reservoirs and irrigation channels (7: 25.9%) (Table 3.5).

Table 3.5 Location on farm by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	19	5	24	17.4
Paddock Clear for Grazing	9	1	10	7.2
Natural Vegetation	17	5	22	15.9
Unspecified	3	-	3	2.2
Stockyards Including Horse Yards	5	1	6	4.3
Workshop	2	-	2	1.4
Roads, Lanes	17	8	25	18.1
Dam, Water Reservoir, Irrigation Channel	2	7	9	6.5
River, Creek	2	-	2	1.4
Hay Shed	1	-	1	0.7
Machinery Shed	3	-	3	2.2
Shed, Farm Building NEC	3	-	3	2.2
Piggery	1	-	1	0.7
Storage Shed Other	1	-	1	0.7
Windmill Including Troughs	2	-	2	1.4
Farm Excluding Residence NEC	12	1	13	9.4
Farm House	1	-	1	0.7
Farm Yard or Garden	3	1	4	2.9
Other Place Associated with Agricultural Work	3	-	3	2.2
Not Relevant	3	-	3	2.2
Total	**109**	**29**	**138**	**100.0**

Agent and Mechanism of Fatal Incident

The agent most commonly involved in fatal incidents was tractors (30: 21.7%). Other common agents of fatal incidents were aircraft (18: 13.2%), horses (9: 6.5%), cars (8: 5.8%), two-wheeled motorcycles (6: 4.3%), dams (6: 4.3%), powerlines (6: 4.3%) and trees being felled (5: 3.6%). Common agents for working fatalities included tractors (24: 22.0%), aircraft (18: 16.5%) and horses (8: 7.3%). Common agents for bystanders included tractors (6: 20.7%) and dams (5: 17.2%) (Table 3.6).

Table 3.6 Agent of fatal incident by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	2	-	2	1.4
Utility	-	3	3	2.2
Car	6	2	8	5.8
Trailer	-	2	2	1.4
Motorcycle 2 Wheel	3	3	6	4.3
Motorcycle 3 Wheel	1	-	1	0.7
Aircraft	18	-	18	13.2
Other Farm Vehicles NEC	4	-	4	2.9
Total Farm Vehicles	**34**	**10**	**44**	**31.9**
Mobile Farm Machinery and Plant				
Tractor	24	6	30	21.7
Linkage	-	1	1	0.7
Tillage Seeder	1	-	1	0.7
Earth Moving Equipment	1	-	1	0.7
Grain Auger	1	-	1	0.7
Slasher	2	1	3	2.2
Other Mobile Farm Machinery and Plant NEC	2	1	3	2.2
Total Mobile Farm Machinery and Plant	**31**	**7**	**38**	**27.5**
Fixed Plant and Equipment				
Pump	1	-	1	0.7
Generator	1	-	1	0.7
Other Fixed Plant Equipment NEC	1	-	1	0.7
Total Fixed Plant and Equipment	**3**	**-**	**3**	**2.2**
Workshop Equipment				
Other Workshop Equipment NEC	2	-	2	1.4
Total Workshop Equipment	**2**	**-**	**2**	**1.4**
Other Equipment and Materials				
Forklift	1	-	1	0.7
Gun, Rifle, Shotgun	2	-	2	1.4
Other Equipment and Materials NEC	2	-	2	1.4
Total Other Equipment and Materials	**5**	**-**	**5**	**3.6**
Materials				
Steel	1	-	1	0.7
Other Materials NEC	1	-	1	0.7
Total Materials	**2**	**-**	**2**	**1.4**

Table 3.6 Agent of fatal incident by work status, Queensland, farm-related fatalities, Australia, 1989-1992 (cont)

Agent	Working	Bystander	Total	%
Farm Structures				
Swimming Pool	1	-	1	0.7
Dam	1	5	6	4.3
Windmill	2	-	2	1.4
Creek, River	1	1	2	1.4
Tank	-	2	2	1.4
Powerlines	6	-	6	4.3
Other Farm Structures NEC	2	1	3	2.2
Total Farm Structures	**13**	**9**	**22**	**15.9**
Animals				
Horse	8	1	9	6.5
Cattle	1	-	1	0.7
Total Animals	**9**	**1**	**10**	**7.2**
Farm Hazardous Substances				
Pesticides	1	-	1	0.7
Total Farm Hazardous Substances	**1**	**-**	**1**	**0.7**
Working Environment				
Fire or Smoke	1	-	1	0.7
Ground, Rock, Stump	2	-	2	1.4
Trees Being Felled	5	-	5	3.6
Other Working Environment NEC	1	-	1	0.7
Total Working Environment	**9**	**-**	**9**	**6.5**
Total	**109**	**27**	**136**	**100.0**

HIT BY TYRE

A farm hand was attempting to repair a split rim on a caterpillar 12E grader tyre. The farm hand had replaced the tube, the original tyre, refitted both the inner and outer split rings and then commenced to inflate the tyre. The split ring became dislocated and the tube ruptured. The rim then burst apart and hit the farm hand. The station overseer stated that the farm hand was familiar with the fitting up and inflating of this type of wheel arrangement.

The agents most commonly involved in the fatal injury of children were tractors and dams (5: 20.0% each). Children less than five years of age (17: 68.0%) made up the majority of cases, with dams (5: 29.4%) being the most common agent of the fatal incident (Table 3.7).

Table 3.7 Agent of fatal incident for children by age group, Queensland, farm-related fatalities, Australia, 1989-1992

Agent	0-4 years	5-9 years	10-14 years	Total	%
Farm Vehicles					
Utility	-	1	1	2	8.0
Car	2	-	-	2	8.0
Trailer	2	-	-	2	8.0
Motorcycle 2 Wheel	-	-	1	1	4.0
Total Farm Vehicles	**4**	**1**	**2**	**7**	**28.0**
Mobile Farm Machinery and Plant					
Tractor	2	1	2	5	20.0
Linkage	1	-	-	1	4.0
Slasher	-	-	1	1	4.0
Other Mobile Farm Machinery and Plant NEC	1	-	-	1	4.0
Total Mobile Farm Machinery and Plant	**4**	**1**	**3**	**8**	**32.0**
Farm Structures					
Dam	5	-	-	5	20.0
Creek, River	1	-	-	1	4.0
Tank	2	-	-	2	8.0
Total Farm Structures	**8**	**-**	**-**	**8**	**32.0**
Animals					
Horse	-	1	-	1	4.0
Total Animals	**-**	**1**	**-**	**1**	**4.0**
Total	**17**	**3**	**5**	**25**	**100.0**

Vehicle accidents (33: 23.9%) were the most common mechanism of the fatal incident. Vehicle accidents most commonly involved aircraft (18: 54.5%), cars (5: 15.2%) and two-wheeled motorcycles (5: 15.2%). Other common mechanisms of the fatal incident included being hit by moving objects (24: 17.4%), rollovers of mobile machinery (mainly tractors) (22: 15.9%), falls from a height (most commonly from horses) (15: 10.9%), drowning (most commonly in dams) (12: 8.7%) and contact with electricity (most commonly powerlines) (11: 8.0%). For workers, the most common mechanisms were vehicle accidents (28: 25.7%), rollovers of mobile machinery (20: 18.3%) and being hit by moving objects (15: 13.8%). For bystanders, the most common mechanisms were being hit by moving objects (9: 31.0%) and drowning (9: 31.0%) (Table 3.8).

Table 3.8 Mechanism of fatal incident by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	13	2	15	10.9
Hitting Stationary Objects	2	-	2	1.4
Being Hit by Falling Objects	7	-	7	5.1
Being Hit by an Animal	3	-	3	2.2
Being Trapped by Moving Machinery	2	1	3	2.2
Being Trapped Between Stationary and Moving Objects	1	1	2	1.4
Being hit by Moving Objects	15	9	24	17.4
Contact with Flames or Heat	1	-	1	0.7
Contact with Electricity	11	-	11	8.0
Drowning	3	9	12	8.7
Single Contact with Chemical or Substance	1	-	1	0.7
Shot by Firearm	2	-	2	1.4
Vehicle Accident	28	5	33	23.9
Rollover	20	2	22	15.9
Total	**109**	**29**	**138**	**100.0**

TRACTOR ROLLOVER

A farmer was fatally injured when the tractor he was driving (that did not have a rollover protection structure or seat belts fitted) fell down an embankment and overturned. The tractor had an eight tonne cultivator attached. The farmer had driven the tractor to a field near a river that bordered the property. When the farmer did not return for lunch, a relative of the farmer became worried and started a search for the farmer. The tractor was found overturned at the base of a ten-metre embankment at the edge of the river, with the farmer lying adjacent to the tractor. It appears that the tractor had accidentally been reversed over the edge of the riverbank and had rolled a number of times.

Activity at Time of Fatal Incident

The most common activities being performed at the time of the fatal incident were transport for work purposes (28: 20.6%) and recreation or playing activities (18: 13.2%). For people working, the most common activities at the time of the fatal incident were transport for work purposes (28: 25.7%) and working with animals (17: 15.6%). For bystanders, the most common activities at the time of fatal incident were recreation or playing activities (18: 66.7%) and transport (10: 34.5%) (Table 3.9).

Table 3.9 Activity at time of fatal incident by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	28	-	28	20.6
Transport for Recreation	-	6	6	4.4
Transport NEC	-	4	4	2.9
Constructing or Installing	3	-	3	2.2
Maintenance	15	-	15	11.0
Earthmoving or Digging	2	-	2	1.5
Felling Trees or Clearing Land	11	-	11	8.1
Hunting	2	-	2	1.5
Working with Animals	17	-	17	12.5
Working with Crops	16	-	16	11.8
Monitoring, Observing, Inspecting	4	-	4	2.9
Moving Goods	6	-	6	4.4
Work Break	2	-	2	1.5
Recreation or Playing	-	18	18	13.2
Household Domestic Work or Gardening	2	-	2	1.5
Other	1	1	2	1.5
Total	**109**	**29**	**138**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

Overall, the most common pathophysiological causes of death of persons fatally injured were head injuries (39: 28.2%) and multiple injuries (30: 21.7%). In addition, electrocution (11: 10.1%) and crush asphyxia (10: 9.2%) were common causes of death in workers. Head injuries (12: 41.4%) and drowning (9: 31.0%) were the most common cause of death for bystanders (Table 3.10).

Table 3.10 Pathophysiological cause of death by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	27	12	39	28.2
Neck Injuries	4	1	5	3.6
Chest Injuries	10	2	12	8.7
Trunk Injuries	6	-	6	4.3
Abdominal Injuries	1	1	2	1.4
Limb Injuries	2	-	2	1.4
Multiple Injuries to Head and Other Body Parts	8	1	9	6.5
Multiple Injuries - Other	19	2	21	15.2
Drowning	3	9	12	8.7
Crush Asphyxia	10	1	11	8.0
Electrocution	11	-	11	8.0
Burns	2	-	2	1.4
Medical Complications	6	-	6	4.3
Total	**109**	**29**	**138**	**100.0**

Blood alcohol tests were conducted for 60 (55.0%) of the workers and seven (24.1%) bystanders. Of those with blood alcohol readings, six of the workers (10.0%) and four of the bystanders (57.1%) had a blood alcohol level greater than 0.05% g/100ml (Table 3.11).

Table 3.11 Blood alcohol content by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Total
Nil Blood Alcohol Reading	50 (83.3%)	3 (42.9%)	53 (79.1%)
Blood Alcohol Reading Between 0.001% and 0.05%	4 (6.7%)	-	4 (6.0%)
Blood Alcohol Reading Greater than 0.05%	6 (10.0%)	4 (57.1%)	10 (14.9%)
Total	**60 (100.0%)**	**7 (100.0%)**	**67 (100.0%)**

Month and Day of Fatal Incident

There was no consistent monthly pattern of fatal incidents. However, March (17: 12.3%), June and July (each 14: 10.1%) were the months with the highest number of fatalities (Table 3.12).

Table 3.12 Month of incident per year, Queensland, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	5	2	3	3	13	9.4
February	3	1	1	2	7	5.1
March	3	5	5	4	17	12.3
April	-	1	5	1	7	5.1
May	3	2	3	1	9	6.5
June	3	2	2	7	14	10.1
July	2	10	1	1	14	10.1
August	2	2	3	4	11	8.0
September	7	1	2	2	12	8.7
October	4	4	1	4	13	9.4
November	2	4	1	2	9	6.5
December	1	-	8	3	12	8.7
Total	**35**	**34**	**35**	**34**	**138**	**100.0**

Overall, the most common days of the week for farm fatalities were Monday (27: 19.6%) and Saturday (24: 17.4%). For workers, Monday (23: 21.1%) and Thursday (18: 16.5%) had the highest number of farm fatalities. There were slightly more fatalities per day during the week for people working than during the weekend. Saturday (9: 31.0%) had the highest number of fatalities involving bystanders. Weekends had more fatalities per day than weekdays for bystanders (Table 3.13).

Table 3.13 Day of incident by work status, Queensland, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	13	6	19	13.8
Monday	23	4	27	19.6
Tuesday	12	6	18	13.0
Wednesday	15	2	17	12.5
Thursday	18	2	20	14.5
Friday	10	-	10	7.2
Saturday	15	9	24	17.4
Not Known	3	-	3	2.2
Total	**109**	**29**	**138**	**100.0**

Visitor to the Farm

Of the 138 farm-related fatalities, 36 (26.1%) were of visitors, 91 (65.9%) were of residents and for eleven (8.0%), their visitor status was not known or not relevant. For people working, 27 (24.8%) were visitors, 74 (67.9%) were residents and for eight (7.3%), their visitor status was not known or not relevant. For bystanders, there were nine (31.0%) visitors, 17 (58.6%) residents and for three bystanders (10.3%) their visitor status was not known or not relevant.

NEW SOUTH WALES

Between 1989 and 1992, there were 158 farm-related fatalities in New South Wales. This is an average of 39 fatalities per year. Of the 158 fatalities in New South Wales, 124 (78.5%) were of persons working at the time of the incident and 34 (21.5%) were of bystanders (Table 3.14).

Of the 124 people working, 68 (54.8%) were farmers who were employed in the agricultural industry. This gave a rate for farmers of 25.1 per 100,000 per year. There were also 26 (21.0%) farm hands and assistants who were employed in the agricultural industry and fatality injured at work. This gave a rate for farm hands and assistants of 20.3 per 100,000 per year.

Table 3.14 Number of fatalities per year by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	21	11	32	20.3
1990	30	8	38	24.1
1991	41	12	53	33.5
1992	32	3	35	22.2
Total	**124**	**34**	**158**	**100.0**

Gender and Age

The age of people who were fatally injured is displayed in Table 3.15. Of the 158 fatalities, 24 (15.2%) were of children less than 15 years. The age group with the highest number of fatalities was the 55-64 year age group, with 27 (17.1%) fatalities. For working fatalities, there were four (3.2%) people under the age of 15 years who were fatally injured. For workers, the age group with the highest number of fatalities was the 55-64 year group (23: 18.5%). For bystanders, 20 (58.8%) fatal incidents involved bystanders aged less than 15 years of age, with 15 (44.1%) of the bystanders aged less than five years.

Table 3.15 Age group by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	15	15	9.5
5 -14	4	5	9	5.7
15 - 24	17	3	20	12.7
25 - 34	21	3	24	15.2
35 - 44	21	-	21	13.3
45 - 54	21	1	22	13.9
55 - 64	23	4	27	17.1
65 - 74	12	1	13	8.2
75+	5	2	7	4.4
Total	**124**	**34**	**158**	**100.0**

REPAIRING COMBINE SOWER

A grazier was repairing a combine sower (planter) on his property. The grazier was working on the bearings (having removed a wheel) of the combine. The combine was jacked up by a hydraulic jack sitting on a number of wooden blocks. The grazier was hammering at the bearings to remove them and the vibrations loosened the wooden blocks, causing the jack to collapse, and the combine to fall onto the grazier.

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 133 (84.2%) incidents. The cereal grains, sheep, cattle and pigs (33: 20.9%); meat cattle (26: 16.5%); and sheep (14: 8.9%) enterprises had the highest number of fatal incidents. For working fatalities, cereal grains, sheep, cattle and pigs (25: 20.2%); meat cattle (25: 20.2%); and sheep (10: 8.1%) enterprises had the highest number of fatal incidents. For bystanders, cereal grains, sheep, cattle and pigs (8: 23.5%); and sheep (4: 11.8%) enterprises had the highest number of fatal incidents (Table 3.16).

Table 3.16 Farm enterprise by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Total	%
Agriculture	**123**	**33**	**156**	**98.7**
Poultry	*-*	*1*	*1*	*0.6*
Poultry for Meat	*2*	*-*	*2*	*1.3*
Fruit	*1*	*-*	*1*	*0.6*
Grapes	*2*	*-*	*2*	*1.3*
Plantation Fruit	*2*	*1*	*3*	*1.9*
Orchard and Other Fruit	*4*	*1*	*5*	*3.2*
Vegetables Including Potatoes	*3*	*2*	*5*	*3.2*
Cereal Grains, Sheep, Cattle, Pigs	*25*	*8*	*33*	*20.9*
Cereal Grains	*8*	*-*	*8*	*5.1*
Sheep, Cereal Grains	*2*	*-*	*2*	*1.3*
Meat Cattle, Cereal Grains	*2*	*-*	*2*	*1.3*
Sheep, Meat Cattle	*8*	*-*	*8*	*5.1*
Sheep	*10*	*4*	*14*	*8.9*
Meat Cattle	*25*	*1*	*26*	*16.5*
Dairy	*4*	*1*	*5*	*3.2*
Pigs	*2*	*-*	*2*	*1.3*
Cotton	*5*	*1*	*6*	*3.8*
Agriculture NEC	*4*	*-*	*4*	*2.5*
Aerial Agricultural Services	*1*	*-*	*1*	*0.6*
Services to Agriculture NEC	*1*	*-*	*1*	*0.6*
Agriculture Not Known	*12*	*13*	*25*	*15.8*
Other	**1**	**1**	**2**	**1.3**
Total	**124**	**34**	**158**	**100.0**

Location of Fatal Incident

The most common locations where people were fatally injured were roads and lanes (27: 17.1%), paddocks clear for grazing (26: 16.5%) and paddocks under crop (24: 15.2%). For people who were working at the time of the fatal, the most common locations of the fatal incident were paddocks under crop, paddocks clear for grazing (each 22: 17.7%) and roads and lanes (21: 16.9%). For fatal incidents involving bystanders, there were ten locations where the fatal incident occurred. The most common location of the fatal incident for bystanders was dams, water reservoirs and irrigation channels (14: 41.2%) (Table 3.17).

Table 3.17 Location on farm by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	22	2	24	15.2
Paddock Clear for Grazing	22	4	26	16.5
Natural Vegetation	12	2	14	8.9
Unspecified	3	-	3	1.9
Stockyards Including Horse Yards	1	1	2	1.3
Workshop	2	-	2	1.3
Roads, Lanes	21	6	27	17.1
Dam, Water Reservoir, Irrigation Channel	4	14	18	11.4
River, Creek	6	1	7	4.4
Hay Shed	2	-	2	1.3
Machinery Shed	3	-	3	1.9
Shed, Farm Building NEC	3	1	4	2.5
Dairy	1	-	1	0.6
Woolshed Shearing Shed	1	-	1	0.6
Disposal Pit	1	-	1	0.6
Animal Shed Other Including Broiler Shed	1	-	1	0.6
Sorting Packing Shed	1	-	1	0.6
Farm Excluding Residence NEC	4	-	4	2.5
Farm Residence	1	-	1	0.6
Farm House	-	1	1	0.6
Farm Yard or Garden	4	2	6	3.8
Other Place Associated with Agricultural Work	4	-	4	2.5
Not Relevant	5	-	5	3.2
Total	**124**	**34**	**158**	**100.0**

Agent and Mechanism of Fatal Incident

The agent most commonly involved in fatal incidents was tractors (25: 15.8%). Other common agents involved in fatal incidents were dams (15: 9.5%), aircraft (14: 8.9%), firearms (11: 7.0%), trucks (9: 5.7%) and trees being felled (8: 5.0%). Common agents involved in working fatalities included tractors (20: 16.1%), aircraft (14: 11.3%) and trucks (9: 7.3%). Common agents for bystanders included dams (13: 38.2%) and tractors (5: 14.7%) (Table 3.18).

Table 3.18 Agent of fatal incident by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	9	-	9	5.7
Utility	3	2	5	3.2
Car	3	2	5	3.2
Motorcycle 2 Wheel	4	1	5	3.2
Motorcycle 3 Wheel	1	-	1	0.6
Motorcycle 4 Wheel	-	1	1	0.6
Aircraft	14	-	14	8.9
Other Farm Vehicles NEC	4	-	4	2.5
Total Farm Vehicles	**38**	**6**	**44**	**27.8**
Mobile Farm Machinery and Plant				
Tractor	20	5	25	15.8
Tillage Seeder	1	1	2	1.3
Fertiliser Spreader	1	-	1	0.6
Earth Moving Equipment	1	-	1	0.6
Harvesting Machine	1	-	1	0.6
Grain Auger	3	-	3	1.9
Hay Baler	1	-	1	0.6
Posthole Digger	1	-	1	0.6
Other Mobile Farm Machinery and Plant NEC	2	1	3	1.9
Total Mobile Farm Machinery and Plant	**31**	**7**	**38**	**24.1**
Fixed Plant and Equipment				
Pump	1	-	1	0.6
Feed Mixer	1	-	1	0.6
Other Fixed Plant and Equipment NEC	2	-	2	1.3
Total Fixed Plant and Equipment	**4**	**-**	**4**	**2.5**
Workshop Equipment				
Welder	1	-	1	0.6
Electric Drill	1	-	1	0.6
Total Workshop Equipment	**2**	**-**	**2**	**1.4**
Other Equipment and Materials				
Fencing Equipment	-	1	1	0.6
Gun, Rifle, Shotgun	9	2	11	7.0
Other Equipment and Materials NEC	1	-	1	0.6
Total Other Equipment and Materials	**10**	**3**	**13**	**8.2**
Materials				
Timber	1	-	1	0.6
Hay Bales Other	1	-	1	0.6
Total Materials	**2**	**-**	**2**	**1.3**

Table 3.18 Agent of fatal incident by work status, New South Wales, farm-related fatalities, Australia, 1989-1992 (cont)

Agent	Working	Bystander	Total	%
Farm Structures				
House Yard	1	-	1	0.6
Fence	-	1	1	0.6
Tank	1	-	1	0.6
Dam	2	13	15	9.5
Creek, River	5	-	5	3.2
Embankment	3	-	3	1.9
Irrigation Channel	1	1	2	1.3
Field Bin	1	-	1	0.6
Powerlines	3	-	3	1.9
Other Farm Structures NEC	3	-	3	1.9
Total Farm Structures	**20**	**15**	**35**	**22.2**
Animals				
Horse	3	1	4	2.5
Snake	1	-	1	0.6
Insect	1	-	1	0.6
Total Animals	**5**	**1**	**6**	**3.8**
Working Environment				
Fire or Smoke	2	-	2	1.3
Ground, Rock, Stump	2	-	2	1.3
Lumber	-	1	1	0.6
Trees Being Felled	7	1	8	5.0
Other Working Environment NEC	1	-	1	0.6
Total Working Environment	**12**	**2**	**13**	**8.2**
Total	**124**	**34**	**158**	**100.0**

The agent most commonly involved in the fatal injury of children was dams (9: 37.5%). Children less than five years of age (15: 62.5%) made up the majority of cases, with dams (8: 53.3%) being the most common agent involved in the fatal incident (Table 3.19).

Table 3.19 Agent of fatal incident for children by age group, New South Wales, farm-related fatalities, Australia, 1989-1992

Agent	0-4 years	5-9 years	10-14 years	Total	%
Farm Vehicles					
Truck	-	1	-	1	4.2
Utility	1	-	1	2	8.3
Motorcycle 2 Wheel	-	-	1	1	4.2
Motorcycle 4 Wheel	-	-	1	1	4.2
Total Farm Vehicles	**1**	**1**	**3**	**5**	**20.8**
Mobile Farm Machinery and Plant					
Tractor	3	-	-	3	12.5
Tillage Seeder	1	-	-	1	4.2
Other Mobile Farm Machinery and Plant NEC	1	-	-	1	4.2
Total Mobile Farm Machinery and Plant	**5**	**-**	**-**	**5**	**20.8**
Farm Structures					
Fence	-	1	-	1	4.2
Dam	8	1	-	9	37.5
Irrigation Channel	1	-	-	1	4.2
Other Farm Structures NEC	-	1	-	1	4.2
Total Farm Structures	**9**	**3**	**-**	**12**	**50.0**
Animals					
Horse	-	-	1	1	4.2
Total Animals	**-**	**-**	**1**	**1**	**4.2**
Working Environment					
Trees Being Felled	-	1	-	1	4.2
Total Working Environment	**-**	**1**	**-**	**1**	**4.2**
Total	**15**	**5**	**4**	**24**	**100.0**

Vehicle accidents (37: 23.4%) were the most common mechanism of the fatal incident. Vehicle accidents most commonly involved aircraft (14: 37.8%) and trucks (6: 16.2%). Other common mechanisms of the fatal incident included being hit by moving objects (most commonly tractors) (23: 14.6%), drowning (mainly in dams) (23: 14.6%), being hit by falling objects (most commonly trees being felled) (15: 9.5%), rollovers of mobile machinery (most commonly tractors) (13: 8.2%) and being shot by firearms (11: 7.0%). For working fatalities, the most common mechanisms were vehicle accidents (32: 25.8%), being hit by moving objects (18: 14.5%), being hit by falling objects (12: 9.7%) and rollovers of mobile machinery (11: 8.9%). For bystander fatalities, the most common mechanisms were drowning (14: 41.2%) and being hit by moving objects (5: 14.7%) (Table 3.20).

Table 3.20 Mechanism of fatal incident by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	7	1	8	5.1
Hitting Stationary Objects	1	1	2	1.3
Being Hit by Falling Objects	12	3	15	9.5
Being Bitten by an Animal	1	-	1	0.6
Being Hit by an Animal	2	1	3	1.9
Being Trapped by Moving Machinery	7	-	7	4.4
Being Trapped Between Stationary and Moving Objects	2	-	2	1.3
Being Hit by Moving Objects	18	5	23	14.6
Contact with Flames or Heat	2	-	2	1.3
Exposure to Environmental Cold	1	-	1	0.6
Contact with Electricity	6	-	6	3.8
Drowning	9	14	23	14.6
Insect and Spider Bites	1	-	1	0.6
Shot by Firearm	9	2	11	7.0
Slide or Cave-In	3	-	3	1.9
Vehicle Accident	32	5	37	23.4
Rollover	11	2	13	8.2
Total	**124**	**34**	**158**	**100.0**

AIRCRAFT CRASH

A crop dusting pilot was engaged to spray a number of farms at night. During the spraying of the third farm, the pilot's wife and son were marking a field that the pilot was to spray. The pilot made four passes over the field and, whilst banking on a fifth turn, hit trees about twelve metres off the ground. The plane then hit the ground and burst into flames. An investigation was unable to determine the cause of the crash, though it appears that it may have been due to pilot error, possibly spatial disorientation.

Activity at Time of Fatal Incident

The most common activities being performed at the time of the fatal incident were transport for work purposes (36: 22.8%), recreation or playing activities (17: 10.8%), maintenance activities and working with crops (each 16: 10.1%). For people working, the most common activities at the time of the fatal incident were transport for work purposes (36: 29.0%), maintenance activities and working with crops (each 16: 12.9%). For bystander fatalities, the most common activity at the time of fatal incident was recreation or playing activities (17: 50.0%) (Table 3.21).

Table 3.21 Activity at time of fatal incident by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	36	-	36	22.8
Transport for Recreation	-	6	6	3.8
Transport NEC	-	2	2	1.3
Constructing or Installing	3	-	3	1.9
Maintenance	16	-	16	10.1
Earthmoving or Digging	5	-	5	3.2
Felling Trees or Clearing Land	11	-	11	7.0
Firefighting	1	-	1	0.6
Hunting	6	-	6	3.8
Working with Animals	10	-	10	6.3
Working with Crops	16	-	16	10.1
Monitoring, Observing, Inspecting	5	2	7	4.4
Moving Goods	10	-	10	6.3
Rescuing	1	-	1	0.6
Recreation or Playing	-	17	17	10.8
Working - Context Unclear	1	-	1	0.6
Other	-	5	5	3.2
Not Known / Not Stated	1	2	2	1.3
Total	**124**	**34**	**158**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

Overall, the most common pathophysiological causes of death of persons fatally injured were head injuries (39: 24.7%), multiple injuries (27: 17.1%) and drowning (26: 16.4%). In addition, chest injuries (12: 9.7%) and crush asphyxia (10: 8.1%) were common causes of death for workers. Drowning (14: 41.2%) and head injuries (9: 26.5%) were the most common cause of death for bystanders (Table 3.22).

Table 3.22 Pathophysiological cause of death by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	30	9	39	24.7
Neck Injuries	5	1	6	3.8
Chest Injuries	12	3	15	9.5
Trunk Injuries	5	1	6	3.8
Abdominal Injuries	7	1	8	5.1
Limb Injuries	1	-	1	0.6
Multiple Injuries to Head and Other Body Parts	6	2	8	5.1
Multiple Injuries - Other	18	1	19	12.0
Drowning	12	14	26	16.5
Crush Asphyxia	10	-	10	6.3
Electrocution	5	-	5	3.2
Burns	1	-	1	0.6
Inhalation of a Chemical Substance	1	-	1	0.6
Suffocation	2	1	3	1.9
Envenomation	1	-	1	0.6
Hypothermia	1	-	1	0.6
Aspiration	-	1	1	0.6
Not Known	1	-	1	0.6
Medical Complications	6	-	6	3.8
Total	**124**	**34**	**158**	**100.0**

Blood alcohol tests were conducted for 75 (60.5%) of the workers and 15 (44.1%) bystanders. Of those with blood alcohol readings, five of the workers (6.7%) and seven of the bystanders (46.7%) had a blood alcohol level greater than 0.05% g/100ml (Table 3.23).

Table 3.23 Blood alcohol content by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Total
Nil Blood Alcohol Reading	65 (86.7%)	7 (46.7%)	72 (80.0%)
Blood Alcohol Reading Between 0.001% and 0.05%	5 (6.7%)	1 (6.7%)	6 (6.7%)
Blood Alcohol Reading Greater than 0.05%	5 (6.7%)	7 (46.7%)	12 (13.3%)
Total	**75 (100.0%)**	**15 (100.0%)**	**91 (100.0%)**

Month and Day of Fatal Incident

There was no consistent monthly pattern of fatal incidents. However, December (20: 12.7%), November (18: 11.4%) and March (16: 10.1%) were the months with the highest number of fatalities (Table 3.24).

Table 3.24 Month of incident per year, New South Wales, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	6	5	3	15	9.5
February	4	3	2	-	9	5.7
March	1	3	7	5	16	10.1
April	2	5	5	2	14	8.9
May	4	3	5	3	15	9.5
June	2	1	2	3	8	5.1
July	4	2	3	2	11	7.0
August	4	3	2	2	11	7.0
September	1	1	7	2	11	7.0
October	2	1	3	4	10	6.3
November	2	7	7	2	18	11.4
December	5	3	5	7	20	12.7
Total	**32**	**38**	**53**	**35**	**158**	**100.0**

Overall, the most common days of the week for farm fatalities were Saturday (33: 20.9%) and Friday (24: 15.2%). For workers, Saturday (23: 18.5%) and Friday (20: 16.1%) had the highest number of farm fatalities. Saturday (10: 29.4%) and Sunday (9: 26.4%) had the highest number of fatalities involving bystanders (Table 3.25).

Table 3.25 Day of incident by work status, New South Wales, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	12	9	21	13.3
Monday	18	5	23	14.6
Tuesday	17	3	20	12.7
Wednesday	18	2	20	12.7
Thursday	16	1	17	10.8
Friday	20	4	24	15.2
Saturday	23	10	33	20.9
Total	**124**	**34**	**158**	**100.0**

Visitor to the Farm

Of the 158 farm-related fatalities, 45 (28.5%) were of visitors, 103 (65.2%) were of residents and for ten (6.3%) their visitor status was not known or not relevant. For people working, 34 (27.4%) were visitors, 82 (66.1%) were residents and for eight (6.5%) their visitor status was not known or not relevant. For bystanders, there were eleven (32.3%) visitors, 21 (61.8%) residents and for two (5.9%) bystanders their visitor status was not known or not relevant.

VICTORIA

Between 1989 and 1992, there were 103 farm-related fatalities in Victoria. This is an average of 26 fatalities per year. Of the 103 fatalities in Victoria, 55 (53.4%) were of persons working at the time of the incident and 48 (46.6%) were of bystanders (Table 3.26).

Of the 55 people working, 39 (70.9%) were farmers who were employed in the agricultural industry. This was a rate for farmers of 14.0 per 100,000 per year. There were also eleven (20.0%) farm hands and assistants who were employed in the agricultural industry and fatally injured at work. This was a rate for farm hands and assistants of 14.4 per 100,000 per year.

Table 3.26 Number of fatalities per year by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	17	10	27	26.2
1990	13	13	26	25.2
1991	11	16	27	26.2
1992	14	9	23	22.3
Total	**55**	**48**	**103**	**100.0**

Gender and Age

The age of people who were fatally injured is displayed in Table 3.27. Of the 103 fatalities, 33 (32.0%) were of children aged less than 15 years. Children aged less than five years had the highest number of fatalities, with 21 (20.4%) fatalities. For working fatalities, there were three workers (5.5%) under the age of 15 years fatally injured and the age group with the highest number of fatalities was the 45-54 year age group (14: 25.5%). The majority of bystander fatalities involved people aged less than 35 years of age, with 21 (45.7%) of the bystanders aged less than five years.

Table 3.27 Age group by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	21	21	20.4
5 - 14	3	9	12	11.7
15 - 24	8	4	12	11.7
25 - 34	7	7	14	13.6
35 - 44	6	1	7	6.8
45 - 54	14	-	14	13.6
55 - 64	8	1	9	8.7
65 - 74	5	5	10	9.7
75+	4	-	4	3.9
Total	**55**	**48**	**103**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 80 (77.7%) incidents. The sheep (11: 10.7%), meat cattle and dairy (each 10: 9.7%) enterprises had the highest number of fatal incidents. For working fatalities, sheep (7: 12.7%), meat cattle (6: 10.9%) and cereal grains, sheep, cattle and pigs (6: 10.9%) enterprises had the highest number of fatal incidents. For bystander fatalities, dairy (6: 12.5%) had the highest number of fatal incidents (Table 3.28).

Table 3.28 Farm enterprise by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Total	%
Agriculture	**55**	**43**	**98**	**95.1**
Grapes	*1*	*2*	*3*	*2.9*
Orchard and Other Fruit	*3*	*2*	*5*	*4.9*
Vegetables Including Potatoes	*3*	*-*	*3*	*2.9*
Cereal Grains, Sheep, Cattle, Pigs	*6*	*3*	*9*	*8.7*
Cereal Grains	*4*	*-*	*4*	*3.9*
Sheep, Cereal Grains	*2*	*1*	*3*	*3.0*
Meat Cattle, Cereal Grains	*4*	*-*	*4*	*3.9*
Sheep, Meat Cattle	*3*	*1*	*4*	*3.9*
Sheep	*7*	*4*	*11*	*10.7*
Meat Cattle	*6*	*4*	*10*	*9.7*
Dairy	*4*	*6*	*10*	*9.7*
Pigs	*-*	*1*	*1*	*1.0*
Nurseries	*1*	*-*	*1*	*1.0*
Agriculture NEC	*3*	*2*	*5*	*4.9*
Services to Agriculture NEC	*2*	*-*	*2*	*1.9*
Agriculture Not Known	*6*	*17*	*23*	*22.3*
Other	**-**	**5**	**5**	**4.9**
Total	**55**	**48**	**103**	**100.0**

FATAL GUNSHOT WOUND

A farmer died of gunshot wounds suffered when his rifle discharged accidentally. The farmer had a loaded rifle situated in the front seat of his utility as he was driving around his property. The rifle was placed with the butt to the floor and the muzzle to the roof, with the safety catch on. Two children entered the utility and were lifted onto the passenger seat. A few minutes later the gun discharged, either because it was bumped or the trigger was accidentally pulled. It was subsequently discovered that the safety catch was faulty and the gun would discharge even when the safety catch was on.

Location of Fatal Incident

The most common locations where people were fatally injured were dams, water reservoirs and irrigation channels (22: 21.4%), roads and lanes (21: 20.4%) and paddocks clear for grazing (14: 13.6%). For people who were working at the time of the fatal incident, the most common locations of the fatal incident were roads and lanes (11: 20.0%); paddocks under crop (7: 12.7%); and paddocks clear for grazing (6: 10.9%). For bystander fatalities, there were ten locations where fatal incidents occurred. The most common locations of the fatal incident for bystanders were dams, water reservoirs and irrigation channels (18: 37.5%); and roads and lanes (10: 20.8%) (Table 3.29).

Table 3.29 Location on farm by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	7	2	9	8.7
Paddock Clear for Grazing	6	8	14	13.6
Natural Vegetation	3	2	5	4.9
Unspecified	1	-	1	1.0
Stockyards Including Horse Yards	5	1	6	5.8
Roads, Lanes	11	10	21	20.4
Dam, Water Reservoir, Irrigation Channel	4	18	22	21.4
River, Creek	2	-	2	1.9
Hay Shed	2	-	2	1.9
Dairy	-	1	1	1.0
Shed, Farm Building NEC	2	-	2	1.9
Woolshed Shearing Shed	1	-	1	1.0
Farm Excluding Residence NEC	2	2	4	3.9
Farm Yard or Garden	1	3	4	3.9
Farm Residence NEC	1	-	1	1.0
Other Place Associated with Agricultural Work	4	1	5	4.9
Grain Handling Facilities	1	-	1	1.0
Not Relevant	2	-	2	1.9
Total	**55**	**48**	**103**	**100.0**

Agent and Mechanism of Fatal Incident

The agents most commonly involved in fatal incidents were dams (17: 16.5%), tractors (16: 15.5%), cars (8: 7.8%) and horses (7: 6.8%). Common agents for working fatalities included tractors (11: 20.0%) and horses (6: 10.9%). Common agents for bystanders included dams (14: 29.2%), cars and tractors (5: 17.2% each) (Table 3.30).

Table 3.30 Agent of fatal incident by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	3	2	5	4.9
Utility	1	3	4	3.9
Car	3	5	8	7.8
Trailer	-	3	3	3.0
Motorcycle 2 Wheel	1	4	5	4.9
Motorcycle 3 Wheel	2	1	3	2.9
Motorcycle 4 Wheel	1	1	2	1.9
Aircraft	1	-	1	1.0
Total Farm Vehicles	**12**	**19**	**31**	**30.1**
Mobile Farm Machinery and Plant				
Tractor	11	5	16	15.5
Locomotive	1	-	1	1.0
Fertiliser Spreader	1	-	1	1.0
Grain Auger	1	-	1	1.0
Other Mobile Farm Machinery and Plant NEC	1	-	1	1.0
Total Mobile Farm Machinery and Plant	**15**	**5**	**20**	**19.4**
Other Equipment and Materials				
Forklift	1	-	1	1.0
Gun, Rifle, Shotgun	4	1	5	4.9
Total Other Equipment and Materials	**5**	**1**	**6**	**5.8**
Materials				
Wire other	1	-	1	1.0
Round Bales	2	-	2	1.9
Hay Bales Other	1	-	1	1.0
Other Materials NEC	1	-	1	1.0
Total Materials	**5**	**-**	**5**	**4.9**
Farm Structures				
Tank	-	1	1	1.0
Dam	3	14	17	16.5
Creek, River	1	-	1	1.0
Irrigation Channel	-	3	3	2.9
Other Farm Structures NEC	2	2	4	3.9
Total Farm Structures	**6**	**20**	**26**	**25.2**
Animals				
Horse	6	1	7	6.8
Cattle	1	-	1	1.0
Sheep	-	1	1	1.0
Total Animals	**7**	**2**	**9**	**8.7**
Farm Hazardous Substances				
Gases	1	-	1	1.0
Total Farm Hazardous Substances	**1**	**-**	**1**	**1.0**

Table 3.30 Agent of fatal incident by work status, Victoria, farm-related fatalities, Australia, 1989-1992 (cont)

Agent	Working	Bystander	Total	%
Working Environment				
Fire or Smoke	1	-	1	1.0
Trees Being Felled	3	1	4	3.9
Total Working Environment	**4**	**1**	**5**	**4.9**
Total	**55**	**48**	**103**	**100.0**

The agent most commonly involved in the fatal injury of children was dams (12: 36.4%). Children less than five years of age (21: 63.6%) made up the majority of cases, with dams (10: 47.6%) being the most commonly involved agent (Table 3.31).

Table 3.31 Agent of fatal incident for children by age group, Victoria, farm-related fatalities, Australia, 1989-1992

Agent	0-4 years	5-9 years	10-14 years	Total	%
Farm Vehicles					
Utility	2	-	-	2	6.1
Trailer	2	1	-	3	9.1
Motorcycle 2 Wheel	-	1	1	2	6.1
Motorcycle 3 Wheel	-	-	2	2	6.1
Motorcycle 4 Wheel	-	-	2	2	6.1
Total Farm Vehicles	**4**	**2**	**5**	**11**	**33.3**
Mobile Farm Machinery and Plant					
Tractor	2	1	-	3	9.1
Grain Auger	-	1	-	1	3.0
Total Mobile Farm Machinery and Plant	**2**	**2**	**-**	**4**	**12.1**
Farm Structures					
Tank	1	-	-	1	3.0
Dam	10	2	-	12	36.4
Irrigation Channel	2	-	-	2	6.1
Other Farm Structures NEC	-	1	-	1	3.0
Total Farm Structures	**13**	**3**	**-**	**16**	**48.5**
Animals					
Horse	1	-	-	1	3.0
Total Animals	**1**	**-**	**-**	**1**	**3.0**
Working Environment					
Trees Being Felled	1	-	-	1	3.0
Total Working Environment	**1**	**-**	**-**	**1**	**3.0**
Total	**21**	**7**	**5**	**33**	**100.0**

Drowning (24: 23.3%) was the most common mechanism of the fatal incident. Drowning deaths most commonly occurred in dams (17: 70.8%). Other common mechanisms of the fatal incident included vehicle accidents (commonly cars) (22: 21.4%), being hit by moving objects (commonly tractors) (15: 14.6%) and rollovers of mobile machinery (commonly

tractors) (10: 9.7%). For working fatalities, the most common mechanisms were vehicle accidents (10: 18.2%), rollovers of mobile machinery and being hit by moving objects (7: 12.7% each). For bystander fatalities, the most common mechanisms were drowning (19: 39.6%) and vehicle accidents (12: 25.0%) (Table 3.32).

Table 3.32 Mechanism of fatal incident by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	5	-	5	4.9
Hitting Stationary Objects	-	1	1	1.0
Being Hit by Falling Objects	6	1	7	6.8
Being Hit by an Animal	4	2	6	5.8
Being Trapped by Moving Machinery	1	-	1	1.0
Being Trapped Between Stationary and Moving Objects	2	-	2	1.9
Being Hit by Moving Objects	7	8	15	14.6
Contact with Flames or Heat	1	-	1	1.0
Contact with Electricity	-	1	1	1.0
Drowning	5	19	24	23.3
Single Contact with Chemical or Substance	1	-	1	1.0
Shot by Firearm	4	1	5	4.9
Vehicle Accident	10	12	22	21.4
Rollover	7	3	10	9.7
Mechanism Not Known	2	-	2	1.9
Total	**55**	**48**	**103**	**100.0**

Activity at Time of Fatal Incident

The most common activities at the time of the fatal incident were recreation or playing activities (30: 29.1%), transport for recreation (15: 14.6% each) and transport for work purposes (14: 13.6%). For people working, the most common activities at the time of the fatal incident were transport for work purposes (14: 25.5%) and working with animals (10: 18.2%). For bystander fatalities, recreation or playing activities (30: 62.5%) and transport for recreation (15: 31.3%) were the most common type of activities being performed at the time of the fatal incident (Table 3.33).

Table 3.33 Activity at time of fatal incident by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	14	-	14	13.6
Transport for Recreation	-	15	15	14.6
Constructing or Installing	2	-	2	1.9
Maintenance	4	-	4	3.9
Earthmoving or Digging	1	-	1	1.0
Slaughtering, Gutting or Shelling	2	-	2	1.9
Felling Trees or Clearing Land	3	-	3	2.9
Firefighting	1	-	1	1.0
Hunting	1	-	1	1.0
Working with Animals	10	-	10	9.7
Working with Crops	7	-	7	6.8
Monitoring, Observing, Inspecting	1	-	1	1.0
Moving Goods	6	-	6	5.8
Rescuing	1	-	1	1.0
Recreation or Playing	-	30	30	29.1
Other	-	2	2	1.9
Not Known / Not Stated	2	1	3	2.9
Total	**55**	**48**	**103**	**100.0**

HIT BY A TREE BRANCH

A farmer died several days after being injured when a limb from a tree he was cutting down struck him across his back. The farmer was working alone on his property, using a chainsaw to cut down a dead tree. It appears that the farmer made a horizontal cut into the tree, without cutting a scarf beforehand. As a result, when the upper section of the tree hit the ground, a four-metre branch was dislodged and fell across the farmer's back.

Pathophysiological Cause of Death and Blood Alcohol Content

Overall, the most common pathophysiological causes of death of persons fatally injured were head injuries (30: 29.1%) and drowning (25: 24.3%). In addition, chest injuries (9: 8.7%), crush asphyxia and multiple injuries (each 4: 7.3%) were common causes of death in workers. For bystanders, drowning was the most common cause of death (20: 41.7%) (Table 3.34).

Table 3.34 Pathophysiological cause of death by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	16	14	30	29.1
Neck Injuries	2	1	3	2.9
Chest Injuries	8	1	9	8.7
Trunk Injuries	2	1	3	2.9
Abdominal Injuries	1	1	2	1.9
Limb Injuries	1	1	2	1.9
Multiple Injuries to Head and Other Body Parts	1	2	3	2.9
Multiple Injuries - Other	3	1	4	3.9
Drowning	5	20	25	24.3
Crush Asphyxia	4	3	7	6.8
Electrocution	-	1	1	1.0
Burns	1	-	1	1.0
Inhalation of a Chemical Substance	1	-	1	1.0
Fat Embolism Crush Injury Syndrome	1	-	1	1.0
Not Known	2	1	3	2.9
Medical Complications	7	1	8	7.8
Total	**55**	**48**	**103**	**100.0**

Blood alcohol tests were conducted for 33 (60.0%) workers and 17 (35.4%) bystanders. Of those with blood alcohol readings, one (3.0%) worker and two (11.8%) bystanders had a blood alcohol level greater than 0.05% g/100ml (Table 3.35).

Table 3.35 Blood alcohol content by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Total
Nil Blood Alcohol Reading	31 (93.9%)	13 (76.5%)	44 (88.0%)
Blood Alcohol Reading Between 0.001% and 0.05%	1 (3.0%)	2 (11.8%)	3 (6.0%)
Blood Alcohol Reading Greater than 0.05%	1 (3.0%)	2 (11.8%)	3 (6.0%)
Total	**33 (100.0%)**	**17 (100.0%)**	**50 (100.0%)**

Month and Day of Fatal Incident

There was no consistent monthly pattern of fatal incidents. However, January (15: 14.6%), April and September (each 13: 12.6%) and May (11: 10.7%) were the months with the highest number of fatalities (Table 3.36).

Table 3.36 Month of incident per year, Victoria, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	4	5	4	2	15	14.6
February	-	-	2	3	5	4.9
March	2	2	-	-	4	3.9
April	4	4	3	2	13	12.6
May	2	4	5	-	11	10.7
June	1	2	2	3	8	7.8
July	3	2	1	2	8	7.8
August	1	2	-	2	5	4.9
September	2	3	5	3	13	12.6
October	5	-	-	2	7	6.8
November	2	1	3	3	9	8.7
December	1	1	2	1	5	4.9
Total	**27**	**26**	**27**	**23**	**103**	**100.0**

Overall, the most common days of the week for farm fatalities were Saturday (22: 21.4%) and Tuesday (17: 16.5%). For workers, Tuesday (13: 23.6%) and Saturday (9: 16.4%) had the highest number of fatalities. There were slightly more fatalities per day during the weekend than during the week for people working. Saturday (13: 27.0%) and Friday (10: 20.8%) had the highest number of fatalities involving bystanders. Weekends had more fatalities per day than weekdays for bystanders (Table 3.37).

Table 3.37 Day of incident by work status, Victoria, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	8	7	15	14.6
Monday	8	2	10	9.7
Tuesday	13	4	17	16.5
Wednesday	7	8	15	14.6
Thursday	2	3	5	4.9
Friday	6	10	16	15.5
Saturday	9	13	22	21.4
Unknown	2	1	3	2.9
Total	**55**	**48**	**103**	**100.0**

Visitor to the Farm

Of the 103 farm-related fatalities, 23 (22.3%) were of visitors, 73 (70.9%) were of residents and for seven (6.8%) their visitor status was not relevant. For people working, nine (16.4%) were visitors, 44 (80.0%) were residents and for two (3.6%) their visitor status was not relevant. For bystanders, there were 14 (29.2%) visitors, 29 (60.4%) residents and for five (10.4%) their visitor status was not relevant.

TASMANIA

Between 1989 and 1992, there were 30 farm-related fatalities in Tasmania. This is an average of approximately seven fatalities per year. Of the 30 fatalities in Tasmania, 20 (66.7%) were of persons working at the time of the incident and ten (33.3%) were of bystanders (Table 3.38).

Of the 30 people working, twelve (40.0%) were farmers who were employed in the agricultural industry. This was a rate for farmers of 39.8 per 100,000 per year. There were also four (13.3%) farm hands and assistants who were employed in the agricultural industry and fatality injured at work.

Table 3.38 Number of fatalities per year by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	4	2	6	20.0
1990	6	1	7	23.3
1991	5	5	10	33.3
1992	5	2	7	23.3
Total	**20**	**10**	**30**	**100.0**

Gender and Age

The age of people who were fatally injured are displayed in Table 3.39. Of the 30 fatalities, three (10.0%) were of children less than 15 years. The age group with the highest number of fatalities was the 55-64 age group (6: 20.0%). For working fatalities, the 55-64 year age group had the highest number of fatalities (5: 25.0%). For bystander fatalities, seven (70.0%) were of persons aged less than 35 years of age, with three (30.0%) of the bystanders aged less than 15 years.

Table 3.39 Age group by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	2	2	6.7
5 - 14	-	1	1	3.3
15 - 24	2	3	5	16.7
25 - 34	3	1	4	13.3
35 - 44	1	1	2	6.7
45 - 54	3	1	4	13.3
55 - 64	5	1	6	20.0
65 - 74	3	-	3	10.0
75+	3	-	3	10.0
Total	**20**	**10**	**30**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 18 (60.0%) incidents. The sheep (4: 13.3%) and cereal grains, sheep, cattle and pigs (3: 10.0%) enterprises had the highest number of fatal incidents. For working fatalities, sheep (3: 15.0%) enterprises had the highest number of fatal incidents. For bystander fatalities, cereal grains, sheep, cattle and pigs (2: 20.0%) enterprises had the highest number of fatal incidents (Table 3.40).

Table 3.40 Farm enterprise by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Total	%
Agriculture	**20**	**9**	**29**	**96.7**
Orchard and Other Fruit	*2*	*-*	*2*	*6.7*
Vegetables Including Potatoes	*1*	*-*	*1*	*3.3*
Cereal Grains, Sheep, Cattle, Pigs	*1*	*2*	*3*	*10.0*
Meat Cattle, Cereal Grains	*1*	*-*	*1*	*3.3*
Sheep, Meat Cattle	*2*	*-*	*2*	*6.7*
Sheep	*3*	*1*	*4*	*13.3*
Meat Cattle	*1*	*1*	*2*	*6.7*
Agriculture NEC	*2*	*-*	*2*	*6.7*
Agriculture Not Known	*7*	*5*	*12*	*40.0*
Other	**-**	**1**	**1**	**3.3**
Total	**20**	**10**	**30**	**100.0**

VEHICLE OVERTURN

A 10 year old boy died of head injuries he sustained when the car which he was driving around a paddock on his parent's farm overturned, throwing him from the vehicle. The incident occurred on a steep, undulating paddock. The child had been driving vehicles for several years, having been taught by his father, and on this occasion he drove the car to a paddock around which he had driven many times. The vehicle rolled as he turned around a corner of the paddock, and the child, who was not wearing a seat belt, was thrown from the vehicle.

Location of Fatal Incident

The most common locations where people were fatally injured were paddocks under crop (6: 20.0%) and areas of natural vegetation (6: 20.0%). For people who were working at the time of the fatal incident, the most common locations of the fatal incident were areas of natural vegetation; and roads and lanes (each 5: 25.0%). For bystander fatalities, there were five locations where fatalities occurred. The most common location of the fatal incident for bystanders was dams, water reservoirs and irrigation channels (5: 50.0%) (Table 3.41).

Table 3.41 Location on farm by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	4	2	6	20.0
Paddock Clear for Grazing	3		3	10.0
Natural Vegetation	5	1	6	20.0
Stockyards Including Horse Yards	1	-	1	3.3
Roads, Lanes	5	-	5	16.7
Dam, Water Reservoir, Irrigation Channel	-	5	5	16.7
Shed, Farm Building NEC	1	-	1	3.3
Other Place Associated with Agricultural Work	-	1	1	3.3
Not Relevant	1	1	2	6.7
Total	**20**	**10**	**30**	**100.0**

TRACTOR RUNOVER

A farm hand was carrying out repairs on a tractor, putting 'stop leak' in the radiator. After the stop leak was poured into the radiator, the engine of the tractor had to be kept running for a specific period of time. The farm hand was attempting to start the tractor, while standing on the ground. The farm hand started the tractor, but the tractor was in gear and lurched forward, running over the farm hand.

Agent and Mechanism of Fatal Incident

The agent most commonly involved in fatal incidents was tractors (9: 30.0%). Other common agents of fatal incidents were dams (5: 16.7%), trees being felled (3: 10.0%), trucks and utilities (each 2: 6.7%). Common agents for working fatalities were tractors (9: 45.0%), trucks and trees being felled (each 2: 10.0%). The most common agent for bystanders was dams (5: 50.0%) (Table 3.42)

Table 3.42 Agent of fatal incident by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	2	-	2	6.7
Utility	1	1	2	6.7
Car	-	1	1	3.3
Trailer	-	1	1	3.3
Motorcycle 2 Wheel	1	-	1	3.3
Total Farm Vehicles	**4**	**3**	**7**	**23.3**
Mobile Farm Machinery and Plant				
Tractor	9	-	9	30.0
Earth Moving Equipment	1	-	1	3.3
Total Mobile Farm Machinery and Plant	**10**	**-**	**10**	**33.3**
Other Equipment and Materials				
Gun, Rifle, Shotgun	-	1	1	3.3
Total Other Equipment and Materials	**-**	**1**	**1**	**3.3**
Materials				
Timber	1	-	1	3.3
Total Materials	**1**	**-**	**1**	**3.3**
Farm Structures				
Dam	-	5	5	16.7
Total Farm Structures	**-**	**5**	**5**	**16.7**
Animals				
Horse	1	-	1	3.3
Total Animals	**1**	**-**	**1**	**3.3**
Working Environment				
Ground, Rock, Stump	1	-	1	3.3
Lumber	1	-	1	3.3
Trees Being Felled	2	1	3	10.0
Total Working Environment	**4**	**1**	**5**	**16.7**
Total	**20**	**10**	**30**	**100.0**

The agent most commonly involved in the fatal injury of children were dams (2: 66.7% each). Children less than five years of age (2: 66.7%) made up the majority of cases, with dams (2: 100.0%) being involved in both deaths (Table 3.43).

Table 3.43 Agent of fatal incident for children by age group, Tasmania, farm-related fatalities, Australia, 1989-1992

Agent	0-4 years	5-9 years	10-14 years	Total	%
Farm Vehicles					
Utility	-	-	1	1	33.3
Total Farm Vehicles	**-**	**-**	**1**	**1**	**33.3**
Farm Structures					
Dam	2	-	-	2	66.7
Total Farm Structures	**2**	**-**	**-**	**2**	**66.7**
Total	**2**	**-**	**1**	**3**	**100.0**

Being hit by moving objects (commonly tractors) (7: 23.3%) was the most common mechanism of the fatal incident. Other common mechanisms included drowning in dams (5: 16.7%), being hit by falling objects (mainly trees being felled) (4: 13.3%) and vehicle accidents (4: 13.3%). For workers, the most common mechanisms of the fatal incident were being hit by moving objects (7: 35.0%) and rollovers of mobile machinery (5: 25.0%). For bystanders, the most common mechanism of the fatal incident was drowning (5: 50.0%) (Table 3.44).

Table 3.44 Mechanism of the fatal incident by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls on the Same Level	1	-	1	3.3
Falls From a Height	-	1	1	3.3
Being Hit by Falling Objects	3	1	4	13.3
Being Hit by an Animal	1	-	1	3.3
Being Trapped Between Stationary and Moving Objects	1	-	1	3.3
Being Hit by Moving Objects	7	-	7	23.3
Drowning	-	5	5	16.7
Shot by Firearm	-	1	1	3.3
Vehicle Accident	2	2	4	13.3
Rollover	5	-	5	16.7
Total	**20**	**10**	**30**	**100.0**

Activity at Time of Fatal Incident

Overall, the most common activity at the time of the fatal incident was recreation or playing activities, with six (20.0%) bystander fatalities. For people working, the most common activities at the time of the fatal incident were transport for work purposes and felling trees or clearing land (each 5: 25.0%), maintenance activities and working with crops (each 4: 20.0%). For bystander fatalities, the most common activities at the time of fatal incident were recreation or playing activities (6: 60.0%) and transport for recreation (2: 20.0%) (Table 3.45).

Table 3.45 Activity at time of fatal incident by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	5	-	5	16.7
Transport for Recreation	-	2	2	6.7
Maintenance	4	-	4	13.3
Felling Trees or Clearing Land	5	-	5	16.7
Hunting	-	1	1	3.3
Working with Animals	2	-	2	6.7
Working with Crops	4	-	4	13.3
Monitoring, Observing, Inspecting	-	1	1	3.3
Recreation or Playing	-	6	6	20.0
Total	**20**	**10**	**30**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

Overall, the most common pathophysiological causes of death of persons fatally injured were head injuries (9: 30.0%) and chest injuries (6: 20.0%). In addition, multiple injuries (4: 20.0%) was a common cause of death for workers. Drowning (5: 50.0%) was the most common cause of death for bystanders (Table 3.46).

Table 3.46 Pathophysiological cause of death by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	6	3	9	30.0
Neck Injuries	-	1	1	3.3
Chest Injuries	6	-	6	20.0
Trunk Injuries	2	-	2	6.7
Multiple Injuries to Head and Other Body Parts	3	-	3	10.0
Multiple Injuries - Other	1	-	1	3.3
Drowning	-	5	5	16.7
Crush Asphyxia	2	-	2	6.7
Medical Complications	-	1	1	3.3
Total	**20**	**10**	**30**	**100.0**

Blood alcohol tests were conducted for 18 (90.0%) of the workers and six (60.0%) of the bystanders. Of those with blood alcohol readings, one (5.6%) of the workers and two (33.3%) of the bystanders had a blood alcohol level greater than 0.05% g/100ml (Table 3.47).

Table 3.47 Blood alcohol content by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Total
Nil Blood Alcohol Reading	17 (94.4)	4 (66.7%)	21 (87.5%)
Blood Alcohol Reading Between 0.001% and 0.05%	-	-	-
Blood Alcohol Reading Greater than 0.05%	1 (5.6%)	2 (33.3%)	3 (12.5%)
Total	**18 (100.0%)**	**6 (100.0%)**	**24 (100.0%)**

Month and Day of Fatal Incident

There was no consistent monthly pattern of fatal incidents. However, February and April (each 5: 16.7%) and November (4: 13.3%) were the months with the highest number of fatalities (Table 3.48).

Table 3.48 Month of incident per year, Tasmania, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	2	-	-	2	6.7
February	1	-	4	-	5	16.7
March	-	-	2	1	3	10.0
April	1	2	2	-	5	16.7
May	1	-	-	1	2	6.7
July	-	-	1	-	1	3.3
August	1	-	-	-	1	3.3
September	1	1	-	-	2	6.7
October	1	-	1	1	3	10.0
November	-	2	-	2	4	13.3
December	-	-	-	2	2	6.7
Total	**6**	**7**	**10**	**7**	**30**	**100.0**

Overall, the most common days of the week for farm fatalities were Monday and Tuesday (6: 20.0% each). For workers, Monday and Wednesday (5: 25.0% each) had the highest number of fatalities. There were more fatalities per day during the week than during the weekend for people working. Tuesday and Sunday (each 3: 30.0%) had the highest number of fatalities involving bystanders (Table 3.49).

Table 3.49 Day of incident by work status, Tasmania, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	1	3	4	13.3
Monday	5	1	6	20.0
Tuesday	3	3	6	20.0
Wednesday	5	-	5	16.7
Thursday	3	2	5	16.7
Friday	2	1	3	10.0
Unknown	1	-	1	3.3
Total	**20**	**10**	**30**	**100.0**

Visitor to the Farm

Of the 30 farm-related fatalities in Tasmania, twelve (40.0%) were of visitors, 15 (50.0%) were of residents and for three (10.0%) their visitor status was not known or not relevant. For people working, six (30.0%) were visitors, twelve (60.0%) were residents and for two (10.0%) their visitor status was not known or not relevant. For bystanders, there were six (60.0%) visitors, three (30.0%) residents and for one (10.0%) bystander their visitor status was not relevant.

SOUTH AUSTRALIA

Between 1989 and 1992, there were 39 farm-related fatalities in South Australia. This is an average of almost ten fatalities per year. Of the 39 fatalities in South Australia, 32 (82.1%) were of persons working at the time of the incident and seven (21.9%) were of bystanders (Table 3.50).

Of the 32 people working, 22 (68.8%) were farmers who were employed in the agricultural industry. This gave a rate for farmers of 19.4 per 100,000 per year. There were also four (12.5%) farm hands and assistants who were employed in the agricultural industry and fatality injured at work.

Table 3.50 Number of fatalities per year by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	11	2	13	33.3
1990	5	3	8	20.5
1991	6	2	8	20.5
1992	10	-	10	25.6
Total	**32**	**7**	**39**	**100.0**

Gender and Age

The age of people who were fatally injured is displayed in Table 3.51. Of the 39 fatalities, five (12.8%) were of children aged less than 15 years. The age group with the highest number of fatalities was the 35-44 age group (7: 17.9%). For working fatalities, the age group with the highest number of fatalities was 35-44 year group (7: 21.9%). The majority of the bystander fatalities were of people aged less than 35 years of age, with three (42.9%) of the bystanders aged less than five years.

Table 3.51 Age group by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	3	3	7.7
5 - 14	-	2	2	5.1
15 - 24	5	-	5	12.8
25 - 34	5	1	6	15.4
35 - 44	7	-	7	17.9
45 - 54	5	-	5	12.8
55 - 64	4	-	4	10.3
65 - 74	5	1	6	15.4
75+	1	-	1	2.6
Total	**32**	**7**	**39**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 28 (87.5%) incidents. The sheep (6: 15.4%), meat cattle (6: 15.4%), cereal grains, sheep, cattle and pigs and cereal grains (4: 10.3%) enterprises had the highest number of fatal incidents. For working fatalities, meat cattle (6: 18.8%), sheep (5: 15.6%) and cereal grains, sheep, cattle and pigs (4: 12.5%) enterprises had the highest number of fatal incidents. For bystander fatalities, cereal grains, sheep and dairy enterprises each had one (14.3%) fatal incident (Table 3.52).

Table 3.52 Farm enterprise by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Total	%
Agriculture	**32**	**7**	**39**	**100.0**
Vegetables Including Potatoes	*2*	*-*	*2*	*5.1*
Cereal Grains, Sheep, Cattle, Pigs	*4*	*-*	*4*	*10.3*
Cereal Grains	*3*	*1*	*4*	*10.3*
Sheep, Cereal Grains	*1*	*-*	*1*	*2.6*
Meat Cattle, Cereal Grains	*1*	*-*	*1*	*2.6*
Sheep, Meat Cattle	*1*	*-*	*1*	*2.6*
Sheep	*5*	*1*	*6*	*15.4*
Meat Cattle	*6*	*-*	*6*	*15.4*
Dairy	*1*	*1*	*2*	*5.1*
Pigs	*1*	*-*	*1*	*2.6*
Other Agriculture	*1*	*-*	*1*	*2.6*
Agriculture NEC	*2*	*-*	*2*	*5.1*
Agriculture Not Known	*4*	*4*	*8*	*20.5*
Total	**32**	**7**	**39**	**100.0**

CHILD DROWNING IN WATER TANK

A three year old child was playing near an 8000 gallon water tank, situated about two metres above the ground. The child was pulling grass from the ground and then climbing up a steel six rung grate on the side of the tank and throwing the grass into the water in the tank. It appears the child overbalanced and fell into the water whilst playing. The area at the rear of the farm residence was fenced from the rest of the farm. However, the water tank was not enclosed separately by any fencing, nor was the tank covered by mesh.

Location of Fatal Incident

The most common locations where people were fatally injured were paddocks under crop (7: 17.9%), roads and lanes (6: 15.4%) and sheds and farm buildings NEC (5: 12.8%). For people who were working at the time of the fatal incident, there were twelve different locations where fatal incidents occurred. The most common locations of the fatal incident for workers were paddocks under crop and roads and lanes (each 6: 18.9%). For bystander fatalities, there were six locations where the fatal incident occurred. The most common location of the fatal incident for bystanders was dams, water reservoirs and irrigation channels (2: 28.6%) (Table 3.53).

Table 3.53 Location on farm by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	6	1	7	17.9
Paddock Clear for Grazing	2	1	3	7.7
Natural Vegetation	4	-	4	10.3
Unspecified	-	1	1	2.6
Stockyards Including Horse Yards	1	-	1	2.6
Roads, Lanes	6	-	6	15.4
Dam, Water Reservoir, Irrigation Channel	-	2	2	5.1
Shed, Farm Building NEC	4	1	5	12.8
Woolshed Shearing Shed	1	-	1	2.6
Windmill Including Troughs	2	-	2	5.1
Farm Excluding Residence NEC	2	-	2	5.1
Farm Yard or Garden	2	1	3	7.7
Farm Residence NEC	1	-	1	2.6
Not Relevant	1	-	1	2.6
Total	**32**	**7**	**39**	**100.0**

FALL FROM LADDER

A sheep farmer had partially constructed a shed about 80 metres from the farm residence. At the time of the incident, the construction consisted of a concrete slab and stone walls. Two days prior to the incident, a large steel beam had been placed on top of the brick work at one end, with the aid of a forklift attachment on a tractor. The steel beam was supported only by the bricks and a metal stay that was attached towards one end. It appears that the farmer was standing on a single span metal ladder, which was leaning against the steel beam, and was welding something to the beam. As he did this, one of the supporting bricks dislodged, causing the beam and the farmer to fall to the concrete slab below.

Agent and Mechanism of Fatal Incident

The agent most commonly involved in fatal incidents was aircraft (5: 12.8%). Common agents involved in working fatalities included aircraft (5: 15.6%), posthole diggers (3: 9.4%) and two-wheeled motorcycles (3: 9.4%) (Table 3.54).

Table 3.54 Agent of fatal incident by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	1	-	1	2.6
Utility	1	-	1	2.6
Car	2	-	2	5.1
Trailer	1	1	2	5.1
Motorcycle 2 Wheel	3	-	3	7.7
Aircraft	5	-	5	12.8
Total Farm Vehicles	**13**	**1**	**14**	**35.9**
Mobile Farm Machinery and Plant				
Tractor	1	1	2	5.1
Harvesting Machine	1	-	1	2.6
Posthole Digger	3	-	3	7.7
Other Mobile Farm Machinery and Plant NEC	1	-	1	2.6
Total Mobile Farm Machinery and Plant	**5**	**1**	**6**	**15.4**
Fixed Plant and Equipment				
Other Fixed Plant and Equipment NEC	1	-	1	2.6
Total Fixed Plant and Equipment	**1**	**-**	**1**	**2.6**
Workshop Equipment				
Gas Bottle	1	-	1	2.6
Electric Drill	1	-	1	2.6
Total Workshop Equipment	**2**	**-**	**2**	**5.1**
Other Equipment and Materials				
Gun, Rifle, Shotgun	2	-	2	5.1
Total Other Equipment and Materials	**2**	**-**	**2**	**5.1**
Materials				
Steel	1	-	1	2.6
Round Bales	1	-	1	2.6
Total Materials	**2**	**-**	**2**	**5.1**
Farm Structures				
Dam	-	1	1	2.6
Tank	-	1	1	2.6
Creek, River	-	1	1	2.6
Windmill	1	-	1	2.6
Silo Grain	-	1	1	2.6
Powerlines	2	-	2	5.1
Total Farm Structures	**3**	**4**	**7**	**17.9**

Table 3.54 Agent of fatal incident by work status, South Australia, farm-related fatalities, Australia, 1989-1992 (cont)

Agent	Working	Bystander	Total	%
Animals				
Horse	1	-	1	2.6
Total Animals	**1**	**-**	**1**	**2.6**
Farm Hazardous Substances				
Gases	1	-	1	2.6
Pesticides	-	1	1	2.6
Total Farm Hazardous Substances	**1**	**1**	**2**	**5.1**
Working Environment				
Heat	1	-	1	2.6
Total Working Environment	**1**	**-**	**1**	**2.6**
Total	**32**	**7**	**39**	**100.0**

The agents involved in the fatal injury of children on South Australia farms were a trailer, dam, tank, grain silo and pesticide. Children less than five years of age (3: 60.0%) made up the majority of cases (Table 3.55).

Table 3.55 Agent of fatal incident for children by age group, South Australia, farm-related fatalities, Australia, 1989-1992

Agent	0-4 years	5-9 years	10-14 years	Total	%
Farm Vehicles					
Trailer	-	1	-	1	20.0
Total Farm Vehicles	**-**	**1**	**-**	**1**	**20.0**
Farm Structures					
Dam	1	-	-	1	20.0
Tank	1	-	-	1	20.0
Silo Grain	-	1	-	1	20.0
Total Farm Structures	**2**	**1**	**-**	**3**	**60.0**
Farm Hazardous Substances					
Pesticides	1	-	-	1	20.0
Total Farm Hazardous Substances	**1**	**-**	**-**	**1**	**20.0**
Total	**3**	**2**	**-**	**5**	**100.0**

Vehicle accidents (11: 28.2%) were the most common mechanism of the fatal incident for farm-related fatalities. Vehicle accidents most commonly involved aircraft (5: 45.5%), two-wheeled motorcycles (3: 27.3%) and cars (2: 18.2%). Other common mechanisms of the fatal incident included being trapped by moving machinery and being hit by moving objects (4: 10.3% each). For workers, the most common mechanisms were vehicle accidents (11: 34.4%), being trapped by moving machinery and being hit by moving objects (each 4: 12.5%). For bystanders, the most common mechanism of the fatal incident was drowning (3: 42.9%) (Table 3.56).

Table 3.56 Mechanism of fatal incident by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	2	1	3	7.7
Being Hit by Falling Objects	2	-	2	5.1
Being Hit by an Animal	1	-	1	2.6
Being Trapped by Moving Machinery	4	-	4	10.3
Being Hit by Moving Objects	4	-	4	10.3
Exposure to Environmental Heat	1	-	1	2.6
Contact with Electricity	3	-	3	7.7
Explosion	1	-	1	2.6
Drowning	-	3	3	7.7
Single Contact with Chemical or Substance	1	1	2	5.1
Slide or Cave-In	-	1	1	2.6
Shot by Firearm	2	-	2	5.1
Vehicle Accident	11	-	11	28.2
Rollover	-	1	1	2.6
Total	**32**	**7**	**39**	**100.0**

Activity at Time of Fatal Incident

The most common activity at the time of the fatal incident was transport for work purposes (9: 23.7%). For people working, the most common activities at the time of the fatal incident was transport for work purposes (9: 28.1%) and moving goods (4: 12.5%). For bystanders, recreation or playing activities (5: 83.3%) was the most common activity at the time of the fatal incident (Table 3.57).

Table 3.57 Activity at time of fatal incident, South Australia, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	9	-	9	23.7
Transport for Recreation	-	1	1	2.6
Constructing or Installing	3	-	3	7.9
Maintenance	2	-	2	5.3
Earthmoving or Digging	3	-	3	7.9
Milling	1	-	1	2.6
Hunting	2	-	2	5.3
Working with Animals	2	-	2	5.3
Working with Crops	3	-	3	7.9
Monitoring, Observing, Inspecting	1	-	1	2.6
Moving Goods	4	-	4	10.5
Recreation or Playing	-	5	5	15.6
Other	2	1	2	5.3
Total	**32**	**7**	**38**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

Overall, the most common pathophysiological causes of death of persons fatally injured were chest injuries (9: 23.1%) and head injuries (8: 20.5%). In addition, multiple injuries (6: 18.8%) and electrocution (3: 9.4%) were common causes of death for workers. Drowning (3: 42.9%) was the most common cause of death for bystanders (Table 3.58).

Table 3.58 Pathophysiological cause of death by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	7	1	8	20.5
Neck Injuries	1	-	1	2.6
Chest Injuries	9	-	9	23.1
Trunk Injuries	1	-	1	2.6
Multiple Injuries to Head and Other Body Parts	3	-	3	7.7
Multiple Injuries – Other	3	-	3	7.7
Drowning	-	3	3	7.7
Crush Asphyxia	-	1	1	2.6
Electrocution	3	-	3	7.7
Burns	2	-	2	5.1
Suffocation	-	1	1	2.6
Fat Embolism Crush Injury Syndrome	1	-	1	2.6
Chemical Substance Ingestion	1	1	2	5.1
Dehydration	1	-	1	2.6
Total	**32**	**7**	**39**	**100.0**

Blood alcohol tests were conducted for 28 (87.5%) of the workers and three (42.8%) bystanders. Of those with blood alcohol readings, four (14.3%) of the workers had a blood

alcohol reading between 0.001% and 0.05% and all three bystanders had a nil blood alcohol reading (Table 3.59).

Table 3.59 Blood alcohol content by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Total
Nil Blood Alcohol Reading	24 (85.7%)	3 (100.0%)	27 (87.1%)
Blood Alcohol Reading Between 0.001% and 0.05%	4 (14.3%)	-	4 (12.9%)
Blood Alcohol Reading Greater than 0.05%	-	-	-
Total	**28 (100.0%)**	**3 (100.0%)**	**31 (100.0%)**

Month and Day of Fatal Incident

There was no consistent monthly pattern of fatal incidents. However, December (7: 17.9%) and February and June (each 5: 12.8%) were the months with the highest number of fatalities (Table 3.60).

Table 3.60 Month of incident, South Australia, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	-	-	1	1	2.6
February	1	1	2	1	5	12.8
March	1	1	-	1	3	7.7
April	-	-	-	3	3	7.7
May	-	1	-	1	2	5.1
June	3	1	-	1	5	12.8
July	-	2	1	-	3	7.7
August	1	1	2	-	4	10.3
September	1	-	-	1	2	5.1
October	1	-	-	-	1	2.6
November	-	1	1	1	3	7.7
December	5	-	2	-	7	17.9
Total	**13**	**8**	**8**	**10**	**39**	**100.0**

Overall, the most common day of the week for farm fatalities was Thursday (11: 28.2%). For workers, Monday (10: 31.3%) had the highest number of farm fatalities. Friday (2: 28.6%) had the highest number of fatalities involving bystanders (Table 3.61).

Table 3.61 Day of incident by work status, South Australia, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	5	1	6	15.4
Monday	3	1	4	10.3
Tuesday	3	1	4	10.3
Wednesday	4	-	4	10.3
Thursday	10	1	11	28.2
Friday	2	2	4	10.3
Saturday	5	1	6	15.4
Total	**32**	**7**	**39**	**100.0**

Visitor to the Farm

Of the 39 farm-related fatalities, twelve (30.8%) were of visitors, 25 (78.1%) were of residents and for two (5.1%) their visitor status was not relevant. For people working, nine (28.1%) were visitors, 21 (65.6%) were residents and for two (6.3%) their visitor status was not relevant. For bystanders, there were three (42.9%) visitors and four (57.1%) residents.

WESTERN AUSTRALIA

Between 1989 and 1992, there were 40 farm-related fatalities in Western Australia. This is an average of ten fatalities per year. Of the 40 fatalities in Western Australia, 26 (65.0%) were of persons working at the time of the incident and 14 (35.0%) were of bystanders (Table 3.62).

Of the 26 people working, 16 (61.5%) were farmers who were employed in the agricultural industry. This gave a rate for farmers of 16.6 per 100,000 farmers per year. There were also four (15.4%) farm hands and assistants who were employed in the agricultural industry and fatality injured at work.

Table 3.62 Number of fatalities per year by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	6	2	8	20.0
1990	9	4	13	32.5
1991	7	3	10	25.0
1992	4	5	9	22.5
Total	**26**	**14**	**40**	**100.0**

Gender and Age

The age of people who were fatally injured is displayed in Table 3.63. Of the 40 fatalities, eight (20.0%) were of children aged less than 15 years. The age groups with the highest number of fatalities were the 25-34 age group (9: 22.5) and the 15-24 age group (8: 20.0%). For working fatalities, the age group with the highest number of fatalities was the 25-34 year group (7: 26.9%). Most of the bystander fatalities were of people aged less than 35 years of age, with seven (50.0%) of the bystanders aged less than five years.

Table 3.63 Age group by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	7	7	17.5
5 - 14	-	1	1	2.5
15 - 24	6	2	8	20.0
25 - 34	7	2	9	22.5
35 - 44	2	-	2	5.0
45 - 54	5	1	6	15.0
55 - 64	1	-	1	2.5
65 - 74	1	1	2	5.0
75+	4	-	4	10.0
Total	**26**	**14**	**40**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 33 (82.5%) incidents. The cereal grains, sheep, cattle and pigs (8: 20.0%), meat cattle (6: 15.0%) and sheep and cereal grains (5: 12.5%) enterprises had the highest number of fatal incidents. For working fatalities, meat cattle (6: 23.1%), sheep and cereal grains (5: 19.2%) and cereal grains, sheep, cattle and pigs (4: 15.4%) enterprises had the highest number of fatal incidents. For bystander fatalities, cereal grains, sheep, cattle and pigs (4: 28.6%), orchard and other fruit (3: 21.4%) and sheep (2: 14.3%) were the enterprises that had the highest number of fatal incidents (Table 3.64).

Table 3.64 Farm enterprise by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Total	%
Agriculture	**24**	**14**	**38**	**95.0**
Orchard and Other Fruit	*1*	*3*	*4*	*10.0*
Vegetables Including Potatoes	*1*	*-*	*1*	*2.5*
Cereal Grains, Sheep, Cattle, Pigs	*4*	*4*	*8*	*20.0*
Cereal Grains	*1*	*-*	*1*	*2.5*
Sheep, Cereal Grains	*5*	*-*	*5*	*12.5*
Sheep	*1*	*2*	*3*	*7.5*
Meat Cattle	*6*	*-*	*6*	*15.0*
Nurseries	*1*	*-*	*1*	*2.5*
Agriculture NEC	*2*	*-*	*2*	*5.0*
Agriculture Not Known	*2*	*5*	*7*	*17.5*
Other	**2**	**-**	**2**	**5.0**
Total	**26**	**14**	**40**	**100.0**

TRACTOR RUNOVER

A horse stud farmer had just finished feeding some horses and was returning the feeder to a shed, using a tractor to tow the feeder. When the farmer got to the yard next to the shed, he left the tractor running in second gear with the high ratio gear in neutral. The farmer then stepped off the tractor to detach the feeder. The farmer had some problem in removing the hitch pin and it appears that he moved to the side of the tractor to release the hand brake, which was said to usually be enough to release the pin. In doing this, it appears that the farmer may have inadvertently engaged the high ratio gear, allowing the tractor and feeder to move forward and run over him.

Location of Fatal Incident

The most common locations where people were fatally injured were dams, water reservoirs and irrigation channels (7: 17.5%) and paddocks under crop (6: 15.0%). For people who were working at the time of the fatal incident, there were twelve different locations where fatalities occurred. The most common locations of the fatal incident for workers were paddocks under crop (6: 23.1%) and areas of natural vegetation (4: 15.4%). For bystander fatalities, there were seven locations where the fatalities occurred. The most common location of the fatal incident for bystanders was dams, water reservoirs and irrigation channels (6: 42.9%) (Table 3.65).

Table 3.65 Location on farm by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	6	-	6	15.0
Paddock Clear for Grazing	2	2	4	10.0
Natural Vegetation	4	-	4	10.0
Stockyards Including Horse Yards	2	-	2	5.0
Roads, Lanes	3	1	4	10.0
Dam, Water Reservoir, Irrigation Channel	1	6	7	17.5
Shed, Farm Building NEC	1	1	2	5.0
Storage Shed Other	1	-	1	2.5
Farm Excluding Residence NEC	1	1	2	5.0
Farm Yard or Garden	1	2	3	7.5
Other Place Associated with Agricultural Work	1	-	1	2.5
Not Relevant	3	1	4	10.0
Total	**26**	**14**	**40**	**100.0**

Agent and Mechanism of Fatal Incident

The agents most commonly involved in fatal incidents were dams (7: 17.5%) and tractors (5: 12.5%). Other common agents of fatal incidents were aircraft (4: 10.0%), trucks and two-wheeled motorcycles (each 3: 7.5%). Common agents for working fatalities included aircraft (4: 15.4%) and tractors (3: 11.5%). The most common agent for bystanders was dams (6: 42.9%) (Table 3.66).

Table 3.66 Agent of fatal incident by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Total	%
Farm Vehicles				
Truck	2	1	3	7.5
Utility	-	2	2	5.0
Car	2	-	2	5.0
Motorcycle 2 Wheel	2	1	3	7.5
Aircraft	4	-	4	10.0
Total Farm Vehicles	**10**	**4**	**14**	**35.0**
Mobile Farm Machinery and Plant				
Tractor	3	2	5	12.5
Grain Auger	1	-	1	2.5
Other Mobile Farm Machinery and Plant NEC	1	-	1	2.5
Total Mobile Farm Machinery and Plant	**5**	**2**	**7**	**17.5**
Workshop Equipment				
Ladder Excluding Ladder Attached to Structure	1	-	1	2.5
Total Workshop Equipment	**1**	**-**	**1**	**2.5**
Other Equipment and Materials				
Gun, Rifle, Shotgun	1	1	2	5.0
Other Equipment and Material NEC	1	-	1	2.5
Total Equipment and Materials	**2**	**1**	**3**	**7.5**
Farm Structures				
Dam	1	6	7	17.5
Creek, River	1	-	1	2.5
Tank	-	1	1	2.5
Silo Grain	1	-	1	2.5
Other Farm Structures NEC	1	-	1	2.5
Total Farm Structures	**4**	**7**	**11**	**27.5**
Animals				
Horse	2	-	2	5.0
Snake	1	-	1	2.5
Total Animals	**3**	**-**	**3**	**7.5**
Working Environment				
Lumber	1	-	1	2.5
Total Working Environment	**1**	**-**	**1**	**2.5**
Total	**26**	**14**	**40**	**100.0**

The agent most commonly involved in the fatal injury of children was dams (4: 50.0% each). Children less than five years of age (7: 87.5%) made up the majority of cases, with dams (4: 57.1%) being the most commonly involved agent (Table 3.67).

Table 3.67 Agent of fatal incident for children by age group, Western Australia, farm-related fatalities, Australia, 1989-1992

Agent	0-4 years	5-9 years	10-14 years	Total	%
Farm Vehicles					
Truck	1	-	-	1	12.5
Utility	1	-	-	1	12.5
Motorcycle 2 Wheel	-	1	-	1	12.5
Total Farm Vehicles	**2**	**1**	**-**	**3**	**37.5**
Farm Structures					
Dam	4	-	-	4	50.0
Tank	1	-	-	1	12.5
Total Farm Structures	**5**	**-**	**-**	**5**	**62.5**
Total	**7**	**1**	**-**	**8**	**100.0**

Vehicle accidents (11: 27.5%) were the most common mechanism of the fatal incident. Vehicle accidents most commonly involved aircraft (4: 36.4%), trucks, two-wheeled motorcycles and utilities (each 2: 18.2%). Other common mechanisms of the fatal incident included drowning (most commonly in dams) (8: 20.0%) and being hit by moving objects (5: 12.5%). For working fatalities, the most common mechanisms were vehicle accidents (8: 30.8%) and being hit by moving objects (4: 15.4%). For bystander fatalities, the most common mechanism was drowning (all in dams) (6: 42.9%) (Table 3.68).

Table 3.68 Mechanism of the fatal incident by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Falls From a Height	2	-	2	5.0
Hitting Stationary Objects	1	-	1	2.5
Being Hit by Falling Objects	1	1	2	5.0
Being Bitten by an Animal	1	-	1	2.5
Being Hit by an Animal	2	-	2	5.0
Being Trapped Between Stationary and Moving Objects	2	-	2	5.0
Being Hit by Moving Objects	4	1	5	12.5
Contact with Electricity	2	-	2	5.0
Drowning	2	6	8	20.0
Shot by Firearm	1	1	2	5.0
Vehicle Accident	8	3	11	27.5
Rollover	-	2	2	5.0
Total	**26**	**14**	**40**	**100.0**

HELICOPTER CRASH

A pastoralist was a passenger in a helicopter that was about to be used to help muster cattle. The pastoralist was showing the pilot of the helicopter the

layout of the property and where the cattle were to be mustered to, when one of the main rotor blades separated in flight, due to a fatigue fracture, and the helicopter plummeted to the ground. Both the helicopter pilot and the pastoralist were killed. The pilot was very experienced, with more than 2000 hours on this type of helicopter and more than 15,000 hours in total flying experience.

Activity at Time of Fatal Incident

The most common activities being performed at the time of the fatal incident were recreation or playing activities (9: 22.5%) and transport for work purposes (7: 17.5%). For people working, the most common activities at the time of the fatal incident were transport for work purposes (7: 26.9%); working with animals; and monitoring, observing or inspecting (each 4: 15.4%). For bystander fatalities, the most common activity at the time of the fatal incident was recreation or playing activities (9: 64.3%) (Table 3.69).

Table 3.69 Activity at time of fatal incident by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	7	-	7	17.5
Transport for Recreation	-	2	1	2.5
Maintenance	3	-	3	7.5
Felling Trees or Clearing Land	1	-	1	2.5
Hunting	1	-	1	2.5
Working with Animals	4	-	4	10.0
Working with Crops	2	-	2	5.0
Mining Activities	1	-	1	2.5
Monitoring, Observing, Inspecting	4	-	4	10.0
Moving Goods	3	-	3	7.5
Recreation or Playing	-	9	9	22.5
Assault	-	1	1	2.5
Other	-	2	1	2.5
Total	**26**	**14**	**40**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

Overall, the most common pathophysiological causes of death of persons fatally injured were head injuries (11: 27.5%) and drowning (8: 20.0%). Head injuries (7: 26.9%) was the most common pathophysiological cause of death for workers and drowning (6: 42.9%) was the most prominent cause of death for bystanders (Table 3.70).

Table 3.70 Pathophysiological cause of death by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	7	4	11	27.5

Neck Injuries	1	-	1	2.5
Chest Injuries	1	-	1	2.5
Trunk Injuries	1	1	2	5.0
Abdominal Injuries	1	1	2	5.0
Multiple Injuries to Head and Other Body Parts	2	-	2	5.0
Multiple Injuries - Other	4	1	5	12.5
Drowning	2	6	8	20.0
Crush Asphyxia	2	1	3	7.5
Electrocution	2	-	2	5.0
Not Known	1	-	1	2.5
Medical Complications	2	-	2	5.0
Total	**26**	**14**	**40**	**100.0**

Blood alcohol tests were conducted for 20 (76.9%) of the workers and twelve (85.7%) of the bystanders. Of those with blood alcohol readings, three (15.0%) of the workers and one (8.3%) of the bystanders had a blood alcohol level greater than 0.05% g/100ml (Table 3.71).

Table 3.71 Blood alcohol content by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Total
Nil Blood Alcohol Reading	15 (75.0%)	11 (91.7%)	26 (81.3%)
Blood Alcohol Reading Between 0.001% and 0.05%	2 (10.0%)	-	2 (5.2%)
Blood Alcohol Reading Greater than 0.05%	3 (15.0%)	1 (8.3%)	4 (12.5%)
Total	**20 (100.0%)**	**12 (100.0%)**	**32 (100.0%)**

Month and Day of Fatal Incident

There was no consistent monthly pattern of fatal incidents. However, April and May (each 7: 17.5%) were the months with the highest number of fatalities (Table 3.72).

Table 3.72 Month of incident, Western Australia, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	1	1	-	3	7.5
February	1	1	-	1	3	7.5
March	1	2	-	-	3	7.5
April	-	2	3	2	7	17.5
May	2	3	-	2	7	17.5
June	-	2	2	-	4	10.0
August	1	1	-	-	2	5.0
September	-	-	1	1	2	5.0
October	1	-	-	1	2	5.0
November	-	1	1	1	3	7.5
December	1	-	2	1	4	10.0
Total	**8**	**13**	**10**	**9**	**40**	**100.0**

Overall, the most common days of the week for farm fatalities were Monday and Saturday (each 8: 20.0%). For workers, Monday (7: 26.9%) had the highest number of farm fatalities. Saturday (5: 35.7%) had the highest number of fatalities involving bystanders. Weekends had more fatalities per day than weekdays for bystanders (Table 3.73).

Table 3.73 Day of incident by work status, Western Australia, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	3	2	5	12.5
Monday	7	1	8	20.0
Tuesday	3	1	4	10.0
Wednesday	2	3	5	12.5
Thursday	4	2	6	15.0
Friday	3	-	3	7.5
Saturday	3	5	8	20.0
Not known	1	-	1	2.5
Total	**26**	**14**	**40**	**100.0**

Visitor to the Farm

Of the 40 farm-related fatalities in Western Australia, 14 (35.0%) were of visitors, 24 (60.0%) were of residents and for two (5.0%) their visitor status was not known or not relevant. For people working, nine (34.6%) were visitors, 16 (61.5%) were residents and for one (3.8%) worker their visitor status was not relevant. For bystanders, there were five (35.7%) visitors, eight (57.1%) residents and for one (7.1%) bystander their visitor status was not known.

NORTHERN TERRITORY

Between 1989 and 1992, there were seven property-related fatalities in the Northern Territory of people who were working. There were no bystander fatalities during this timeframe (Table 3.74).

Of the seven people working, one (14.3%) was a station hand who was employed in the agricultural industry.

Table 3.74 Number of fatalities per year by work status, Northern Territory, farm-related fatalities, Australia, 1989-1992

Year	Working	%
1989	2	28.6
1990	2	28.6
1991	-	-
1992	3	42.9
Total	**7**	**100.0**

Gender and Age

The age of people who were fatally injured is displayed in Table 3.75. Of the seven fatalities, none were of children.

Table 3.75 Age group by work status, Northern Territory, farm-related fatalities, Australia, 1989-1992

Age Group	Working	%
15 - 24	1	14.3
25 - 34	2	28.6
35 - 44	2	28.6
45 - 54	2	28.6
Total	**7**	**100.0**

Farm Enterprise

There were three agricultural enterprises on which fatal incidents occurred. These were meat cattle (5: 71.4%), sheep and meat cattle and other agriculture (each 1: 14.3%) (Table 3.76).

Table 3.76 Farm enterprise by work status, Northern Territory, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	%
Agriculture	**7**	**100.0**
Sheep, Meat Cattle	*1*	*14.3*
Meat Cattle	*5*	*71.4*
Other Agriculture	*1*	*14.3*
Total	**7**	**100.0**

Location of Fatal Incident

The seven fatal incidents involving workers occurred in paddocks clear for grazing (4: 57.1%), areas of natural vegetation (2: 28.6%) and roads and lanes (1: 14.3%) (Table 3.77).

Table 3.77 Location on farm by work status, Northern Territory, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	%
Paddock Clear for Grazing	4	57.1
Natural Vegetation	2	28.6
Roads, Lanes	1	14.3
Total	**7**	**100.0**

INCIDENT INVOLVING BOREHOLE PUMP

A boreman's assistant was finishing repairs on a borehole pump with a co-worker, when he neglected to trim a new rod protruding from the pump. The rod was 19mm thick stainless steel and protruded from the pump some 900mm. The assistant started the pump and bent over to see if there was any build up of water pressure. With the motor running, the shaft was rotating in excess of 1200 revolutions per minute. Due to centrifugal force the rod started to bend - the rod flexed to 45 degrees - and struck the assistant in the head, killing him instantly. Manufacturer's warnings regarding the excess rod, were placed on the rod, on the packaging of the rod, on the bore and in guidelines provided by the manufacturers. Manufacturers recommend that the rod is trimmed to 150mm. When the co-workers was querying why the assistant had not trimmed the rod, the co-worker stated the assistant had wanted to leave it there in case they had to pull the bore back up again if it was not working correctly.

Agent and Mechanism of Fatal Incident

The five agents involved in fatal incidents were aircraft (4: 57.1%), a car (1: 14.3%), a pump (1: 14.3%) and a knife (1: 14.3%) (Table 3.78).

Table 3.78 Agent of fatal incident by work status, Northern Territory, farm-related fatalities, Australia, 1989-1992

Agent	Working	%
Farm Vehicles		
Car	1	14.3
Aircraft	4	57.1
Total Farm Vehicles	**5**	**71.4**
Fixed Plant and Equipment		
Pump	1	14.3
Total Fixed Plant and Equipment	**1**	**14.3**
Hand Tools		
Knife	1	14.3
Total Hand Tools	**1**	**14.3**
Total	**7**	**100.0**

Vehicle accidents (5: 71.4%) were the most common mechanism of fatal incident. Vehicle accidents most commonly involved aircraft (4: 80.0%). The remaining mechanisms of the fatal incident were being hit by moving objects (1: 14.3%) and being stabbed with a knife (1: 14.3%) (Table 3.79).

Table 3.79 Mechanism of fatal incident by work status, Northern Territory, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	%
Being Hit by Moving Objects	1	14.3
Stabbed by Knife	1	14.3
Vehicle Accident	5	71.4
Total	**7**	**100.0**

Activity at Time of Fatal Incident

The two most common activities at the time of the fatal incident were transport for work purposes and working with animals (each 2: 28.5%) (Table 3.80).

Table 3.80 Activity at time of fatal incident, Northern Territory, farm-related fatalities, Australia, 1989-1992

Activity	Working	%
Transport for Work Purposes	2	28.5
Maintenance	1	14.3
Slaughtering, Cutting or Shelling	1	14.3
Working with Animals	2	28.5
Monitoring, Observing, Inspecting	1	14.3
Total	**7**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

Multiple injuries (4: 57.1%) and head injuries (2: 28.6%) were the most common pathophysiological causes of death for workers in the Northern Territory (Table 3.81).

Table 3.81 Pathophysiological cause of death, Northern Territory, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	%
Head Injuries	2	28.6
Limb Injuries	1	14.3
Multiple Injuries to Head and Other Body Parts	2	28.6
Multiple Injuries - Other	2	28.6
Total	**7**	**100.0**

Blood alcohol tests were conducted for four (57.1%) of the workers. Of those with blood alcohol readings taken, all had a nil blood alcohol reading.

Month and Day of Fatal Incident

There was no consistent monthly pattern of fatal incidents. The month with the highest number of fatalities was July (3: 42.9%) (Table 3.82).

Table 3.82 Month of incident by work status, Northern Territory, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1992	Total	%
February	-	1	-	1	14.3
June	-	-	1	1	14.3
July	2	-	1	3	42.9
October	-	1	-	1	14.3
November	-	-	1	1	14.3
Total	**2**	**2**	**3**	**7**	**100.0**

The days of the week with the highest number of fatalities in the Northern Territory were Sunday and Wednesday (each 2: 28.6%) (Table 3.83).

Table 3.83 Day of incident by work status, Northern Territory, farm-related fatalities, Australia, 1989-1992.

Day of Week	Working	%
Sunday	2	28.6
Tuesday	1	14.3
Wednesday	2	28.6
Thursday	1	14.3
Saturday	1	14.3
Total	**7**	**100.0**

Visitor to the Farm

Of the seven farm-related fatalities in the Northern Territory, four (57.1%) were of visitors and three (42.9%) were of residents.

SUMMARY SECTION 3

The work-related fatalities rate for Australian farmers, was 20.6 per 100,000 per year, and varied between 13.9 for Victoria and 39.8 for Tasmania. For farm hands, the rate per year for Australia was 18.1 per 100,000 and varied between 14.4 for Victoria and 24.1 for Queensland. The rate per 10,000 establishments varied from 5.9 for South Australia to 82.8 for the Northern Territory. The overall rate for Australia was 9.8 per 10,000 establishments.

Queensland

- There were 34 farm-related fatalities per year during 1989 to 1992 of workers and bystanders in Queensland. The fatality rate for farmers was 28.7 per 100,000 per year and for farm hands and assistants it was 24.1 per 100,000 per year.
- The most common farm enterprises where the fatal incident occurred were meat cattle; cereal grains, sheep, cattle and pigs; and sugar cane.
- The most common locations of the fatal incident were roads and lanes; paddocks under crop; and areas of natural vegetation.
- For working fatalities, tractors; aircraft; and horses were common agents involved in the fatal incident. Tractors and dams were the most common agents of the fatal incident for bystanders.
- For workers, common mechanisms of the fatal incident were vehicle accidents; rollovers of mobile machinery (mainly tractors); and being hit by moving objects. Common mechanisms of the fatal incident for bystanders were being hit by moving objects and drowning.
- The most common activities undertaken by workers at the time of the fatal incident were transport for work purposes and working with animals. Bystanders were commonly involved in recreation or playing activities and transport.

New South Wales

- There were 39 farm-related fatalities per year during 1989 to 1992 of workers and bystanders in New South Wales. The fatality rate for farmers was 25.1 per 100,000 per year and for farm hands and assistants it was 20.3 per 100,000 per year.
- The most common farm enterprises where the fatal incident occurred were cereal grains, sheep, cattle and pigs; meat cattle; and sheep.
- The most common locations of the fatal incident were roads and lanes; paddocks clear for grazing; and paddocks under crop.
- For working fatalities, tractors; aircraft; and trucks were common agents involved in the fatal incident. Dams and tractors were common agents of the fatal incident for bystanders.
- The common mechanisms of the fatal incident for workers were vehicle accidents; being hit by moving objects (most commonly tractors); being hit by falling objects (mainly trees being felled); and rollovers of mobile machinery (mainly tractors). Common mechanisms of the fatal incident for bystanders were drowning and being hit by moving objects.

- The most common activities undertaken by workers at the time of the fatal incident were transport for work purposes; maintenance activities; and working with crops. Bystanders were commonly involved in recreation or playing activities.

Victoria

- There were 26 farm-related fatalities per year during 1989 to 1992 for workers and bystanders in Victoria. The fatality rate for farmers was 14.0 per 100,000 per year and for farm hands and assistants it was 14.4 per 100,000 per year.
- The most common farm enterprises where the fatal incident occurred were sheep; meat cattle; and dairy.
- The most common locations of the fatal incident were dams, water reservoirs and irrigation channels; roads and lanes; and paddocks clear for grazing.
- Common agents involved in the fatal incident for working fatalities were tractors and horses. Dams; cars; and tractors were common agents of the fatal incident for bystanders.
- Common mechanisms of the fatal incident for workers were vehicle accidents; rollovers of mobile machinery; and being hit by moving objects. Common mechanisms of the fatal incident for bystanders were drowning and vehicle accidents.
- The most common activities undertaken by workers at the time of the fatal incident were transport for work purposes and working with animals. Bystanders were commonly involved in recreation or playing activities and transport for recreation.

Tasmania

- There were seven farm-related fatalities per year during 1989 to 1992 for workers and bystanders in Tasmania. The fatality rate for farmers was 39.8 per 100,000 per year. Due to the low number of farm hands, an incidence rate for this group was not calculated.
- The most common farm enterprises where the fatal incident occurred were sheep; and cereal grains, sheep, cattle and pigs.
- The most common locations of the fatal incident were paddocks under crop and areas of natural vegetation.
- Common agents involved in the fatal incident for working fatalities were tractors; trucks; and trees being felled. Dams were the most common agent involved in the fatal incident of bystanders.
- Common mechanisms of the fatal incident for workers were being hit by moving objects and rollovers of mobile machinery. The most common mechanism of the fatal incident for bystanders was drowning.
- The most common activities undertaken by workers at the time of the fatal incident were transport for work purposes; maintenance activities; and working with crops. Bystanders were commonly involved in recreation or playing activities and transport for recreation.

South Australia

- There were ten farm-related fatalities per year during 1989 to 1992 for workers and bystanders in South Australia. The fatality rate for farmers in South Australia was 19.4 per 100,000 per year. Due to the low number of farm hands, an incidence rate for this group was not calculated.
- The most common farm enterprises where the fatal incident occurred were sheep; meat cattle; cereal grains, sheep, cattle and pigs; and cereal grains.
- The most common locations of the fatal incident were paddocks under crop; roads and lanes; and sheds and other farm buildings NEC.
- Common agents involved in the fatal incident for working fatalities were aircraft; posthole diggers; and two-wheel motorcycles.
- Common mechanisms of the fatal incident for workers were vehicle accidents; being trapped by moving machinery; and being hit by moving objects. The most common mechanism of the fatal incident for bystanders was drowning.
- The most common activities undertaken by workers at the time of the fatal incident were transport for work purposes and moving goods. Bystanders were commonly involved in recreation or playing activities.

Western Australia

- There were ten farm-related fatalities per year during 1989 to 1992 for workers and bystanders in Western Australia. The fatality rate for farmers was 16.6 per 100,000 per year and for farm hands and assistants it was 3.3 per 100,000 per year.
- The most common farm enterprises where the fatal incident occurred were cereal grains, sheep, cattle and pigs; meat cattle; and sheep and cereal grains.
- The most common locations of the fatal incident were dams, water reservoirs and irrigation channels; and paddocks under crop.
- Common agents involved in the fatal incident for working fatalities were aircraft and tractors. Dams were common agent of the fatal incident for bystanders.
- Common mechanisms of the fatal incident for workers were vehicle accidents and being hit by moving objects. The most common mechanism of the fatal incident for bystanders was drowning.
- The most common activities undertaken by workers at the time of the fatal incident were transport for work purposes; working with animals; and monitoring, observing or inspecting. Bystanders were commonly involved in recreation or playing activities.

Northern Territory

- There were seven farm-related fatalities during 1989 to 1992 for workers in the Northern Territory. There were no bystander fatalities. No incidence rates of specific work groups were calculated due to the low numbers.
- The farm enterprises where the fatal incidents occurred were meat cattle; sheep and meat cattle; and other agriculture.
- The locations of the fatal incidents were paddocks clear for grazing; areas of natural vegetation; and roads and lanes.
- The most common agent of the fatal incident for workers was aircraft.
- The most common mechanism of the fatal incident for workers was vehicle accidents.
- The most common activities undertaken by workers at the time of the fatal incident were transport for work purposes and working with animals.

Section 4: Fatal Injuries on Farms by Specific Age Group

Work-related traumatic farm deaths in three specific age groups have been examined. These are children (people aged less than 15 years), young adults (people aged 15-29 years) and older adults (people age 55+ years). The analysis includes all people in those age groups who were considered to be working, bystanders to work or other farm fatalities at the time of fatal injury. Information on gender and age, state or territory of the fatal incident, location on farm, mechanism, agent, pathophysiological cause of death, blood alcohol, day of incident, month of incident and visitor status is included.

CHILDREN (0 - 14 YEARS)

Each year, fatalities involving young children continue to be a large proportion of Australian farm deaths. Of the 587 fatalities on farms between 1989 and 1992, there were 115 (19.6%) of children aged less than 15 years who were either working (9: 7.8%), bystanders to work (89: 77.4%) or other farm fatalities (17: 14.8%). This was an average of 29 deaths per year.

Gender and Age

Of the 115 fatalities involving children, 87 (75.7%) involved males and 28 (24.3%) involved females. Of the 72 fatalities of children less than five years of age, 48 (66.7%) were of males and 24 (33.3%) were of females. Of the 25 fatalities of children aged 5-9 years, 24 (96.0%) were males and one (4.0%) was a female. For the 18 fatalities of children aged 10-14 years, 15 (83.3%) were males and three (16.7%) were female.

Children aged one year or less represented 22.6% and children less than five years old represented 62.6% of all child farm-related fatalities (Table 4.1).

Table 4.1 Number of fatalities per year by age group and gender, children, farm-related fatalities, Australia, 1989-1992

Year	0 - 4 Years		5 - 9 Years		10 - 14 Years		Total	%
	Male	Female	Male	Female	Male	Female		
1989	13	6	4	-	4	1	28	24.3
1990	15	4	6	-	1	1	27	23.5
1991	11	7	9	1	5	1	34	29.6
1992	9	7	5	-	5	-	26	22.6
Total	**48**	**24**	**24**	**1**	**15**	**3**	**115**	**100.0**

State or Territory of Fatal Incident

Between 1989 and 1992, Victoria (34: 29.6%), New South Wales (30: 26.1) and Queensland (29: 25.2%) had much higher numbers of fatalities of children than the remaining states and the Northern Territory (Table 4.2).

Table 4.2 State or Territory of incident by age group, children, farm-related fatalities, Australia, 1989-1992

State or Territory	0 - 4 Years	5 - 9 Years	10 - 14 Years	Total	%
QLD	19	4	6	29	25.2
NSW	16	9	5	30	26.1
VIC	22	7	5	34	29.6
TAS	2	-	1	3	2.6
SA	3	2	-	5	4.3
WA	10	2	1	13	11.3
NT	-	1	-	1	0.9
Total	**72**	**25**	**18**	**115**	**100.0**

CHILD RUN OVER BY TRACTOR

A two year old child was accompanying his parents on their rural property to feed cattle. The family rode a tractor with a single seat to a paddock on the property. The parents alighted from the tractor to feed the cattle and left the tractor in low gear, with the tractor moving along at a very slow pace. It appears the child also attempted to alight from the tractor and, in doing so, either fell or was unable to get out of the way of the tractor and was run over.

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 86 (74.8%) incidents. The most common farm enterprises were cereal grains, sheep, cattle and pigs (17: 14.8%), meat cattle (13: 11.3%), dairy (13: 11.3%), sheep (9: 7.8%) and orchard and other fruit (8: 7.0%) (Table 4.3).

Table 4.3 Farm enterprise by age group, children, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	0 - 4 Years	5 - 9 Years	10 - 14 Years	Total	%
Agriculture	**70**	**25**	**18**	**113**	**98.3**
Poultry	*2*	*-*	*-*	*2*	*1.7*
Grapes	*-*	*-*	*2*	*2*	*1.7*
Plantation Fruit	*3*	*-*	*-*	*3*	*2.6*
Orchard and Other Fruit	*7*	*-*	*1*	*8*	*7.0*
Vegetables Including Potatoes	*3*	*-*	*-*	*3*	*2.6*
Cereal Grains, Sheep, Cattle, Pigs	*10*	*4*	*3*	*17*	*14.8*
Cereal Grains	*-*	*2*	*-*	*2*	*1.7*
Sheep, Cereal Grains	*1*	*-*	*-*	*2*	*1.7*
Sheep, Meat Cattle	*2*	*2*	*1*	*5*	*4.3*
Sheep	*6*	*2*	*1*	*9*	*7.8*
Meat Cattle	*5*	*3*	*5*	*13*	*11.3*
Dairy	*7*	*5*	*1*	*13*	*11.3*
Pigs	*2*	*-*	*-*	*2*	*1.7*
Cotton	*-*	*-*	*1*	*1*	*0.9*
Agriculture NEC	*1*	*1*	*1*	*3*	*2.6*
Agriculture Not Known	*21*	*6*	*2*	*29*	*25.2*
Other	**2**	**-**	**-**	**2**	**1.7**
Total	**72**	**25**	**18**	**115**	**100.0**

DROWNING IN A FARM DAM

A one year old girl drowned in a large dam on her family's dairy property when she somehow got out of a fenced area in front of the farmhouse where she was playing. The fences and gates had been reinforced in an effort to contain her in that area because the toddler had been prone to wandering about the property. When the child's mother went looking for her daughter, she could not find her and the toddler was eventually found in the dam.

Location of Fatal Incident

The most common location on farms where children were fatally injured were dams, water reservoirs and irrigation channels (40: 34.8%), roads and lanes (17: 14.8%), paddocks under crop (11: 9.6%) and farm yards or gardens (10: 8.7%) (Table 4.4).

Table 4.4 Location on farm by age group, children, farm-related fatalities, Australia, 1989-1992

Location on Farm	0 - 4 years	5 - 9 years	10 - 14 years	Total	%
Paddock Under Crop	6	2	3	11	9.6
Paddock Clear for Grazing	4	4	1	9	7.8
Natural Vegetation	-	2	4	6	5.2
Stockyards Including Horse Yards	2	1	1	4	3.5
Roads, Lanes	6	6	5	17	14.8
Dam, Water Reservoir, Irrigation Channel	35	4	1	40	34.8
River, Creek	1	1	1	3	2.6
Shed, Farm Building NEC	3	2	1	6	5.2
Dairy	1	-	-	1	0.9
Disposal Pit	-	1	-	1	0.9
Farm Excluding Residence NEC	3	-	1	4	3.5
Farm Residence	-	1	-	1	0.9
Farm Yard or Garden	10	-	-	10	8.7
Shearers Quarters	1	-	-	1	0.9
Grain Handling Facilities	-	1	-	1	0.9
Total	**72**	**25**	**18**	**115**	**100.0**

FALL FROM A HORSE

An eleven year old boy was riding a horse on a dirt road from the gate of a homestead to a weir. The child was visiting the family farm and was in the presence of family members, when he was thrown from his horse, catching his foot in the stirrup. As the child was dragged by the horse, the horse kicked the child in the head. The child was not wearing a safety helmet. The child had been riding horses since he was a toddler and it was considered that he had good riding ability for his age.

Agent and Mechanism of Fatal Incident

The agent most commonly involved in child fatalities on farms were dams (33: 28.7%). Other common agents were tractors (11: 9.6%) and utilities (8: 7.0%). Of the 33 fatalities where a dam was involved, 30 (90.9%) were of children under the age of five years (Table 4.5).

Table 4.5 Agent of fatal incident by age group, children, farm-related fatalities, Australia, 1989-1992

Agent	0 - 4 Years	5 - 9 Years	10 - 14 Years	Total	%
Farm Vehicles					
Truck	2	1	-	3	1.7
Utility	4	1	3	8	7.0
Car	2	-	-	2	1.7
Trailer	4	2	-	6	5.2
Motorcycle 2 Wheel	-	2	3	5	4.3
Motorcycle 3 Wheel	-	-	2	2	1.7
Motorcycle 4 Wheel	-	1	3	4	3.5
Bicycle	-	-	1	1	0.9
Total Farm Vehicles	**12**	**7**	**12**	**31**	**27.0**
Mobile Farm Machinery and Plant					
Tractor	7	2	2	11	9.6
Linkage	1	-	-	1	0.9
Tillage Seeder	1	-	-	1	0.9
Grain Auger	-	1	-	1	0.9
Slasher	-	-	1	1	0.9
Other Mobile Farm Machinery and Plant NEC	2	-	-	2	1.7
Total Mobile Farm Machinery and Plant	**11**	**3**	**3**	**17**	**14.8**
Other Equipment and Materials					
Gun, Rifle, Shotgun	-	1	-	1	0.9
Total Other Equipment and Materials	**-**	**1**	**-**	**1**	**0.9**
Farm Structures					
Farm Structure	1	-	-	1	0.9
Swimming Pool	1	-	-	1	0.9
Tank	7	-	-	7	6.1
Fence	-	1	-	1	0.9
Dam	30	3	-	33	28.7
Creek, River	2	2	1	5	4.3
Irrigation Channel	3	-	-	3	2.6
Silo Grain	-	1	-	1	0.9
Other Farm Structure NEC	-	2	-	2	1.7
Total Farm Structures	**44**	**9**	**1**	**54**	**47.0**
Animals					
Horse	1	3	1	5	4.3
Snake	1	-	-	1	0.9
Total Animals	**2**	**3**	**1**	**6**	**5.2**
Farm Hazardous Substances					
Pesticides	1	-	-	1	0.9
Fuel	1	-	-	1	0.9
Total Farm Hazardous Substances	**2**	**-**	**-**	**2**	**1.7**
Working Environment					
Trees Being Felled	1	1	-	2	1.7
Other Working Environment NEC	-	1	1	2	1.7
Total Working Environment	**1**	**2**	**1**	**4**	**3.5**
Total	**72**	**25**	**18**	**115**	**100.0**

Drowning (42: 58.3%) was the most common mechanism of the fatal incident for children less than five years of age. Drowning fatalities for this young age group most commonly occurred in dams (30: 71.4%), but also in tanks (5: 11.9%), irrigation channels (3: 7.1%), creeks or rivers (2: 4.8%), in a swimming pool (1: 2.4%) and in a cattle dip trough (1: 2.4%). Other common mechanisms for children less than five years of age included being hit by moving objects (such as a tractor or a trailer) (18: 25.0%), being hit by falling objects (such as a tank or a tree being felled) (3: 4.2%) and vehicle accidents (involving cars or utilities) (3: 4.2%).

Drowning (5: 20.0%) was also the most common mechanism of the fatal incident for children between five and nine years of age. Other common mechanisms for this age group were vehicle accidents (involving motorbikes and trailers) (4: 16.0%), falls from a height (3: 12.0%) and being hit by moving objects (such as vehicles or tractors) (3: 12%).

Vehicle accidents (involving utilities and motorbikes) (8: 44.4%) were the most common mechanism of the fatal incident for children aged ten to 14 years (Table 4.6).

Table 4.6 Mechanism of fatal incident by age group, children, farm-related fatalities, Australia, 1989-1992

Mechanism	0 - 4 Years	5 - 9 Years	10 - 14 Years	Total	%
Falls From a Height	1	3	2	6	5.2
Hitting Stationary Objects	-	-	2	2	1.7
Being Hit by Falling Objects	3	2	1	6	5.2
Being Bitten by an Animal	1	-	-	1	0.9
Being Hit by an Animal	1	2	-	3	2.6
Being Trapped by Moving Machinery	-	-	2	2	1.7
Being Trapped Between Stationary and Moving Objects	1	1	-	2	1.7
Being Hit by Moving Objects	18	3	2	23	20.0
Contact with Flames or Heat	-	1	-	1	0.9
Contact with Electricity	-	1	-	1	0.9
Drowning	42	5	1	48	41.7
Single Contact with Chemical or Substance	2	-	-	2	2.6
Shot by Firearm	-	1	-	1	0.9
Slide or Cave-In	-	1	-	1	0.9
Vehicle Accident	3	4	8	15	13.0
Rollover	-	1	-	1	0.9
Total	**72**	**25**	**18**	**115**	**100.0**

Activity at Time of Fatal Incident

The most common activities being performed at the time of the fatal incident were recreation or playing (84: 73.0%) and transport for recreation (16: 13.9%) (Table 4.7).

Table 4.7 Activity at time of fatal incident by age group, children, farm-related fatalities, Australia, 1989-1992

Activity	0 - 4 Years	5 - 9 Years	10 - 14 Years	Total	%
Transport for Work Purposes	-	-	2	2	1.7
Transport for Recreation	3	6	7	16	13.9
Transport NEC	2	-	1	3	2.6
Maintenance	-	-	1	1	0.9
Hunting	-	1	-	1	0.9
Working with Animals	-	1	1	2	1.7
Working with Crops	-	1	1	2	1.7
Monitoring, Observing, Inspecting	-	-	1	1	0.9
Moving Goods	-	1	-	1	0.9
Recreation or Playing	66	14	4	84	73.0
Other	1	1	-	2	1.7
Total	**72**	**25**	**18**	**115**	**100.0**

RUNOVER BY REVERSING TRAILER

A six year old child was one of five children in a single axle, dual wheel trailer which was being towed by a diesel tractor driven by the child's father on their farm. The father was reversing the trailer into a shed when the child stood up, overbalanced and fell from the trailer. The trailer then ran over the child.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological causes of death were drowning (49: 42.6%) and head injuries (41: 35.7%). Of the 49 children who drowned, 42 (85.7%) were of children under the age of five years. Of the 43 fatalities of children between five and 14 years, 21 (48.8%) were due to head injuries (Table 4.8).

Table 4.8 Pathophysiological cause of death by age group, children, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	0 - 4 Years	5 - 9 Years	10 - 14 Years	Total	%
Head Injuries	20	11	10	41	35.7
Chest Injuries	2	2	1	5	4.3
Trunk Injuries	1	-	-	1	0.9
Abdominal Injuries	1	1	2	4	3.5
Multiple Injuries to Head and Other Body Parts	2	-	-	2	1.7
Multiple Injuries - Other	1	1	2	4	3.5
Drowning	42	5	2	49	42.6
Crush Asphyxia	-	1	-	1	0.9
Electrocution	-	1	-	1	0.9
Inhalation of a Chemical Substance	-	1	-	1	0.9
Suffocation	-	2	-	2	1.7
Chemical Substance Ingestion	2	-	-	2	1.7
Envenomation	1	-	-	1	0.9
Medical Complications	-	-	1	1	0.9
Total	**72**	**25**	**18**	**115**	**100.0**

Blood alcohol tests were conducted for 29 (25.2%) children less than 15 years. Where blood alcohol tests were conducted, the results revealed that all except one of the children had a nil blood alcohol reading. One child less than 15 years had a blood alcohol reading less than 0.05% after ingesting kerosene.

DROWNING IN TROUGH

A 18 month old child was trying to retrieve a soft-drink can from a rain water tank that had been converted into a water trough for stock. The child crawled into the trough that was filled with water and could not get out and drowned. The mother subsequently found the child in the trough.

Month and Day of Fatal Incident

The months with the highest number of fatalities were January (16: 13.9%), September (13: 11.3%), June (12: 10.4%), October (10: 8.7%) and December (10: 8.7%) (Table 4.9).

Table 4.9 Month of incident per year, children, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	5	5	4	2	16	13.9
February	2		2	3	7	6.1
March	1	4	1	2	8	7.0
April	3	1	2	2	8	7.0
May	1	2	3	2	8	7.0
June	1	3	4	4	12	10.4
July	3	2	2	2	9	7.8
August	3	3	2	1	9	7.8
September	3	3	5	2	13	11.3
October	3	3	2	2	10	8.7
November	1	-	4	-	5	4.3
December	2	1	3	4	10	8.7
Total	**28**	**27**	**34**	**26**	**115**	**100.0**

Saturday (30: 26.1%) and Sunday (20: 17.4) had the largest number of fatalities (Table 4.10).

Table 4.10 Day of incident by age group, children, farm-related fatalities, Australia, 1989-1992

Day of Week	0 - 4 Years	5 - 9 Years	10 - 14 Years	Total	%
Sunday	11	6	3	20	17.4
Monday	9	2	3	14	12.2
Tuesday	7	4	3	14	12.2
Wednesday	11	3	2	16	13.9
Thursday	6	-	2	8	7.0
Friday	8	4	1	13	11.3
Saturday	20	6	4	30	26.1
Total	**72**	**25**	**18**	**115**	**100.0**

Visitor to the Farm

Of the 115 children less than 15 years fatally injured on Australian farms, 35 (30.4%) were visitors, 75 (65.2%) were residents and for five (4.3%) it was not known whether the child was a visitor to the farm or not.

YOUNG ADULTS (15 - 29 YEARS)

Of the 587 fatalities on farms between 1989 and 1992, there were 122 (20.8%) young adults aged 15-29 years. There were on average 30 fatalities per year on Australian farms of young adults between 1989 and 1992 (Table 4.11).

Table 4.11 Number of fatalities per year by age group, young adults, farm-related, Australia, 1989-1992

Year	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
1989	9	14	6	29	23.8
1990	9	11	9	29	23.8
1991	8	14	12	34	27.9
1992	5	14	11	30	24.6
Total	**31**	**53**	**38**	**122**	**100.0**

The majority of fatal injuries to young adults on Australian farms occurred while the person was working (82: 67.2%). There were an average ten fatalities per year of young adults who were not working.

Gender and Age

Of the 122 fatalities of young adults, 109 (89.3%) were of males and only 13 (10.7%) were of females. Just under half of the fatalities of young adults were of persons in the 20-24 year age group (53: 43.4%). The majority of working (76: 92.7%), bystander (17: 77.3%) and other farm (16: 88.9%) fatalities were of males (Table 4.12).

Table 4.12 Age group and gender by work status, young adults, farm-related, Australia, 1989-1992

Age Group	Working		Bystander		Other Farm		Total	%
	Male	Female	Male	Female	Male	Female		
15-19	17	-	6	2	6	-	31	25.4
20-24	35	4	6	1	6	1	53	43.4
25-29	24	2	5	2	4	1	38	31.1
Total	**76**	**6**	**17**	**5**	**16**	**2**	**122**	**100.0**

State or Territory of Fatal Incident

New South Wales (37: 30.3%), Queensland (29: 23.8%) and Victoria (22: 18.0%) had much higher numbers of fatalities of young adults than the remaining states and the Northern Territory (Table 4.13).

Table 4.13 State or Territory of incident by age group, young adults, farm-related fatalities, Australia, 1989-1992

State or Territory	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
QLD	9	11	9	29	23.8
NSW	8	17	12	37	30.3
VIC	3	12	7	22	18.0
TAS	3	2	1	6	4.9
SA	2	3	4	9	7.4
WA	5	6	3	14	11.5
NT	1	2	2	5	4.1
Total	**31**	**53**	**38**	**122**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 98 (80.3%) incidents. The most common type of farm enterprises were meat cattle (23: 18.9%) and cereal grains, sheep, cattle and pigs (10: 8.2%) (Table 4.14).

Table 4.14 Farm enterprise by age group, young adults, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
Agriculture	**30**	**51**	**34**	**115**	**94.3**
Poultry	-	-	*2*	*2*	*1.6*
Grapes	-	-	*1*	*1*	*0.8*
Orchard and Other Fruit	*2*	*2*	*1*	*5*	*4.1*
Vegetables Including Potatoes	*1*	*1*	-	*2*	*1.6*
Cereal Grains, Sheep, Cattle, Pigs	*4*	*4*	*2*	*10*	*8.2*
Cereal Grains		*4*	*1*	*5*	*4.1*
Sheep, Cereal Grains	-	*2*	*2*	*4*	*3.3*
Meat Cattle, Cereal Grains	-	*1*	-	*1*	*0.8*
Sheep, Meat Cattle		*2*	*4*	*6*	*4.9*
Sheep	*4*	*5*	-	*9*	*7.4*
Meat Cattle	*6*	*9*	*8*	*23*	*18.9*
Dairy	*2*	*1*	-	*3*	*2.5*
Pigs	-	*1*	-	*1*	*0.8*
Sugar Cane	*2*	*1*	*2*	*5*	*4.1*
Cotton	-	*3*	*1*	*4*	*3.3*
Nurseries	*1*	*1*	*1*	*3*	*2.5*
Agriculture NEC		*2*	*3*	*5*	*4.1*
Aerial Agriculture Services	-	-	*1*	*1*	*0.8*
Services To Agriculture NEC	-	*1*	-	*1*	*0.8*
Agriculture Not Known	*8*	*11*	*5*	*24*	*19.7*
Other	**1**	**2**	**4**	**7**	**5.7**
Total	**31**	**53**	**38**	**122**	**100.0**

Location of Fatal Incident

Roads and lanes (35: 28.7%), paddocks clear for grazing (18: 14.8%), paddocks under crop (13: 10.7%) and areas of natural vegetation (13: 10.7%) were the most common locations of the fatal incident on the farm for young adults (Table 4.15).

Table 4.15 Location on farm by age group, young adults, farm-related fatalities, Australia, 1989-1992

Location on Farm	15 - 19 years	20 - 24 years	25 - 29 years	Total	%
Paddock Under Crop	4	6	3	13	10.7
Paddock Clear for Grazing	5	7	6	18	14.8
Natural Vegetation	5	3	5	13	10.7
Stockyards Including Horse Yards	-	2	1	3	2.5
Workshop	1	-	1	2	1.6
Roads, Lanes	8	16	11	35	28.7
Dam, Water Reservoir, Irrigation Channel	1	7	1	9	7.4
River, Creek	-	-	1	1	0.8
Hay Shed	-	1	2	3	2.5
Shed, Farm Building NEC	-	3	1	4	3.3
Dairy	1	-	-	1	0.8
Woolshed Shearing Shed	-	1	-	1	0.8
Farm Excluding Residence NEC	1	1	3	5	4.1
Farm Residence	-	3	1	4	3.3
Farm Yard or Garden	2	1	-	3	2.5
Other Place Associated With Agricultural Work	2	2	1	5	4.1
Not Relevant	1	-	1	2	1.6
Total	**31**	**53**	**38**	**122**	**100.0**

CRUSHED BY CAR

A 21 year old male station hand died of crush asphyxia when his car, in which he was replacing the engine, fell onto his chest. The incident occurred after the station hand had parked the car in a hay shed. He used a small car jack under the middle of the front axle to lift the car and then proceeded to replace the engine of the car. His brother had warned the station hand that just using a single jack was dangerous, but the station hand told him not to worry and stated that he had been under the car all day without any problems. The brother then left. The car then fell off the jack and onto the station hand's chest.

PLAYING WITH A FIREARM

A 21 year old male farm labourer was sitting on a bed in a bedroom at a mate's farmhouse when his mate sought to scare him by pointing a firearm at him. The farm labourer's mate pulled the trigger of the rifle in order to scare the farm labourer, not realizing that the rifle was loaded, and accidentally shot the labourer.

HIT BY WINCH

A 26 year old stockman died when a winch and a section of box steel fell on him whilst he was attempting to get a bore water pump to operate. The stockman was on his own caretaking a farm for a number of days. It appears that the stockman was attempting to get a bore water pump working when a section of box pipe supporting the pump and a hand winch fell on him. Two ladders, combined with the steel and the winch, were used to try to raise the bore pipe. It appears the pipe may have slipped whilst the winch was under load and the stockman was struck on the head by the winch.

Agent and Mechanism of Fatal Incident

Farm vehicles (commonly cars, motorcycles and aircraft) (54: 44.3%), farm structures (including dams and overhead powerlines) (18: 14.8%), other materials and equipment (mainly firearms) (14: 11.5%) and mobile farm machinery and plant (mainly tractors) (14: 11.5%) were the most common agents of fatal injury for young adults (Table 4.16).

Table 4.16 Agent of fatal incident by age group, young adults, farm-related fatalities, Australia, 1989-1992

Agent	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
Farm Vehicles					
Truck	-	3	5	8	6.6
Utility	5	-	2	7	5.7
Car	3	6	4	13	10.7
Motorcycle 2 Wheel	6	3	2	11	9.0
Motorcycle 3 Wheel	-	2	-	2	1.6
Aircraft	1	4	5	10	8.2
Other Farm Vehicle NEC	1	2	-	3	2.6
Total Farm Vehicles	**16**	**20**	**18**	**54**	**44.3**
Mobile Farm Machinery and Plant					
Tractor	3	3	2	8	6.6
Fertiliser Spreader	-	-	1	1	0.8
Grain Auger	-	2	-	2	1.6
Hay Baler	-	-	1	1	0.8
Other Mobile Farm Machinery and Plant NEC	1	-	1	2	1.6
Total Mobile Farm Machinery and Plant	**4**	**5**	**5**	**14**	**11.5**
Fixed Plant and Equipment					
Pump	-	1	-	1	0.8
Other Fixed Plant and Equipment NEC	-	1	1	2	1.6
Total Fixed Plant and Equipment	**-**	**2**	**1**	**3**	**2.6**
Workshop Equipment					
Workshop Equipment	-	-	1	1	0.8
Total Workshop Equipment	**-**	**-**	**1**	**1**	**0.8**
Other Equipment and Materials					
Gun, Rifle, Shotgun	5	5	1	11	9.0
Other Equipment and Materials NEC	1	1	1	3	2.5
Total Other Equipment and Materials	**6**	**6**	**2**	**14**	**11.5**
Materials					
Round Bales	-	-	1	1	0.8
Other Materials NEC	-	2	-	2	1.6
Total Materials	**-**	**2**	**1**	**3**	**2.5**
Farm Structures					
Dam	1	5	-	6	4.9
Creek or River	-	-	2	2	1.6
Embankment	-	-	1	1	0.8
Irrigation Channel	-	1	-	1	0.8
Powerlines	2	1	1	4	3.3
Other Farm Structure NEC	1	3	-	4	3.3
Total Farm Structures	**4**	**10**	**4**	**18**	**14.8**

Table 4.16 Agent of fatal incident by age group, young adults, farm-related fatalities, Australia, 1989-1992 (cont)

Agent	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
Animals					
Horses	-	4	2	6	4.9
Total Animals	**-**	**4**	**2**	**6**	**4.9**
Working Environment					
Fire or Smoke	-	1	2	3	2.5
Ground, Rock, Stump	-	-	1	1	0.8
Lumber	-	1	-	1	0.8
Heat	-	1	1	2	1.6
Trees Being Felled	1	1	-	2	1.6
Total Working Environment	**1**	**4**	**4**	**9**	**7.4**
Total	**31**	**53**	**38**	**122**	**100.0**

For 15-19 year olds, vehicle accidents (involving utilities, cars, two-wheel motorcycles and aircraft) (14: 45.2%) and being shot with a firearm (5: 16.1%) were the most common mechanisms of fatal injury.

Vehicle accidents (involving two and three-wheel motorcycles, aircraft, cars, trucks and other farm vehicles) (16: 30.2%), being hit by moving objects (including trucks and other mobile machinery) (7: 13.2%) and drowning (mainly in dams) (7: 13.2%) were the most common mechanisms of fatal injury for 20-24 year olds.

For 25-29 year olds, vehicle accidents (involving aircraft, cars, trucks, utilities and two-wheel motorcycles) (16: 42.1%) and being hit by moving objects (including tractors, trucks and other mobile machinery) (6: 15.8%) were the most common mechanisms of fatal injury (Table 4.17).

Table 4.17 Mechanism of fatal incident by age group, young adults, farm-related fatalities, Australia, 1989-1992

Mechanism	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
Falls From a Height	-	3	1	4	3.3
Hitting Stationary Objects	1	-	-	1	0.8
Hitting Objects with a Part of the Body Unspecified	-	1	-	1	0.8
Being Hit by Falling Objects	-	5	2	7	5.7
Being Hit by an Animal	-	1	2	3	2.5
Being Trapped Between Stationary and Moving Objects	1	-	-	1	0.8
Being Trapped by Moving Machinery	-	1	1	2	1.6
Being Hit by Moving Objects	3	7	6	16	13.1
Contact with Flames or Heat	-	1	2	3	2.5
Exposure to Environmental Heat	-	1	1	2	1.6
Contact with Electricity	3	3	3	9	7.4
Drowning	2	7	2	11	9.0
Shot by Firearm	5	5	1	11	9.0
Slide or Cave-In	-	-	1	1	0.8
Vehicle Accident	14	16	16	46	37.7
Rollover	2	2	-	4	3.3
Total	**31**	**53**	**38**	**122**	**100.0**

Activity at Time of Fatal Incident

The most common activities at the time of the fatal incident were transport for work purposes (21: 17.2%), transport for recreation (15: 12.3%) and maintenance activities (14: 11.5%) (Table 4.18).

Table 4.18 Activity at time of fatal incident by age group, young adults, farm-related fatalities, Australia, 1989-1992

Activity	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
Transport for Work Purposes	5	10	6	21	17.2
Transport for Recreation	5	5	5	15	12.3
Transport NEC	2	1	2	5	4.1
Constructing or Installing	1	1	2	4	3.3
Maintenance	2	9	3	14	11.5
Felling Trees or Clearing Land	1	1	-	2	1.6
Hunting	4	4	1	9	7.4
Working with Animals	2	4	3	9	7.4
Working with Crops	3	4	5	12	9.8
Monitoring, Observing, Inspecting	-	1	4	5	4.1
Moving Goods	3	5	2	10	8.2
Work Break	-	1	-	1	0.8
Recreation or Playing	1	4	2	7	5.7
Household Domestic Work or Gardening	-	1	-	1	0.8
Assault	-	-	1	1	0.8
Other	2	2	2	6	4.9
Total	**31**	**53**	**38**	**122**	**100.0**

MUSTERING CATTLE

A 20 year old male jackaroo and several other stockmen were mustering cattle in a paddock. The jackaroo was in the process of rounding up cattle when he was thrown from his horse. The jackaroo was not wearing a riding helmet at the time of the incident and died after receiving head injuries in the fall.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological causes of death were head injuries (39: 32.0%), multiple injuries (16: 13.1%), drowning (11: 9.0%) and electrocution (9: 7.4%) (Table 4.19).

Table 4.19 Pathophysiological cause of death by age group, young adults, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
Head Injuries	10	20	9	39	32.0
Neck Injuries	1	4	3	8	6.6
Chest Injuries	2	2	3	7	5.7
Trunk Injuries	1	2	3	6	4.9
Abdominal Injuries	3	1	1	5	4.1
Limb Injuries	-	2	-	2	1.6
Multiple Injuries to Head and Other Body Parts	2	1	5	7	5.7
Multiple Injuries - Other	2	4	3	9	7.4
Drowning	2	7	2	11	9.0
Crush Asphyxia	4	3	1	8	6.6
Electrocution	3	3	3	9	7.4
Burns	-	1	1	2	1.6
Inhalation of a Chemical Substance	-	1	1	2	1.6
Suffocation	-	-	1	1	0.8
Dehydration	-	1	1	2	1.6
Not Known	1	-	1	2	1.6
Medical Complications	-	1	-	1	0.8
Total	**31**	**53**	**38**	**122**	**100.0**

Blood alcohol tests were conducted for 22 (71.0%) of the 15-19 year olds, 36 (67.9%) of the 20-24 year olds and for 30 (78.9%) of the 25-29 year olds. Where blood alcohol tests were conducted, the results of the tests revealed that the majority of adolescents and young adults had a nil blood alcohol reading (Table 4.20). However, there were several cases where blood alcohol levels greater than 0.05% were recorded.

Table 4.20 Blood alcohol content by age group, young adults, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total
Nil Blood Alcohol Reading	19 (86.4%)	26 (72.2%)	22 (73.3%)	67 (76.1%)
Blood Alcohol Reading Between 0.001% and 0.05%	-	1 (2.8%)	2 (6.7%)	3 (3.4%)
Blood Alcohol Reading Greater than 0.05%	3 (13.6%)	9 (25.0%)	6 (20.0%)	18 (20.5)
Total	**22 (100.0%)**	**36 (100.0%)**	**30 (100.0%)**	**88 (100.0%)**

Month and Day of Fatal Incident

The month with the highest number of fatalities was December (17: 13.9%), but there was no consistent monthly pattern. The month with the lowest number of fatalities was August (5: 4.1%) (Table 4.21).

Table 4.21 Month of incident per year, young adults, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	2	2	2	4	10	8.2
February	2	3	5	3	13	10.7
March	4	1	4	-	9	7.4
April	-	-	2	2	4	3.3
May	2	3	3	2	10	8.2
June	3	2	-	3	8	6.6
July	6	5	1	2	14	11.5
August	1	2	2	-	5	4.1
September	2	1	5	4	12	9.8
October	2	1	1	4	8	6.6
November	1	6	3	2	12	9.8
December	4	3	6	4	17	13.9
Total	**29**	**29**	**34**	**30**	**122**	**100.0**

Saturday (26: 21.3%) was the day of the week with the highest number of fatalities (Table 4.22).

Table 4.22 Day of incident by age group, young adults, farm-related fatalities, Australia, 1989-1992

Day of Week	15 - 19 Years	20 - 24 Years	25 - 29 Years	Total	%
Sunday	4	7	5	16	13.1
Monday	5	6	6	17	13.9
Tuesday	1	14	3	18	14.8
Wednesday	3	6	9	18	14.8
Thursday	5	6	1	12	9.8
Friday	4	4	5	13	10.7
Saturday	9	9	8	26	21.3
Not Known	-	1	1	2	1.6
Total	**31**	**53**	**38**	**122**	**100.0**

Visitor to the Farm

Of the 122 young adults fatally injured on a farm, just over half resided on the farm (67: 54.9%), 44 (36.1%) were visitors to the farm and it was not known if eleven (9.0%) young adults were visitors to the farm or not.

OLDER ADULTS (55+ YEARS)

Of the 587 fatalities on Australian farms between 1989 and 1992 there were 149 (25.4%) of older adults. For the older adults, this was an average of 37 fatalities per year (Table 4.23).

Table 4.23 Number of fatalities per year by age group, older adults, farm-related fatalities, Australia, 1989-1992

Year	55 - 64 Years	65+ Years	Total	%
1989	16	14	30	20.1
1990	24	15	39	26.2
1991	21	15	36	24.2
1992	12	32	44	29.5
Total	**73**	**76**	**149**	**100.0**

The majority of fatal injuries to older adults on Australian farms occurred while the person was working (112: 75.2%). There were on average nine fatalities per year of older adults who were not working.

Gender and Age

Of the 149 fatalities of older adults, 140 (94.0%) were of males and nine (6.0%) were of females. Males were predominantly working at the time of the fatal incident (109: 77.9%) and females had equal numbers who were either working, bystanders or other farm (each 3: 33.3%) (Table 4.24).

Table 4.24 Age group and gender by work status, older adults, farm-related fatalities, Australia, 1989-1992

Age Group	Working		Bystander		Other Farm		Total	%
	Male	Female	Male	Female	Male	Female		
55 - 64	54	1	6	1	9	2	73	49.0
65+	55	2	8	2	8	1	76	51.0
Total	**109**	**3**	**14**	**3**	**17**	**3**	**149**	**100.0**

State or Territory of Fatal Incident

New South Wales (54: 36.2%), Queensland (32: 21.5%) and Victoria (28: 18.8%) had more than double the number of fatalities of older adults compared with the three remaining states (Table 4.25). There were no fatalities of older adults on properties in the Northern Territory between 1989-1992.

Table 4.25 State or Territory of incident by age group, older adults, farm-related fatalities, Australia, 1989-1992

State or Territory	55 - 64 Years	65+ Years	Total	%
QLD	15	17	32	21.5
NSW	32	22	54	36.2
VIC	12	16	28	18.8
TAS	6	6	12	8.1
SA	5	7	12	8.1
WA	3	8	11	7.4
Total	**73**	**76**	**149**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 113 (75.8%) incidents. The most common type of farm enterprises were cereal grains, sheep, cattle and pigs (25: 16.8%), meat cattle (21: 14.1%) and sheep (15: 10.1%) (Table 4.26).

Table 4.26 Farm enterprise by age group, older adults, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	55 - 64 Years	65+ Years	Total	%
Agriculture	**73**	**76**	**149**	**100.0**
Fruit	*-*	*1*	*1*	*0.7*
Grapes	*1*	*-*	*1*	*0.7*
Plantation Fruit	*1*	*1*	*2*	*1.3*
Orchard and Other Fruit	*3*	*2*	*5*	*3.4*
Vegetables Including Potatoes	*6*	*1*	*7*	*4.7*
Cereal Grains, Sheep, Cattle, Pigs	*11*	*14*	*25*	*16.8*
Cereal Grains	*3*	*1*	*4*	*2.7*
Sheep, Cereal Grains	*1*	*-*	*1*	*0.7*
Meat Cattle, Cereal Grains	*2*	*4*	*6*	*4.0*
Sheep, Meat Cattle	*3*	*3*	*6*	*4.0*
Sheep	*8*	*7*	*15*	*10.1*
Meat Cattle	*7*	*14*	*21*	*14.1*
Dairy	*-*	*2*	*2*	*1.3*
Other Agriculture	*2*	*1*	*3*	*2.0*
Sugar Cane	*3*	*1*	*4*	*2.7*
Cotton	*1*	*-*	*1*	*0.7*
Nurseries	*-*	*1*	*1*	*0.7*
Agriculture NEC	*3*	*5*	*8*	*5.4*
Agriculture Not Known	*18*	*18*	*36*	*24.2*
Total	**73**	**76**	**149**	**100.0**

Location of Fatal Incident

Roads and lanes (23: 15.4%), areas of natural vegetation (22: 14.8%), paddocks under crop (21: 14.1%), paddocks clear for grazing (16: 10.7%) and farm yards or gardens (15: 10.1%) were the most common locations of the fatal incident on the farm for older adults (Table 4.27).

Table 4.27 Location on farm by age group, older adults, farm-related fatalities, Australia, 1989-1992

Location on Farm	55 - 64 Years	65+ Years	Total	%
Paddock Under Crop	11	10	21	14.1
Paddock Clear for Grazing	8	8	16	10.7
Natural Vegetation	14	8	22	14.8
Unspecified	1	2	3	2.0
Stockyards Including Horse Yards	5	1	6	4.0
Roads, Lanes	8	15	23	15.4
Dam, Water Reservoir, Irrigation Channel	1	6	7	4.7
River, Creek	3	2	5	3.4
Hay Shed	-	1	1	0.7
Machinery Shed	2	1	3	2.0
Shed, Farm Building NEC	1	4	5	3.4
Woolshed Shearing Shed	1	-	1	0.7
Storage Shed Other	-	1	1	0.7
Windmill Including Troughs	-	1	1	0.7
Sorting Packing Shed	1	-	1	0.7
Farm Excluding Residence NEC	3	1	4	2.7
Farm Residence	3	3	6	4.0
Farm Yard or Garden	7	8	15	10.1
Shearers Quarters	1	-	1	0.7
Other Place Associated with Agricultural Work	1	1	2	1.3
Not Relevant	2	3	5	3.4
Total	**73**	**76**	**149**	**100.0**

TRACTOR AND HARVESTER RUNOVER

A 59 year old male potato farmer was under a potato harvester clearing a blocked conveyor. The harvester was attached to a tractor that was parked on an incline. The hand brake of the tractor did not hold and the farmer was run over by the harvester and the tractor. The farmer had been harvesting potatoes on his farm.

POST-HOLE DIGGER ENTANGLEMENT

A 63 year male farmer was using a tractor with a post-hole digger attached in a paddock on his farm. The paddock had a number of posts already embedded in the ground, which were being placed there for the purposes of constructing glasshouses. The farmer was digging more holes for pine posts. The post-hole digger was being operated by three point linkage on the back of the tractor. The post-hole digger was one metre in length and was as far into the ground as it could go. The farmer had become entangled in the mechanism while it was digging. On the day of the incident, it was windy and the farmer had been working alone. The farmer went to the post-hole digger whilst it was operating and his clothing become entangled in the post-hole digger.

Agent and Mechanism of Fatal Incident

Mobile farm machinery and plant (mainly tractors) (46: 30.9%), farm vehicles (commonly cars) (26: 17.4%), the working environment (including fire or smoke and trees being felled) (25: 16.8%) and farm structures (mainly dams and creeks or rivers) (20: 13.4%) were the most common agents of fatal injury (Table 4.28).

Table 4.28 Agent of fatal incident by age group, older adults, farm-related fatalities, Australia, 1989-1992

Agent	55 - 64 Years	65+ Years	Total	%
Farm Vehicles				
Truck	3	1	4	2.7
Utility	-	2	2	1.3
Car	4	6	10	6.7
Trailer	-	1	1	0.7
Motorcycle 2 Wheel	-	2	2	1.3
Aircraft	4	-	4	2.7
Other Farm Vehicle NEC	1	2	3	2.0
Total Farm Vehicles	**12**	**14**	**26**	**17.4**
Mobile Farm Machinery and Plant				
Tractor	15	22	37	24.8
Tillage Seeder	1	-	1	0.7
Earth Moving Equipment	1	-	1	0.7
Harvesting Machine	1	-	1	0.7
Slasher	2	-	2	1.3
Posthole Digger	2	1	3	2.0
Other Mobile Farm Machinery and Plant NEC	-	1	1	0.7
Total Mobile Farm Machinery and Plant	**22**	**24**	**46**	**30.9**
Fixed Plant and Equipment				
Pump	-	1	1	0.7
Ladder Excluding Ladder Attached to Structure	-	2	2	1.3
Total Fixed Plant and Equipment	**-**	**3**	**3**	**2.0**
Other Equipment and Materials				
Forklift	2	-	2	1.3
Knife	1	-	1	0.7
Gun, Rifle, Shotgun	4	1	5	3.4
Other Equipment and Materials NEC	2	1	3	2.0
Total Other Equipment and Materials	**9**	**2**	**11**	**7.4**
Materials				
Steel	2	-	2	1.3
Timber	-	1	1	0.7
Round Bales	-	1	1	0.7
Hay Bales Other	1	1	2	1.3
Other Materials NEC	1	-	1	0.7
Total Materials	**4**	**3**	**7**	**4.7**

Table 4.28 Agent of fatal incident by age group, older adults, farm-related fatalities, Australia 1989-1992 (cont)

Agent	55 - 64 Years	65+ Years	Total	%
Farm Structures				
Swimming Pool	-	1	1	0.7
Dam	1	5	6	4.0
Windmill	-	1	1	0.7
Creek, River	2	4	6	4.0
Silo Grain	-	1	1	0.7
Rail Tracks	1	-	1	0.7
Powerlines	1	1	2	1.3
Other Farm Structure NEC	1	1	2	1.3
Total Farm Structures	**6**	**14**	**20**	**13.4**
Animals				
Horse	6	1	7	4.7
Cattle	-	1	1	0.7
Sheep	-	1	1	0.7
Insect	1	-	1	0.7
Total Animals	**7**	**3**	**10**	**6.7**
Farm Hazardous Substances				
Farm Chemicals	-	1	1	0.7
Total Farm Hazardous Substances	**-**	**1**	**1**	**0.7**
Working Environment				
Fire or Smoke	4	5	9	6.0
Ground, Rock, or Stump	2	2	4	2.7
Lumber	1	1	2	1.3
Trees Being Felled	5	3	8	5.4
Other Working Environment NEC	1	1	2	1.3
Total Working Environment	**13**	**12**	**25**	**16.8**
Total	**73**	**76**	**149**	**100.0**

SLIPPED AND FELL IN DAM

A 71 year old farmer drowned in a dam on the property. The farmer had stated to his wife that he was going to visit his brother who lived nearby, and was later found in the dam. To visit his brother, the farmer would walk past the dam and it was known that the farmer would check the water level in the dam regularly. It appears the farmer may have slipped while checking the water level in the dam. The farmer had suffered from Parkinson's disease for four years prior to the incident.

Rollovers of mobile machinery (commonly tractors and forklifts) (26: 17.4%), being hit by moving objects (mainly tractors and farm vehicles) (24: 16.1%), vehicle accidents (commonly aircraft, cars and trucks) (16: 10.7%) and being hit by falling objects (mainly trees being felled; and vehicles the person was working underneath, falling on the person) (15: 10.1%) were the most common mechanisms of fatal injury (Table 4.29).

Table 4.29 Mechanism of fatal incident by age group, older adults, farm-related fatalities, Australia, 1989-1992

Mechanism	55 - 64 Years	65+ Years	Total	%
Falls From a Height	9	5	14	9.4
Falls on Same Level	-	1	1	0.7
Hitting Stationary Objects	1	-	1	0.7
Being Hit by Falling Objects	10	5	15	10.1
Being Hit by an Animal	5	3	8	5.4
Being Trapped by Moving Machinery	2	1	3	2.0
Being Trapped Between Stationary and Moving Objects	-	2	2	1.3
Being Hit by Moving Objects	6	18	24	16.1
Contact with Flames or Heat	4	6	10	6.7
Exposure to Environmental Cold	-	1	1	0.7
Contact with Electricity	2	1	3	2.0
Drowning	3	11	14	9.4
Single Contact with Chemical or Substance	1	1	2	1.3
Insect and Spider Bites and Stings	1	-	1	0.7
Shot by Firearm	4	1	5	3.4
Stabbed by Knife	1	-	1	0.7
Vehicle Accident	10	6	16	10.7
Rollover	14	12	26	17.4
Mechanism Not Known	-	2	2	1.3
Total	**73**	**76**	**149**	**100.0**

Activity at Time of Fatal Incident

The most common activities at the time of the fatal incident were transport for work purposes (24: 16.1%), maintenance activities (18: 12.1%), working with crops (16: 10.7%), felling trees or clearing land (15: 10.1%) and working with animals (14: 9.4%) (Table 4.30).

Table 4.30 Activity at time of fatal incident by age group, older adults, farm-related fatalities, Australia, 1989-1992

Activity	55 - 64 Years	65+ Years	Total	%
Transport for Work Purposes	11	13	24	16.1
Transport for Recreation	2	-	2	1.3
Transport NEC	4	4	8	5.4
Constructing or Installing	1	2	3	2.0
Maintenance	12	6	18	12.1
Earthmoving or Digging	3	1	4	2.7
Slaughtering, Gutting or Shelling	3	-	3	2.0
Milling	-	1	1	0.7
Felling Trees or Clearing Land	8	7	15	10.1
Firefighting	1	1	2	1.3
Hunting	-	1	1	0.7
Working with Animals	8	6	14	9.4
Working with Crops	7	9	16	10.7
Monitoring, Observing, Inspecting	4	4	8	5.4
Moving Goods	3	4	7	4.7
Work Break	-	1	1	0.7
Recreation or Playing	2	4	6	4.0
Household Domestic Work or Gardening	1	4	6	4.0
Working – Context Unclear	-	1	1	0.7
Other	2	2	4	2.7
Not Known / Not Stated	1	4	5	3.4
Total	**73**	**76**	**149**	**100.0**

HIT BY FALLING TREE

A 59 year old farmer was felling trees with his son. To fell a tree the farmer and his son would attach a wire rope to the tree and then attach the wire to the rear of a tractor. The tree was then cut with a chainsaw and the wire was pulled to ensured the tree fell in the desired direction. The farmer's son was driving a tractor, with the wire rope attached, and the farmer was operating the chainsaw. The main trunk of the third tree was felled in the desired direction, but a smaller trunk or branch attached to the base of the tree split away from the main truck, falling in the opposite direction and striking the farmer. The farmer's son used the chainsaw to remove the trunk, but the farmer was killed instantly.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological causes of death were head injuries (25: 16.8%), chest injuries (23: 15.4%), multiple injuries (17: 11.4%) and drowning (16: 10.7%) (Table 4.31).

Table 4.31 Pathophysiological cause of death by age group, older adults, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	55 - 64 Years	65+ Years	Total	%
Head Injuries	16	9	25	16.8
Neck Injuries	4	3	7	4.7
Chest Injuries	12	11	23	15.4
Trunk Injuries	4	9	13	8.7
Abdominal Injuries	1	2	3	2.0
Multiple Injuries to Head and Other Body Parts	1	5	6	4.0
Multiple Injuries - Other	7	4	11	7.4
Drowning	4	12	16	10.7
Crush Asphyxia	7	3	10	6.7
Electrocution	2	1	3	2.0
Burns	3	3	6	4.0
Inhalation of a Chemical Substance	1	1	2	1.3
Suffocation	-	1	1	0.7
Fat Embolism Crush Injury Syndrome	1	1	2	1.3
Chemical Substance Ingestion	-	1	1	0.7
Envenomation	1	-	1	0.7
Acute Drug Toxicity	1	-	1	0.7
Hypothermia	-	1	1	0.7
Not Known	1	-	1	0.7
Medical Complications	7	9	16	10.7
Total	**73**	**76**	**149**	**100.0**

Blood alcohol tests were conducted for just over half of both the 55-64 year olds (41: 56.2%) and persons aged 65 years and older (43: 56.6%). Where blood alcohol tests were conducted, the results of the tests revealed that the majority of older persons had a nil blood alcohol reading, with approximately 12% of both 55-64 year olds and persons aged 65 years or older having blood alcohol readings greater than 0.05% (Table 4.32).

Table 4.32 Blood alcohol content by age group, older adults, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	55 - 64 Years	65+ Years	Total
Nil Blood Alcohol Reading	34 (82.9%)	36 (83.7%)	70 (83.3%)
Blood Alcohol Reading Between 0.001% and 0.05%	2 (4.9%)	2 (4.7%)	4 (4.8%)
Blood Alcohol Reading Greater than 0.05%	5 (12.2%)	5 (11.6%)	10 (11.9%)
Total	**41 (100.0%)**	**43 (100.0%)**	**84 (100.0%)**

Month and Day of Fatal Incident

The months with the highest number of fatalities on farms were November (23: 15.4%) and April (20: 13.4%) (Table 4.33).

Table 4.33 Month of incident per year, older adults, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	4	2	2	2	10	6.7
February	2	1	2	-	5	3.4
March	1	2	4	6	13	8.7
April	1	10	6	3	20	13.4
May	4	2	3	4	13	8.7
June	1	2	1	7	11	7.4
July	-	4	2	1	7	4.7
August	2	3	4	4	13	8.7
September	5	-	3	1	9	6.0
October	5	3	1	6	15	10.1
November	3	10	4	6	23	15.4
December	2	-	4	4	10	6.7
Total	**30**	**39**	**36**	**44**	**149**	**100.0**

Monday (28: 18.8%), Saturday (24: 16.1%) and Wednesday (22: 14.8%) were the days of the week with the highest number of fatalities (Table 4.34).

Table 4.34 Day of incident by age group, older adults, farm-related fatalities, Australia, 1989-1992

Day of Week	55 - 64 Years	65+ Years	Total	%
Sunday	8	8	16	10.7
Monday	13	15	28	18.8
Tuesday	9	10	19	12.8
Wednesday	14	8	22	14.8
Thursday	6	10	16	10.7
Friday	10	9	19	12.8
Saturday	12	12	24	16.1
Not Known	1	4	5	3.3
Total	**73**	**76**	**149**	**100.0**

Visitor to the Farm

Of the 149 older adults fatally injured on a farm, approximately three-quarters resided on the farm (111: 74.5%), 29 (19.5%) were visitors to the farm and it was not relevant or not known if nine older adults (6.0%) were visitors to the farm or not.

SUMMARY SECTION 4

Children (0-14 Years)

- There were on average 29 fatalities per year during 1989 to 1992 involving children less than 15 years.
- The majority of children who were fatally injured on Australian farms were male.
- The most common states where the fatal incident occurred were Victoria, New South Wales and Queensland.
- The most common agent and mechanism of the fatal incident for children less than five years of age was drowning in dams. The agent and mechanism of the fatal incident changed from drowning when the children were very young to vehicle accidents or incidents involving mechanical equipment for older children.
- The majority of young children were bystanders to work or other on farm fatalities, but there were a small number of children who were working at the time of the fatal incident.
- The majority of the fatal incidents occurred while the child was playing or performing a recreational activity.
- The majority of children were residents of the farm, but a third were visitors to the farm.

Young Adults (15-29 Years)

- There were 30 farm-related fatalities per year during 1989 to 1992 to young adults aged between 15 and 29 years. Young adults represented a fifth of all farm fatalities. The majority of young adults were working at the time of the fatal incident.
- The majority of young adults were males.
- The most common states where the fatal incident occurred were New South Wales, Queensland and Victoria.
- The most common farm enterprise was meat cattle farms.
- The most common locations of the fatal incident were road and lanes; paddocks; and areas of natural vegetation.
- The most common agents of the fatal incident were cars; trucks; motorcycles; firearms; and aircraft. The most common mechanism of the fatal incident was vehicle accidents.
- The most common activities being performed at the time of the fatal incident were transport, both for work and recreational purposes; and maintenance activities.
- Young adults were most commonly farm residents, although a third were visitors to the farm.

Older Adults (55 + Years)

- There were 37 farm-related fatalities on Australian farms between 1989 and 1992 of older adults aged 55 years or older. The majority of older adults were working at the time of the fatal incident.
- The majority of the older adults were males.
- The three most common states where the fatal incident occurred were New South Wales, Queensland and Victoria.
- The three most common farm enterprises where the fatal incident occurred were cereal grains, sheep, cattle and pigs; meat cattle; and sheep.
- The most common locations where the fatal incident occurred were roads and lanes; areas of natural vegetation; paddocks; and farm yards or gardens.
- Common circumstances involved in the fatal incident were rollovers of mobile machinery (commonly tractors); being hit by moving objects (commonly tractors); and being hit by falling objects (like trees being felled and vehicles that the person was working underneath falling on the person). There were also a number of older adults who drowned in dams, creeks and rivers.
- The common activities at the time of the fatal incident were transport for work purposes and maintenance activities.
- The majority of older adults were residents of the farm at the time of the fatal incident.

Section 5: Fatal Injuries on Farms by Specific Agents

This Section examines some of the more common agents that were identified using the Farm Injury Optimal Data Set (Coleman, 1995) as being the major contributor to the fatal incident on farms between 1989 and 1992. The common agents identified were trucks, utilities, cars, two-wheel motorcycles, aircraft, tractors, firearms, dams, horses and trees being felled.

TRUCKS

Trucks are vehicles in common use on Australian farms, they range in size and use. Most commonly they are used to transport farm produce and animals from the farm to grain receivers, saleyards, markets and abattoirs.

Between 1989 and 1992, there were 23 fatal incidents on Australian farm involving trucks. This is an average of approximately six fatal incidents per year or a fatality every two months. Of the 23 fatal incidents involving trucks, 19 (82.6%) were of persons working at the time of the incident, three (13.0%) were of bystanders and one (4.3%) was an other farm fatality (Table 5.1).

Table 5.1 Number of fatalities per year by work status, trucks, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	6	-	-	6	26.1
1990	5	-	-	5	21.7
1991	4	1	-	5	21.7
1992	4	2	1	7	30.4
Total	**19**	**3**	**1**	**23**	**100.0**

VEHICLE COLLISION

A farmer was driving a truck (a table top trailer carrying an empty 12,000 litre fiberglass tank). The truck had just passed over a crest in the road when the farmer was confronted with another vehicle, travelling in the opposite direction, but in the wrong lane. The farmer applied the truck's brakes, but was unable to avoid the collision. The farmer had been driving from one farm property to another at the time of the incident. The weather was clear, the road dry and visibility was good. Both vehicles were found to be in good mechanical condition.

Gender and Age

Twenty of the twenty-three fatal incidents (87.0%) were of persons aged 15 years or older, although persons of all ages were involved. Most of the workers were adults (18: 94.7%). All of the three bystanders were under 35 years and one was aged between 0 and 4 years. Eighteen (94.7%) workers, all of the bystanders and the person involved in the other farm fatality were male (Table 5.2).

Table 5.2 Age group by work status, trucks, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	1	1	2	8.7
5 - 9	1	-	-	1	4.3
15 - 24	2	1	-	3	13.0
25 - 34	6	1	-	7	30.4
35 - 44	2	-	-	2	8.7
45 - 54	4	-	-	4	17.4
55 - 64	3	-	-	3	13.0
75+	1	-	-	1	4.3
Total	**19**	**3**	**1**	**23**	**100.0**

State or Territory of Fatal Incident

New South Wales (10: 43.5%) and Victoria (5: 21.7%) had the largest number of fatal incidents. New South Wales had the highest number of working fatalities (9: 47.4%), and Victoria had the highest number of bystander (2: 66.7%) fatalities. The other farm fatality occurred in New South Wales (Table 5.3).

Table 5.3 State or Territory of incident by work status, trucks, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	2	-	-	2	8.7
NSW	9	-	1	10	43.5
VIC	3	2	-	5	21.7
TAS	2	-	-	2	8.7
SA	1	-	-	1	4.3
WA	2	1	-	3	13.0
Total	**19**	**3**	**1**	**23**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 16 (69.6%) incidents. The most common farm enterprise type were sheep enterprises (3: 13.0%) (Table 5.4).

Table 5.4 Farm enterprise by work status, trucks, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**19**	**3**	**1**	**23**	**100.0**
Vegetables Including Potatoes	*2*	*-*	*-*	*2*	*8.7*
Cereal Grains, Sheep, Cattle, Pigs	*2*	*-*	*-*	*2*	*8.7*
Cereal Grains	*1*	*-*	*-*	*1*	*4.3*
Sheep, Meat Cattle	*1*	*-*	*-*	*1*	*4.3*
Sheep	*2*	*1*	*-*	*3*	*13.0*
Meat Cattle	*1*	*1*	*-*	*2*	*8.7*
Dairy	*1*	*-*	*1*	*2*	*8.7*
Pigs	*1*	*-*	*-*	*1*	*4.3*
Sugar Cane	*1*	*-*	*-*	*1*	*4.3*
Agriculture NEC	*1*	*-*	*-*	*1*	*4.3*
Agriculture Not Known	*6*	*1*	*-*	*7*	*30.4*
Total	**19**	**3**	**1**	**23**	**100.0**

Location of Fatal Incident

Nine (39.1%) of the fatal incidents occurred on roads and lanes with paddocks, clear for grazing (5: 21.7%) being the next most common location where the fatal incident occurred (Table 5.5).

Table 5.5 Location on farm by work status, trucks, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Under Crop	1	-	-	1	4.3
Paddock Clear for Grazing	3	2	-	5	21.7
Roads, Lanes	9	-	-	9	39.1
Woolshed Shearing Shed	1	-	-	1	4.3
Shed, Farm Building NEC	-	-	1	1	4.3
Farm Yard or Garden	-	1	-	1	4.3
Not Relevant	5	-	-	5	21.7
Total	**19**	**3**	**1**	**23**	**100.0**

Mechanism of Fatal Incident

Twelve (52.2%) of the incidents were vehicle accidents. Nine (39.1%) incidents involved a person being hit by the truck (Table 5.6).

Table 5.6 Mechanism of fatal incident by work status, trucks, farm-related fatalities, Australia 1989-1992

Mechanism	Working	Bystander	Other Farm	Total	%
Falls From a Height	1	-	-	1	4.3
Being Hit by Falling Objects	1	-	-	1	4.3
Being Hit by Moving Objects	6	2	1	9	39.1
Vehicle Accident	11	1	-	12	52.2
Total	**19**	**3**	**1**	**23**	**100.0**

Activity at Time of Fatal Incident

Almost half of the persons fatally injured were travelling, in or on the truck, for work purposes (11: 47.8%) (Table 5.7).

Table 5.7 Activity at time of fatal incident by work status, trucks, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	11	-	-	11	47.8
Transport for Recreation	-	1	-	1	4.3
Transport NEC	2	1	-	3	13.0
Maintenance	1	-	-	1	4.3
Working with Animals	2	-	-	2	8.7
Monitoring, Observing, Inspecting	1	-	-	1	4.3
Moving Goods	2	-	-	2	8.7
Recreation or Playing	-	1	1	2	8.7
Total	**19**	**3**	**1**	**23**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological causes of death for fatalities involving trucks were head injuries and multiple injuries (each 7: 30.4%) (Table 5.8).

Table 5.8 Pathophysiological cause of death by work status, trucks, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	6	-	1	7	30.4
Neck Injuries	1	-	-	1	4.3
Trunk Injuries	2	1	-	3	13.0
Limb Injuries	-	1	-	1	4.3
Multiple Injuries to Head and Other Body Parts	3	-	-	3	13.0
Multiple Injuries - Other	4	-	-	4	17.4
Crush Asphyxia	1	1	-	2	8.7
Medical Complications	2	-	-	2	8.7
Total	**19**	**3**	**1**	**23**	**100.0**

Blood alcohol tests were available for eleven (57.9%) of the working group and two (66.7%) of the bystanders. The person involved in the other farm fatality did not have a blood alcohol test conducted. Of those with known blood alcohol readings, two (18.2%) of the workers and one (50.0%) of the bystanders had a blood alcohol reading above 0.05g/100ml (Table 5.9).

Table 5.9 Blood alcohol content by work status, trucks, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	8 (72.7%)	1 (50.0%)	-	9 (69.2%)
Blood Alcohol Reading Between 0.001% and 0.05%	1 (9.1%)	-	-	1 (7.7%)
Blood Alcohol Reading Greater than 0.05%	2 (18.2%)	1 (50.0%)	-	3 (23.1%)
Total	**11 (100.0%)**	**2 (100.0%)**	**-**	**13 (100.0%)**

Month and Day of Fatal Incident

There was no clear monthly pattern in the number of fatal incidents (Table 5.10).

Table 5.10 Month of incident per year, trucks, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	-	1	-	1	4.3
February	-	-	-	2	2	8.7
March	1	-	1	1	3	13.0
April	-	1	2	1	4	17.4
May	1	-	-	-	1	4.3
June	1	1	-	-	2	8.7
July	1	1	-	-	2	8.7
September	-	-	-	1	1	4.3
October	1	-	-	1	2	8.7
November	-	-	-	1	1	4.3
December	1	2	1	-	4	17.4
Total	**6**	**5**	**5**	**7**	**23**	**100.0**

There was no clear daily pattern in the number of fatal incidents (Table 5.11).

Table 5.11 Day of incident by work status, trucks, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	1	-	-	1	4.3
Monday	4	-	1	5	21.7
Tuesday	5	-	-	5	21.7
Wednesday	3	-	-	3	13.0
Thursday	4	-	-	4	17.4
Saturday	2	3	-	5	21.7
Total	**19**	**3**	**1**	**23**	**100.0**

Visitor to the Farm

Of the 23 fatal incidents, five (21.7%) involved visitors, 13 (56.5%) involved residents of the farm and for five (21.7%) it was not relevant or not known if the person was a visitor to the farm. For people working, three (15.8%) were visitors, eleven (57.9%) were residents and for five (26.3%) their visitor status was not relevant or not known. For bystanders, there was one (33.3%) visitor and two (66.7%) residents. The one other farm fatality involved a visitor to the farm.

UTILITIES

Utilities, or 'utes' as they are often known, are a vehicle found regularly on Australian farms. They are about the same size as a station wagon, but only have a cab and a tray back. They have the capacity to carry about a tonne of equipment and materials in the tray. Some are four-wheel drive and others are not. They are used to carry feed, equipment and other farm items, and are also often used as transport in rural areas.

Between 1989 and 1992, there were 20 fatal incidents on Australian farms involving utilities. This is an average of five fatalities per year or a fatality every three months. There were half as many fatalities in 1991 and 1992 as there were in 1989 and 1990. Of the 20 fatalities involving utilities, six (30.0%) were of persons working at the time of the incident, eleven (55.0%) were of bystanders and three (15.0%) involved other farm fatalities (Table 5.12).

Table 5.12 Number of fatalities per year by work status, utilities, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	3	4	-	7	35.0
1990	1	3	3	7	35.0
1991	1	1	-	2	10.0
1992	1	3	-	4	20.0
Total	**6**	**11**	**3**	**20**	**100.0**

Gender and Age

Thirteen of the twenty fatal incidents (65.0%) were of persons aged 24 years or less, although persons of all ages were involved. Most of the workers were adults, eight (72.7%) of the bystanders were under 15 years and the three other farm persons were aged between 19 and 25 years. Five (83.3%) workers, seven (63.6%) bystanders and all of the other farm persons were male (Table 5.13).

Table 5.13 Age group by work status, utilities, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	4	-	4	20.0
5 - 14	-	4	-	4	20.0
15 - 24	1	2	2	5	25.0
25 - 34	1	-	1	2	10.0
35 - 44	-	1	-	1	5.0
45 - 54	2	-	-	2	10.0
65 - 74	2	-	-	2	10.0
Total	**6**	**11**	**3**	**20**	**100.0**

State or Territory of Fatal Incident

New South Wales (7: 35.0%), Victoria (4: 20.0%) and Queensland (3: 15.0%) had the largest number of fatal incidents. New South Wales had the highest number of working (3: 50.0%) and other farm (2: 66.7%) fatalities, while Queensland and Victoria each had three (27.3%) of the bystander fatalities (Table 5.14).

Table 5.14 State or Territory of incident by work status, utilities, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	-	3	-	3	15.0
NSW	3	2	2	7	35.0
VIC	1	3	-	4	20.0
TAS	1	1	-	2	10.0
SA	1	-	-	1	5.0
WA	-	2	-	2	10.0
NT	-	-	1	1	5.0
Total	**6**	**11**	**3**	**20**	**100.0**

FELL FROM UTE

A 43 year old female was standing in the rear of a ute that was being driven around a farming property. As the ute descended a slope, it turned into a curve and rolled over. The bystander was ejected from the rear tray and was subsequently crushed by the vehicle. The bystander was a visitor to the farm and was having a tour of the property.

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 17 (85.0%) incidents. The most common type of farm enterprises were sheep (4: 20.0%) and cereal grains, sheep, cattle and pigs (4: 20.0%) (Table 5.15).

Table 5.15 Farm enterprise by work status, utilities, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**6**	**11**	**3**	**20**	**100.0**
Plantation Fruit	*1*	*1*	*-*	*2*	*10.0*
Cereal Grains, Sheep, Cattle, Pigs	*1*	*3*	*-*	*4*	*20.0*
Sheep, Meat Cattle	*-*	*2*	*-*	*2*	*10.0*
Sheep	*1*	*3*	*-*	*4*	*20.0*
Meat Cattle	*1*	*1*	*1*	*3*	*15.0*
Dairy	*1*	*-*	*-*	*1*	*5.0*
Cotton	*1*	*-*	*-*	*1*	*5.0*
Agriculture Not Known	*-*	*1*	*2*	*3*	*15.0*
Total	**6**	**11**	**3**	**20**	**100.0**

Location of Fatal Incident

Eleven (55.0%) of the fatal incidents occurred on roads and lanes, with paddocks (4: 20.0%) and areas of natural vegetation (3: 15.0%) being the next most common locations where the fatal incident occurred (Table 5.16).

Table 5.16 Location on farm by work status, utilities, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Under Crop	-	1	-	1	5.0
Paddock Clear for Grazing	-	3	-	3	15.0
Natural Vegetation	1	1	1	3	15.0
Roads, Lanes	5	4	2	11	55.0
Farm Yard or Garden	-	2	-	2	10.0
Total	**6**	**11**	**3**	**20**	**100.0**

Mechanism of Fatal Incident

Thirteen (65.0%) of the incidents were vehicle accidents. Five more (25.0%) involved someone being hit by a moving object, usually the utility (Table 5.17).

Table 5.17 Mechanism of fatal incident by work status, utilities, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Other Farm	Total	%
Falls From a Height	-	1	-	1	5.0
Being Trapped Between Stationary and Moving Objects	1	-	-	1	5.0
Being Hit by Moving Objects	2	3	-	5	25.0
Vehicle Accident	3	7	3	13	65.0
Total	**6**	**11**	**3**	**20**	**100.0**

Activity at Time of Fatal Incident

Most of the persons fatally injured were travelling in the cab of the utility or on the tray of the utility, either for work (4: 20.0%) or recreation (8: 40.0%) purposes. Four others (20.0%), all bystanders, were playing at the time of the incident (Table 5.18).

Table 5.18 Activity at time of fatal incident by work status, utilities, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	4	-	-	4	20.0
Transport for Recreation	-	6	2	8	40.0
Maintenance	1	-	-	1	5.0
Hunting	-	-	1	1	5.0
Recreation or Playing	-	4	-	4	20.0
Working – Context Unclear	1	-	-	1	5.0
Other	-	1	-	1	5.0
Total	**6**	**11**	**3**	**20**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death was head injuries (11: 55.0%), with chest and truck injuries (6: 30%) being the next most common causes of death (Table 5.19).

Table 5.19 Pathophysiological cause of death by work status, utilities, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	1	10	-	11	55.0
Neck Injuries	1	-	-	1	5.0
Chest Injuries	1	1	1	3	15.0
Trunk Injuries	2	-	1	3	15.0
Crush Asphyxia	1	-	-	1	5.0
Not Known	-	-	1	1	5.0
Total	**6**	**11**	**3**	**20**	**100.0**

Blood alcohol tests were available for all of the working group, four (36.4%) of the bystanders and two (66.7%) of the other farm fatalities. Of those with known blood alcohol readings, one (16.7%) of the workers, one (25.0%) of the bystanders and one (50.0%) of the other farm persons had a blood alcohol reading above 0.05 g/100ml (Table 5.20).

Table 5.20 Blood alcohol content by work status, utilities, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	4 (66.7%)	3 (75.0%)	1 (50.0%)	8 (66.7%)
Blood Alcohol Reading Between 0.001% and 0.05%	1 (16.7%)	-	-	1 (5.6%)
Blood Alcohol Reading Greater than 0.05%	1 (16.7%)	1 (25.0%)	1 (50.0%)	3 (25.0%)
Total	**6 (100.0%)**	**4 (100.0%)**	**2 (100.0%)**	**12 (100.0%)**

UTE COLLISION WITH DROP BOX

An assistant agronomist was driving a ute along a private roadway beside an irrigation channel when the offside front wheels of the ute came into contact with a culvert commonly known as a 'drop box', causing the vehicle to overturn. It appears the agronomist was not wearing a seat belt and was thrown from the vehicle. Three main factors contributed to the accident – the excessive speed of the vehicle, the seat belt not being worn and the unmarked position of the drop box. To prevent a re-occurrence of this type of incident, steps were taken by the company to ensure employees drove vehicles at safe speeds and also wore seat belts. Warning markers were also installed at drop box locations to ensure vehicle drivers were aware of their locations.

Month and Day of Fatal Incident

Half of the incidents occurred in June and December (Table 5.21).

Table 5.21 Month of incident per year, utilities, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	1	-	-	2	10.0
February	1	-	-	-	1	5.0
March	-	1	-	-	1	5.0
April	1	-	-	-	1	5.0
June	1	2	1	-	4	20.0
July	1	-	-	-	1	5.0
August	-	-	-	1	1	5.0
September	1	-	-	-	1	5.0
October	-	-	-	1	1	5.0
November	-	1	-	-	1	5.0
December	1	2	1	2	6	30.0
Total	**7**	**7**	**2**	**4**	**20**	**100.0**

There was no clear daily pattern, but nine of the 20 incidents (45.0%) occurred on the weekend (Table 5.22).

Table 5.22 Day of incident by work status, utilities, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	-	4	-	4	20.0
Monday	1	-	-	1	5.0
Tuesday	1	-	-	1	5.0
Wednesday	1	-	1	2	10.0
Thursday	1	4	-	5	25.0
Friday	-	-	2	2	10.0
Saturday	2	3	-	5	25.0
Total	**6**	**11**	**3**	**20**	**100.0**

Visitor to the Farm

Of the 20 fatal incidents involving a utility, eight (40.0%) involved visitors and 12 (60.0%) involved residents of the farm. For people working, two (33.3%) were visitors and four (66.7%) were residents. For bystanders, there were three (27.3%) visitors and eight (72.7%) residents. All of the three other farm fatalities involved visitors.

CARS

Cars are commonly used to transport people around the farm, as well as in and out of town. They are also used to pull trailers such as horse floats, small animal trailers and other equipment.

Between 1989 and 1992, there were 32 fatal incidents on Australian farms involving cars. This is an average of eight fatalities per year or two fatalities every three months. Of the 32 fatal incidents, 17 (53.1%) involved persons who were working at the time of the incident, ten (31.3%) involved bystanders and five (15.6%) involved other farm persons (Table 5.23).

Table 5.23 Number of fatalities per year by work status, cars, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	6	3	2	11	34.4
1990	4	-	-	4	12.5
1991	2	4	2	8	25.0
1992	5	3	1	9	28.1
Total	**17**	**10**	**5**	**32**	**100.0**

Gender and Age

Fatal incidents most commonly involved persons aged between 15 and 34 years (15: 46.9%). Although, people from all age groups were involved. Bystander fatalities were mainly of younger persons. All of the working and other farm persons, and half of the bystanders, were male (Table 5.24).

Table 5.24 Age group by work status, cars, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	2	-	2	6.3
15 - 24	5	2	2	9	28.1
25 - 34	1	5	-	6	18.8
35 - 44	1	-	-	1	3.1
45 - 54	3	-	1	4	12.5
55 - 64	2	1	1	4	12.5
65 - 74	1	-	-	1	3.1
75+	4	-	1	5	15.6
Total	**17**	**10**	**5**	**32**	**100.0**

State or Territory of Fatal Incident

Victoria (9: 28.1%), New South Wales (8: 25.0%) and Queensland (8: 25.0%) had the highest number of fatal incidents. Queensland (6: 35.3%) had the most of the working fatalities, Victoria (5: 50.0%) the most bystander fatalities and New South Wales (3: 60.0%) had the most other farm fatalities (Table 5.25).

Table 5.25 State or Territory of incident by work status, cars, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	6	2	-	8	25.0
NSW	3	2	3	8	25.0
VIC	3	5	1	9	28.1
TAS	-	1	-	1	3.1
SA	2	-	-	2	6.3
WA	2	-	1	3	9.4
NT	1	-	-	1	3.1
Total	**17**	**10**	**5**	**32**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 28 (87.5%) incidents. The most common type of farm enterprises were meat cattle (4: 12.5%) and cereal grains, sheep, cattle and pigs (3: 9.4%) (Table 5.26).

Table 5.26 Farm enterprise by work status, cars, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**15**	**1**	**5**	**21**	**65.6**
Vegetables Including Potatoes	*1*	-	-	*1*	*3.1*
Cereal Grains, Sheep, Cattle, Pigs	*3*	-	-	*3*	*9.4*
Cereal Grains	*1*	-	-	*1*	*3.1*
Meat Cattle, Cereal Grains	*1*	-	-	*1*	*3.1*
Sheep, Meat Cattle	*1*	-	-	*1*	*3.1*
Sheep	-	*1*	*1*	*2*	*6.3*
Meat Cattle	*3*	-	*1*	*4*	*12.5*
Agriculture NEC	*2*	-	-	*2*	*6.3*
Services to Agriculture NEC	*2*	-	-	*2*	*6.3*
Agriculture Not Known	*1*	-	*3*	*4*	*12.5*
Other	**2**	**9**	**-**	**11**	**34.4**
Total	**17**	**10**	**5**	**32**	**100.0**

Location of Fatal Incident

The most common location where fatal incidents occurred were roads and lanes (23: 28.1%). This was the case for workers, bystanders and other farm persons (Table 5.27).

Table 5.27 Location on farm by work status, cars, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Natural Vegetation	1	-	-	1	3.1
Roads, Lanes	11	9	3	23	71.9
Hay Shed	-	-	1	1	3.1
Machinery Shed	1	-	-	1	3.1
Farm Excluding Residence NEC	-	-	1	1	3.1
Other Place Associated with Agricultural Work	1	-	-	1	3.1
Not Relevant	3	1	-	4	12.5
Total	**17**	**10**	**5**	**32**	**100.0**

Mechanism of Fatal Incident

Most of the fatal incidents were due to vehicle accidents (23: 71.9%), although three of the five (60.0%) other farm persons and two (11.8%) of the 17 workers were fatally injured in separate incidents when a car underneath which they were working fell on them (Table 5.28).

Table 5.28 Mechanism of fatal incident by work status, cars, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Other Farm	Total	%
Being Hit by Falling Objects	2	-	3	5	15.6
Being Hit by Moving Objects	3	1	-	4	12.5
Vehicle Accident	12	9	2	23	71.9
Total	**17**	**10**	**5**	**32**	**100.0**

Activity at Time of Fatal Incident

Most of the people were travelling in the car for work (14: 43.8%) or recreation (9: 28.1%) purposes. Three of the five (60.0%) other farm persons were performing maintenance at the time of the incident (Table 5.29).

Table 5.29 Activity at time of fatal incident by work status, cars, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	14	-	-	14	43.8
Transport for Recreation	-	7	2	9	28.1
Transport NEC	-	3	-	3	9.4
Maintenance	2	-	3	5	15.6
Monitoring, Observing, Inspecting	1	-	-	1	3.1
Total	**17**	**10**	**5**	**32**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death was head injuries (13: 40.6%). This was the case for both workers and bystanders (Table 5.30).

Table 5.30 Pathophysiological cause of death by work status, cars, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	5	6	2	13	40.6
Neck Injuries	2	2	-	4	12.5
Chest Injuries	3	-	-	3	9.4
Trunk Injuries	1	-	-	1	3.1
Abdominal Injuries	1	-	1	2	6.3
Multiple Injuries to Head and Other Body Parts	-	2	-	2	6.3
Multiple Injuries - Other	2	-	-	2	6.3
Crush Asphyxia	1	-	2	3	9.4
Medical Complications	2	-	-	2	6.3
Total	**17**	**10**	**5**	**32**	**100.0**

Blood alcohol tests were available for 13 (76.5%) of the working group, half of the bystanders and four (80.0%) of the other farm fatalities. Of those with known blood alcohol readings, none of the workers, one (20.0%) of the bystanders and two (50.0%) of the other farm persons had a blood alcohol reading greater than 0.05 g/100ml (Table 5.31).

Table 5.31 Blood alcohol content by work status, cars, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	12 (92.3%)	4 (80.0%)	2 (50.0%)	18 (81.8%)
Blood Alcohol Reading Between 0.001% and 0.05%	1 (7.7%)	-	-	1 (4.5%)
Blood Alcohol Reading Greater than 0.05%	-	1 (20.0%)	2 (50.0%)	3 (13.6%)
Total	**13 (100.0%)**	**5 (100.0%)**	**4 (100.0%)**	**22 (100.0%)**

A HEAD-ON VEHICLE COLLISION

A farm manager and a co-worker were travelling from their work site to collect some equipment for their employer. They were driving along a narrow section of the road when they had a head-on collision with an oncoming truck. The farm manager either did not see the truck or misjudged the distance between his car and the truck. Neither fatigue nor alcohol were involved in this incident. The weather was fine at the time and visibility was good.

Month and Day of Fatal Incident

There was no consistent monthly (Table 5.32) or daily (Table 5.33) pattern in the number of incidents.

Table 5.32 Month of incident per year, cars, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	1	-	-	2	6.3
March	2	-	1	-	3	9.4
April	1	-	1	1	3	9.4
May	1	1	3	1	6	18.8
June	-	-	-	2	2	6.3
July	1	1	-	-	2	6.3
August	1	-	1	-	2	6.3
September	-	-	2	1	3	9.4
October	1	-	-	1	2	6.3
November	-	1	-	2	3	9.4
December	3	-	-	1	4	12.5

Total	**11**	**4**	**8**	**9**	**32**	**100.0**

Table 5.33 Day of incident by work status, cars, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	-	1	-	1	3.1
Monday	4	-	1	5	15.6
Tuesday	1	3	2	6	18.8
Wednesday	-	-	1	1	3.1
Thursday	3	1	-	4	12.5
Friday	4	4	-	8	25.0
Saturday	5	1	1	7	21.9
Total	**17**	**10**	**5**	**32**	**100.0**

CAR COLLIDED WITH HORSE

A manager of a horticulture enterprise was the driver of a car which struck a horse that had galloped onto the roadway. The horse came from a neighbouring property of 25 acres. The land was used for breeding and maintaining thoroughbred horses. The owner of the land had gone away for the weekend and stated that all gates on the property were locked when he left. The police found no damage to any of the fencing when they first inspected the property, but found that one of the gates to a paddock that housed the horses was open.

Visitor to the Farm

Of the 32 fatal incidents involving cars, five (15.6%) involved visitors, 15 (46.9%) involved residents of the farm, and for 12 (37.5%) the incident occurred on a public roadway. For people working, two (11.8%) were visitors, 12 (70.6%) were residents and three (17.6%) incidents occurred on a public roadway. For bystanders, there was one (10.0%) visitor and nine (90.0%) incidents occurred when the car was on a public roadway. For other farm fatalities, two (40.0%) involved visitors and three (60.0%) involved residents of the farm.

TWO-WHEEL MOTORCYCLES

Two-wheel motorcycles are often used in agricultural work, from transport to mustering sheep. They are a versatile piece of work equipment, and can often go where other vehicles can not.

Between 1989 and 1992, there were 24 fatal incidents on Australian farms involving two-wheel motorbikes. This is an average of six fatalities per year or a fatality every two months. There was an increase in the number of fatalities from 1989 to 1992. Of the 24 fatal incidents involving two-wheel motorbikes, 14 (58.3%) were of persons working at the time of the incident, nine (37.5%) were of bystanders to work and one (4.2%) was an other farm fatality (Table 5.34).

Table 5.34 Number of fatalities per year by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	-	2	-	2	8.3
1990	3	1	-	4	16.7
1991	3	2	1	6	25.0
1992	4	4	-	8	33.3
Total	**14**	**9**	**1**	**24**	**100.0**

Gender and Age

Fatal incidents most commonly involved persons aged 15 to 24 years (9: 37.5%), although people from all age groups were killed. Bystanders were mainly young (four were under 15 years and seven were under 25 years of age). All 24 persons were male (Table 5.35).

Table 5.35 Age group by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
5 - 14	1	4	-	5	20.8
15 - 24	6	3	-	9	37.5
25 - 34	2	-	1	3	12.5
35 - 44	3	-	-	3	12.5
45 - 54	2	-	-	2	8.3
65 - 74	-	1	-	1	4.2
75+	-	1	-	1	4.2
Total	**14**	**9**	**1**	**24**	**100.0**

State or Territory of Fatal Incident

Queensland (7: 29.2%), New South Wales (5: 20.8%) and Victoria (5: 20.8%) had the highest number of fatal incidents. However, New South Wales (4: 28.6%) had the highest number of working fatalities and Victoria (4: 44.4%) the highest number of bystander fatalities (Table 5.36).

Table 5.36 State or Territory of incident by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	3	3	1	7	29.2
NSW	4	1	-	5	20.8
VIC	1	4	-	5	20.8
TAS	1	-	-	1	4.2
SA	3	-	-	3	12.5
WA	2	1	-	3	12.5
Total	**14**	**9**	**1**	**24**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 20 (83.3%) incidents. The most common type of farm enterprises were meat cattle (8: 33.3%) and sheep (6: 25.0%). This was the case overall, and for workers and bystanders (Table 5.37).

Table 5.37 Farm enterprise by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**14**	**9**	**1**	**24**	**100.0**
Grapes	*-*	*1*	*-*	*1*	*4.2*
Orchard and Other Fruit	*1*	*-*	*-*	*1*	*4.2*
Cereal Grains, Sheep, Cattle, Pigs	*-*	*1*	*-*	*1*	*4.2*
Sheep, Meat Cattle	*1*	*-*	*-*	*1*	*4.2*
Sheep	*4*	*2*	*-*	*6*	*25.0*
Meat Cattle	*6*	*2*	*-*	*8*	*33.3*
Sugar Cane	*-*	*1*	*1*	*2*	*8.3*
Agriculture Not Known	*2*	*2*	*-*	*4*	*16.7*
Total	**14**	**9**	**1**	**24**	**100.0**

Location of Fatal Incident

Half of the incidents occurred on roads and lanes, with areas of natural vegetation (3: 12.5%) and paddocks under crop (2: 8.3%) being the only other known places with more than one incident (Table 5.38).

Table 5.38 Location on farm by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Under Crop	1	-	1	2	8.3
Natural Vegetation	1	2	-	3	12.5
Unspecified	2	-	-	2	8.3
Roads, Lanes	9	4	-	13	54.2
River, Creek	1	-	-	1	4.2
Shed, Farm Building NEC	-	1	-	1	4.2
Farm Yard or Garden		1	-	1	4.2
Other Place Associated with Agricultural Work	-	1	-	1	4.2
Total	**14**	**9**	**1**	**24**	**100.0**

MOTORCYCLE COLLISION WITH KANGAROO

A grazier working on a station was riding a motorcycle on a dirt track to check on water levels in a bore for the stock. The grazier was traveling at about 100 km/h when he collided with two kangaroos. The grazier was dislodged from the cycle and was hit in the head as the motorcycle cartwheeled. The grazier was not wearing a helmet at the time of the incident. The father of the grazier found him after searching for the grazier on the station.

Mechanism of Fatal Incident

Twenty of the incidents (83.3%) were vehicle accidents (Table 5.39).

Table 5.39 Mechanism of fatal incident by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Other Farm	Total	%
Hitting Stationary Objects	2	1	-	3	12.5
Being Hit by Moving Objects	-	1	-	1	4.2
Vehicle Accident	12	7	1	20	83.3
Total	**14**	**9**	**1**	**24**	**100.0**

Activity at Time of Fatal Incident

Most of the people fatally injured were riding the motorcycle either for work (12: 50.0%) or recreation (4: 16.7%) purposes (Table 5.40).

Table 5.40 Activity at time of fatal incident, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	12	-	-	12	50.0
Transport for Recreation	-	3	1	4	16.7
Transport NEC	-	2	-	2	8.3
Working with Animals	2	-	-	2	8.3
Monitoring, Observing, Inspecting	-	1	-	1	4.2
Recreation or Playing	-	3	-	3	12.5
Total	**14**	**9**	**1**	**24**	**100.0**

LOST CONTROL OF MOTORCYCLE

A cane inspector was riding a friend's motorcycle on the headlands of a cane farm for recreation. The cane inspector hit a bump on the ground and lost control of the bike and ended up in a gully. The cane inspector was wearing a helmet at the time of the incident and died from crush injuries to the chest.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death was head injuries (11: 45.8%), with multiple injuries (4: 16.7%) the next most common cause of death (Table 5.41).

Table 5.41 Pathophysiological cause of death by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	7	4	-	11	45.8
Neck Injuries	1	1	-	2	8.3
Chest Injuries	1	1	-	2	8.3
Trunk Injuries	-	-	1	1	4.2
Abdominal Injuries	1	1	-	2	8.3
Multiple Injuries to Head and Other Body Parts	3	-	-	3	12.5
Multiple Injuries - Other	-	1	-	1	4.2
Not Known	-	1	-	1	4.2
Medical Complications	1	-	-	1	4.2
Total	**14**	**9**	**1**	**24**	**100.0**

Blood alcohol tests were available for eleven (78.6%) of the working group, six (66.7%) of the bystanders and for the other farm fatality. Of those with known blood alcohol readings, two (33.0%) bystanders were the only persons with a blood alcohol reading greater than 0.05 g/100ml (Table 5.42).

Table 5.42 Blood alcohol content by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	9 (81.8%)	3 (50.0%)	1 (100.0%)	13 (72.2%)
Blood Alcohol Reading Between 0.001% and 0.05%	2 (18.2%)	1 (16.7%)	-	3 (16.7%)
Blood Alcohol Reading Greater than 0.05%	-	2 (33.3%)	-	2 (11.1%)
Total	**11 (100.0%)**	**6 (100.0%)**	**1 (100.0%)**	**18 (100.0%)**

Month and Day of Fatal Incident

There was no consistent monthly (Table 5.43) or daily (Table 5.44) pattern in the number of incidents.

Table 5.43 Month of incident per year, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	1	-	1	2	8.3
February	1	1	-	-	2	8.3
March	1	-	1	-	2	8.3
April	-	-	1	-	1	4.2
May	-	-	-	1	1	4.2
June	2	-	-	-	2	8.3
July	2	1	-	-	3	12.5
August	-	1	1	2	4	16.7
September	-	-	1	1	2	8.3
October	-	-	1	-	1	4.2
November	-	1	-	1	2	8.3
December	-	-	-	2	2	8.3
Total	**6**	**5**	**5**	**8**	**24**	**100.0**

Table 5.44 Day of incident by work status, two-wheel motorcycles, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	3	1	-	4	16.7
Monday	4	-	-	4	16.7
Tuesday	-	1	-	1	4.2
Wednesday	1	3	-	4	16.7
Thursday	2	1	-	3	12.5
Friday	3	1	-	4	16.7
Saturday	1	2	1	4	16.7
Total	**14**	**9**	**1**	**24**	**100.0**

Visitor to the Farm

Of the 24 fatal incidents, eleven (45.8%) involved visitors, eleven (45.8%) involved residents of the farm and for two (8.3%) it was not known if they were visitors. For people working, four (28.6%) were visitors, nine (64.3%) were residents and for one (7.1%) it was not known if they were a visitor. For bystanders, six (66.7%) were visitors, two (22.2%) were residents and for one (11.1%) person it was not known if they were a visitor. The one other farm fatality involved a visitor to the farm.

AIRCRAFT

Aircraft are commonly used in agriculture to apply pesticides and fertilisers and to spread seeds. They are also used to muster animals, check herds and water supplies, survey land and transport people between properties, around properties and to major centres.

Between 1989 and 1992, there were 46 fatalities on Australian farms involving aircraft. This is an average of eleven fatalities per year or about one fatality every month. All of the 46 fatalities involving aircraft were of persons who were working at the time of the incident (Table 5.45).

Many of the fatal incidents due to aircraft involved multiple fatalities. The 46 fatalities involving aircraft occurred in 33 separate incidents. Two incidents involved two people being killed in helicopter crashes; five incidents involved two people being killed in aircraft crashes; three people were killed when their aircraft hit overhead power lines; and five people were killed when their aircraft crashed.

Table 5.45 Number of fatalities per year, aircraft, farm-related fatalities, Australia, 1989-1992

Year	Working	%
1989	12	26.1
1990	20	43.5
1991	8	17.4
1992	6	13.0
Total	**46**	**100.0**

Gender and Age

Aircraft fatalities involved working persons aged from 19 to 62 years. Most commonly, these persons were aged from 25 to 44 years (Table 5.46). All except one worker was male (45: 97.8%).

Table 5.46 Age group, aircraft, farm-related fatalities, Australia, 1989-1992

Age Group	Working	%
15 - 24	5	10.9
25 - 34	14	30.4
35 - 44	10	21.7
45 - 55	13	28.3
55 - 64	4	8.7
Total	**46**	**100.0**

Industry of Working Persons

Of the known industry groups, the aerial agricultural services (16: 34.8%) and meat cattle (11: 23.9%) industry groups had the highest number of fatalities of workers (Table 5.47).

Table 5.47 Industry of the working persons, aircraft, farm-related fatalities, Australia, 1989-1992

Industry	Working	%
Agriculture	**43**	**93.5**
Grapes	*2*	*4.3*
Cereal Grains, Sheep, Cattle, Pigs	*1*	*2.2*
Cereal Grains	*1*	*2.2*
Sheep	*3*	*6.5*
Meat Cattle	*11*	*23.9*
Aerial Agricultural Services	*16*	*34.8*
Services to Agriculture NEC	*3*	*6.5*
Agriculture Not Known	*6*	*13.0*
Other	**3**	**6.5**
Total	**46**	**100.0**

State or Territory of Fatal Incident

The two states with the largest number of fatal incidents were Queensland (18: 39.1%) and New South Wales (14: 30.4%) (Table 5.48).

Table 5.48 State or Territory of incident, aircraft, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	%
QLD	18	39.1
NSW	14	30.4
VIC	1	2.2
SA	5	10.9
WA	4	8.7
NT	4	8.7
Total	**46**	**100.0**

Mechanism of Fatal Incident

All fatalities involving aircraft occurred when the plane crashed.

Activity at Time of Fatal Incident

The most common activities at the time of the fatal incident were transport for work purposes (12: 26.1%) and aircraft used in mustering activities (12: 26.1%). Crop dusting (10: 21.7%) and farm inspections (9: 19.6%) were also common activities (Table 5.49).

Table 5.49 Activity at time of fatal incident, aircraft, farm-related fatalities, Australia, 1989-1992

Activity	Working	%
Transport for Work Purposes	12	26.1
Mustering	12	26.1
Crop Dusting	10	21.7
Inspecting Station or Viewing Harvest	9	19.6
Aerial Sowing of Seed or Rice	3	6.5
Total	**46**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death was multiple injuries (36: 78.2%) (Table 5.50).

Table 5.50 Pathophysiological cause of death, aircraft, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	%
Head Injuries	2	4.3
Chest Injuries	3	6.5
Multiple Injuries to Head and Other Body Parts	7	15.2
Multiple Injuries - Other	29	63.0
Drowning	2	4.3
Burns	3	6.5
Total	**46**	**100.0**

Blood alcohol tests were available for 41 (89.1%) of the working fatalities involving aircraft. Of these, 36 (87.8%) had a nil blood alcohol reading, two (4.9%) had a reading between 0.001% and 0.05% and three (7.3%) had a reading greater than 0.05g/100ml.

Month and Day of Fatal Incident

There was no consistent monthly (Table 5.51) or daily (Table 5.52) pattern in the number of fatal incidents involving aircraft. However, the day of the week that had the most aircraft fatalities was Sunday (10: 21.7%).

Table 5.51 Month of incident per year, aircraft, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	-	1	-	1	2.2
February	-	1	-	-	1	2.2
March	1	3	-	3	7	15.2
April	-	-	2	-	2	4.3
May	-	3	-	-	3	6.5
June	1	-	1	1	3	6.5
July	3	7	-	-	10	21.7
August	1	1	-	-	2	4.3
September	2	-	2	-	4	8.7
October	-	1	-	1	2	4.3
November	1	4	-	1	6	13.0
December	3	-	2	-	5	10.9
Total	**12**	**20**	**8**	**6**	**46**	**100.0**

Table 5.52 Day of incident, aircraft, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	%
Sunday	10	21.7
Monday	5	10.9
Tuesday	6	13.0
Wednesday	8	17.4
Thursday	8	17.4
Friday	5	10.9
Saturday	4	8.7
Total	**46**	**100.0**

Visitor to the Farm

Of the 46 fatalities involving aircraft, 23 (50.0%) were of visitors, 20 (43.5%) were of residents of the farm and for three (6.5%) it was not known if they were visitors.

TRACTORS

Tractors continue to fatally injure more farmers every year than any other piece of agricultural equipment. Tractors come in varying sizes, makes and models and are the most used piece of agricultural equipment on Australian farms. Tractors are used in a range of activities from acting as a power source to towing implements.

Between 1989 and 1992, there were 87 fatal incidents on Australian farms involving tractors. This is an average of 21 fatalities per year or approximately two fatalities every month (Table 5.53). Of the 87 fatalities caused by tractors, 68 (78.2%) involved persons who were working at the time of the incident and 19 (21.8%) were of bystanders to work.

Table 5.53 Number of fatalities per year by work status, tractors, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	15	6	21	24.1
1990	17	4	21	24.1
1991	18	7	25	28.7
1992	18	2	20	23.0
Total	**68**	**19**	**87**	**100.0**

Gender and Age

Tractor fatalities most commonly involved persons over the age of 44 (54: 62.1%), although people from all age groups were killed. Also, over one-third of the bystander fatalities involving tractors were of children less than five years of age (7: 36.8%). All except one of the fatally injured workers were male, and 14 (73.7%) of the 19 bystanders were male (Table 5.54).

Table 5.54 Age group by work status, tractors, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	7	7	8.0
5 - 14	2	2	4	4.6
15 - 24	6	-	6	6.9
25 - 34	7	2	9	10.3
35 - 44	7	-	7	8.0
45 - 54	15	2	17	19.5
55 - 64	12	3	15	17.2
65 - 74	12	3	15	17.2
75+	7	-	7	8.0
Total	**68**	**19**	**87**	**100.0**

State or Territory of Fatal Incident

Queensland (30: 34.5%), New South Wales (25: 28.7%) and Victoria (16: 18.4%) had the largest number of fatal incidents. This was the case for both working and bystander fatalities (Table 5.55).

Table 5.55 State or Territory of incident by work status, tractors, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	24	6	30	34.5
NSW	20	5	25	28.7
VIC	11	5	16	18.4
TAS	9	-	9	10.3
SA	1	1	2	2.3
WA	3	2	5	5.7
Total	**68**	**19**	**87**	**100.0**

RUNOVER BY TRACTOR

A farmer was in a paddock on a farm driving a tractor, with no rollover protection structure (ROPS), up an incline. The farmer got off the tractor to re-connect some wire onto a wire fence. At this point, the tractor started to roll down the hill. The farmer jumped on the tractor and grabbed the steering wheel, but fell off and the lower half of his body was run over by the front wheels of the tractor. It is not clear whether the farmer put the hand brake on the tractor, left it off or whether the hand brake failed.

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 66 (75.9%) incidents. The most common type of farm enterprises were meat cattle (15: 17.2%) and cereal grains, sheep, cattle and pigs (14: 16.1%). Nearly all of the incidents on these enterprises were of workers. Of the 19 bystander incidents, eleven (57.9%) occurred on farms where the type of farm enterprise could not be determined (Table 5.56).

Table 5.56 Farm enterprise by work status, tractors, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Total	%
Agriculture	**66**	**19**	**85**	**97.7**
Fruit	*1*	*-*	*1*	*1.1*
Plantation Fruit	*1*	*-*	*1*	*1.1*
Orchard and Other Fruit	*4*	*2*	*6*	*6.9*
Vegetables Including Potatoes	*4*	*2*	*6*	*6.9*
Cereal Grains, Sheep, Cattle, Pigs	*14*	*-*	*14*	*16.1*
Cereal Grains	*1*	*-*	*1*	*1.1*
Sheep, Cereal Grains	*2*	*1*	*3*	*3.4*
Meat Cattle, Cereal Grains	*1*	*-*	*1*	*1.1*
Sheep, Meat Cattle	*5*	*-*	*5*	*5.7*
Sheep	*3*	*-*	*3*	*3.4*
Meat Cattle	*13*	*2*	*15*	*17.2*
Sugar Cane	*5*	*-*	*5*	*5.7*
Agriculture NEC	*2*	*1*	*3*	*3.4*
Agriculture Not Known	*10*	*11*	*21*	*24.1*
Other	**2**	**-**	**2**	**2.3**
Total	**68**	**19**	**87**	**100.0**

TRACTOR FLIP OVER

A farmer was attempting to fell a large tree on a paddock using a chainsaw. The chainsaw the farmer was using became wedged in a tree. The farmer removed the motor and guide from the saw, with the chain still being wedged in the tree. The farmer then attempted to use a tractor to move the tree by placing a chain around the base of the tree and hooking the chain to the rear of the tractor. The tree then fell, causing the tractor to tip backwards and crush the farmer.

Location on Farm

The most common locations where the fatal incidents occurred were paddocks, either under crop (23: 26.4%) or clear for grazing (11: 12.6%). Other common locations were roads and lanes (16: 18.4%) and areas of natural vegetation (14: 16.1%). This pattern was similar for working and bystander fatalities (Table 5.57).

Table 5.57 Location on farm by work status, tractors, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Total	%
Paddock Under Crop	19	4	23	26.4
Paddock Clear for Grazing	8	3	11	12.6
Natural Vegetation	11	3	14	16.1
Unspecified	2	1	3	3.4
Roads, Lanes	13	3	16	18.4
Dam, Water Reservoir, Irrigation Channel	1	-	1	1.1
River, Creek	2	1	3	3.4
Hay Shed	2	-	2	2.3
Machinery Shed	1	-	1	1.1
Shed, Farm Building NEC	2	1	3	3.4
Sorting Packing Shed	1	-	1	1.1
Farm Excluding Residence NEC	1	-	1	1.1
Farm Yard or Garden	3	2	5	5.7
Other Place Associated with Agricultural Work	2	-	2	2.3
Not Relevant	-	1	1	1.1
Total	**68**	**19**	**87**	**100.0**

Mechanism of Fatal Incident

The two most common mechanisms involved were rollovers (48: 55.2%) and being hit by moving objects (usually the tractor) (33: 37.9%). This was the case for workers and bystanders, except that the bystander fatalities were evenly divided between rollovers and being hit by moving objects (Table 5.58).

Of the incidents that involved working persons being hit by a tractor, 17 (70.8%) involved tractor runovers (usually after falling from the tractor), six (25.0%) involved the worker being struck by the tractor following an attempt to start the tractor while standing on the ground while the tractor was in gear and one (4.2%) involved a person being struck by a tractor that was being towed. All of the bystander fatalities involved the person being runover by the tractor. Of these, six (66.7%) involved a person (mainly children) falling from a tractor and being runover, two (22.2%) involved a child being runover while the tractor was reversing and one (11.1%) involved a child being runover while the tractor was in a forward motion.

Of the incidents that involved tractor rollovers and workers, 28 (73.7%) tractors did not have a rollover protection structure (ROPS) fitted, five (13.2%) tractors had a ROPS fitted, but no seat belt was worn or fitted at the time of the incident and the worker was thrown from the tractor, two (5.3%) tractors had an inadequate roll frame and for three (7.9%) tractors it was not known if a ROPS was fitted or not. Of the bystander fatalities that involved a tractor rollover, nine (90.0%) tractors did not have a ROPS fitted and one (10.0%) tractor was equipped with a ROPS, but did not have a seat belt fitted and the bystander was thrown from the tractor as it rolled over.

Table 5.58 Mechanism of fatal incident by work status, tractors, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Total	%
Being Trapped by Moving Machinery	1	-	1	1.1
Being Trapped Between Stationary and Moving Object	3	-	3	3.4
Being Hit by Moving Objects	24 (17 runovers)	9 (all were runovers)	33	37.9
Vehicle Accident	1	-	1	1.1
Rollover	38	10	48	55.2
Mechanism Not Known	1	-	1	1.1
Total	**68**	**19**	**87**	**100.0**

Activity at Time of Fatal Incident

The most common activities being performed at the time of the fatal incident were working with crops (22: 25.3%), transport for work purposes (17: 19.5%) and felling trees or clearing land (9: 10.3%). These three activities, along with maintenance (8: 11.8%) were the main activities of the injured workers. Transport (7: 36.8%) and recreation activities (7: 36.8%) were the main activities of the bystanders (Table 5.59).

Table 5.59 Activity at time of fatal incident by work status, tractors, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Transport for Work Purposes	17	-	17	19.5
Transport for Recreation	-	2	2	2.3
Transport NEC	3	5	8	9.2
Constructing or Installing	1	-	1	1.1
Maintenance	8	-	8	9.2
Earthmoving or Digging	1	-	1	1.1
Felling Trees or Clearing Land	9	-	9	10.3
Working with Animals	1	-	1	1.1
Working with Crops	22	-	22	25.3
Moving Goods	3	-	3	3.4
Rescuing	1	-	1	1.1
Recreation or Playing	-	7	7	8.0
Household Domestic Work or Gardening	1*	-	1	1.1
Other	-	5	5	5.7
Not Known / Not Stated	1	-	1	1.1
Total	**68**	**19**	**87**	**100.0**

* Worker was slashing grass on farm.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological causes of death were head injuries (19: 21.8%) and crush asphyxia (17: 19.5%). Crush asphyxia (12: 17.6%), head injuries (11: 16.2%), chest injuries (11: 16.2%) and trunk injuries (10: 14.7%) were the main causes of death for workers, while head injuries and crush asphyxia accounted for 13 of the 19 (68.4%) bystander deaths (Table 5.60).

Table 5.60 Pathophysiological cause of death by work status, tractors, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Total	%
Head Injuries	11	8	19	21.8
Neck Injuries	3	1	4	4.6
Chest Injuries	11	-	11	12.6
Trunk Injuries	10	1	11	12.6
Abdominal Injuries	1	-	1	1.1
Multiple Injuries to Head and Other Body Parts	6	2	8	9.2
Multiple Injuries - Other	8	2	10	11.5
Drowning	1	-	1	1.1
Crush Asphyxia	12	5	17	19.5
Fat Embolism Crush Injury Syndrome	1	-	1	1.1
Not Known	1	-	1	1.1
Medical Complications	3	-	3	3.4
Total	**68**	**19**	**87**	**100.0**

Blood alcohol tests were conducted for 43 (63.2%) of the working group and nine (47.4%) bystanders fatalities. Of those with known blood alcohol readings, one worker (2.3%) and two bystanders (22.2%) had blood alcohol readings greater than 0.05g/100ml (Table 5.61).

Table 5.61 Blood alcohol content by work status, tractors, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Total
Nil Blood Alcohol Reading	41 (95.3%)	7 (77.8%)	48 (92.3%)
Blood Alcohol Reading Between 0.001% and 0.05%	1 (2.3%)	-	1 (1.9%)
Blood Alcohol Reading Greater Than 0.05%	1 (2.3%)	2 (22.2%)	3 (5.8%)
Total	**43 (100.0%)**	**9 (100.0%)**	**52 (100.0%)**

Month and Day of Fatal Incident

There was no consistent monthly pattern in the number of fatal incidents, except that there were generally fewer incidents in July and December (Table 5.62).

Table 5.62 Month of incident per year, tractors, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	4	2	1	8	9.2
March	1	-	6	2	9	10.3
April	-	5	4	3	12	13.8
May	2	4	-	2	8	9.2
June	3	1	2	3	9	10.3
July	1	2	-	-	3	3.4
August	4	2	1	1	8	9.2
September	4	-	2	2	8	9.2
October	2	1	3	2	8	9.2
November	2	2	4	2	10	11.5
December	1	-	1	2	4	4.6
Total	**21**	**21**	**25**	**20**	**87**	**100.0**

There was also no clear daily variation in the occurrence of the fatal incidents (Table 5.63).

Table 5.63 Day of incident by work status, tractors, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	9	3	12	13.8
Monday	9	4	13	14.9
Tuesday	13	2	15	17.2
Wednesday	8	2	10	11.5
Thursday	10	2	12	13.8
Friday	9	1	10	11.5
Saturday	10	5	15	17.2
Total	**68**	**19**	**87**	**100.0**

Visitor to the Farm

Of the 87 fatal incidents, 12 (13.8%) were of visitors, 71 (81.6%) were of residents of the farm, one (1.1%) incident occurred on a public roadway, one (1.1%) on a prison farm and for two (2.3%) people it was not known if they were visitors. For people working, eleven (16.2%) were visitors, 54 (79.4%) were residents and for three (4.4%) their visitor status was not relevant or not known. For bystanders, there was one (5.3%) visitor, 17 (8.5%) were residents of the farm and for one (5.3%) it was not known if they were a visitor to the farm or not.

FIREARMS

Firearms are commonly used on Australian farms to get rid of vermin, to cull animals and for recreational activities. While farmers are working, firearms are often kept in easily accessible places in order for quick access. Changes in legislation in Australia have meant that access and use of different types of firearms has changed since the study timeframe.

Between 1989 and 1992, there were 27 fatal incidents on Australian farms involving firearms. This is an average of six fatalities per year or a fatality every two months. Of the 27 fatalities caused by firearms, 18 (66.7%) involved persons who were working at the time of the incident, five (18.5%) were of bystanders to work and four (14.8%) were other farm fatalities (Table 5.64).

Table 5.64 Number of fatalities per year by work status, firearms, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	4	1	1	6	22.2
1990	2	1	-	3	11.1
1991	8	3	1	12	44.4
1992	4	-	2	6	22.2
Total	**18**	**5**	**4**	**27**	**100.0**

Gender and Age

Firearm-related fatalities most commonly involved persons aged between 15 and 24 years (10: 33%), although people from all age groups were killed. Bystander and other farm fatalities were of younger persons, with the ages ranging from 17 to 30 years. All persons killed were male (Table 5.65).

Table 5.65 Age group by work status, firearms, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
5 - 9	-	-	1	1	3.7
15 - 24	6	2	2	10	37.0
25 - 34	-	3	-	3	11.1
35 - 44	3	-	1	4	14.8
45 - 54	4	-	-	4	14.8
55 - 64	4	-	-	4	14.8
65 - 69	1	-	-	1	3.7
Total	**18**	**5**	**4**	**27**	**100.0**

State or Territory of Fatal Incident

New South Wales had the highest number of fatalities, with 13 (48.1%) of the 27 total fatalities, nine (50.0%) of the 18 working fatalities and two (40.0%) of the five, bystander fatalities (Table 5.66).

Table 5.66 State or Territory of incident by work status, firearms, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	2	-	-	2	7.4
NSW	9	2	2	13	48.1
VIC	4	1	-	5	18.5
TAS	-	1	-	1	3.7
SA	2	-	-	2	7.4
WA	1	1	2	4	14.8
Total	**18**	**5**	**4**	**27**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 20 (74.1%) incidents. The most common farm enterprises were cereal grains, sheep, cattle and pigs (6: 25.9%), sheep (4: 14.8%) and meat cattle (4: 14.8%). The enterprise type for bystander and other farm fatalities was commonly not known (Table 5.67).

Table 5.67 Farm enterprise by work status, firearms, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**18**	**5**	**4**	**27**	**100.0**
Orchard and Other Fruit	*2*	-	-	*2*	*7.4*
Cereal Grains, Sheep, Cattle, Pigs	*5*	-	*1*	*6*	*25.9*
Sheep, Cereal Grains	*1*	-	-	*1*	*3.7*
Meat Cattle, Cereal Grains	*2*	-	-	*2*	*7.4*
Sheep, Meat Cattle	*1*	-	-	*1*	*3.7*
Sheep	*3*	*1*	-	*4*	*14.8*
Meat Cattle	*3*	*1*	-	*4*	*14.8*
Agriculture Not Known	*1*	*3*	*3*	*7*	*25.9*
Total	**18**	**5**	**4**	**27**	**100.0**

Location of Fatal Incident

The most common location where the incidents occurred were paddocks, either clear for grazing (9: 33.3%) or under crop (3: 11.1%). Another eight incidents (29.6%) occurred in areas of natural vegetation. Working incidents more commonly occurred in paddocks (10: 55.6%). There was no consistent location for fatal incidents involving bystanders. Other farm incidents commonly occurred in areas of natural vegetation (3: 75.0%) (Table 5.68).

Table 5.68 Location on farm by work status, firearms, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Under Crop	2	1	-	3	11.1
Paddock Clear for Grazing	8	1	-	9	33.3
Natural Vegetation	4	1	3	8	29.6
Workshop	1	-	-	1	3.7
Roads, Lanes	2	-	-	2	7.4
Dam, Water Reservoir, Irrigation Channel	-	-	1	1	3.7
Farm Excluding Residence NEC	-	1	-	1	3.7
Farm Residence	-	1	-	1	3.7
Farm Yard or Garden	1	-	-	1	3.7
Total	**18**	**5**	**4**	**27**	**100.0**

FIREARM FATALITY

A farmer was seated in the centre of the rear of a four wheel drive dual-cab ute and was part of a six person group who were going pig hunting. Three dogs and the guns for pig hunting were placed in the rear of the ute. The ute was travelling on a gravel road on a property when a loaded gun discharged and hit the farmer. It appears that one of the dogs trod on the trigger, causing the gun to discharge.

Mechanism of Fatal Incident

All firearm-related fatalities resulted from the persons being shot.

Activity at Time of Fatal Incident

Fourteen of the 27 (51.9%) fatalities were of persons who were hunting. Hunting was the main activity of the working (10: 55.6%) and for all of the four other farm fatalities (Table 5.69).

Table 5.69 Activity at time of fatal incident by work status, firearms, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	1	-	-	1	3.7
Maintenance	1	-	-	1	3.7
Slaughtering, Gutting, or Shelling	2	-	-	2	7.4
Hunting	10	-	4	14	51.9
Working with Animals	1	-	-	1	3.7
Monitoring, Observing, Inspecting	1	-	-	1	3.7
Moving Goods	1	-	-	1	3.7
Assault	-	1	-	1	3.7
Other		4		4	14.8
Not Known / Not Stated	1	-	-	1	3.7
Total	**18**	**5**	**4**	**27**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death was head injuries (14: 51.9%). This was the case for both workers and bystanders (Table 5.70).

Table 5.70 Pathophysiological cause of death by work status, firearms, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head injuries	10	3	1	14	51.9
Neck injuries	1	-	1	2	7.4
Chest injuries	4	1	1	6	25.9
Abdominal injuries	3	1	1	5	18.5
Total	**18**	**5**	**4**	**27**	**100.0**

Blood alcohol tests were available for 12 (66.7%) of the working group, all five of the bystanders and all of the other farm fatalities. Of those with known blood alcohol readings, one (20.0%) of the bystanders and one (25.0%) of the other farm persons had a blood alcohol reading greater than 0.05g/100ml (Table 5.71).

Table 5.71 Blood alcohol content by work status, firearms, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	10 (83.3%)	3 (60.0%)	3 (75.0%)	16 (72.7%)
Blood Alcohol Reading Between 0.001% and 0.05%	2 (16.7%)	1 (20.0%)	-	3 (13.6%)
Blood Alcohol Reading Greater Than 0.05%	-	1 (20.0%)	1 (25.0%)	2 (9.1%)
Total	**12 (100.0%)**	**5 (100.0%)**	**4 (100.0%)**	**22 (100.0%)**

SHOT FOLLOWING FALL WITH FIREARM

A farmer was climbing through a fence with a loaded rifle when he overbalanced and the firearm discharged, hitting him in the head. The farmer was going to the paddock to cull some emus which were getting into the crop. The wife and son of the farmer found the farmer after a search of the farm.

Month and Day of Fatal Incident

There was no consistent monthly (Table 5.72) or daily (Table 5.73) pattern in the number of incidents, although there were more fatalities on Sunday (6: 22.2%), Monday (6: 22.2%) and Saturday (5: 18.5%) than on other days.

Table 5.72 Month of incident per year, firearms, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	1	-	1	2	7.4
February	1	-	1	-	2	7.4
March	-	1	1	-	2	7.4
April	-	-	1	-	1	3.7
May	-	1	-	-	1	3.7
June	-	-	1	1	2	7.4
July	3	-	1	2	6	22.2
August	-	-	-	1	1	7.4
October	2	-	-	-	2	7.4
November	-	-	3	1	4	14.8
December	-	-	4	-	4	14.8
Total	**6**	**3**	**12**	**6**	**27**	**100.0**

Table 5.73 Day of incident by work status, firearms, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	4	2	-	6	22.2
Monday	5	-	1	6	22.2
Tuesday	2	-	1	3	11.1
Wednesday	2	-	-	2	7.4
Thursday	1	1	1	3	11.1
Friday	2	-	-	2	7.4
Saturday	2	2	1	5	18.5
Total	**18**	**5**	**4**	**27**	**100.0**

SHOT WHILE UNLOADING FIREARM

A 15 year old male was shooting feral cats on the family property using a 12 gauge shotgun. After having been called by his mother to come inside, he returned to the residence yard. A short distance from the residence, the teenager attempted to unload the shotgun. He unloaded one cartridge, but the second cartridge jammed in the loading chamber. The teenager placed the shotgun on the ground, with the butt of the firearm on the ground and the barrel pointing upwards. He then attempted to dislodge the cartridge by using his right foot against the loading lever, causing the firing mechanism to discharge the firearm. As a result, the boy received a fatal shotgun wound to the head.

Visitor to the Farm

Of the 27 fatalities, ten (37.0%) were of visitors, 15 (55.6%) were of residents of the farm and for two (7.4%) it was not known if they were visitors to the farm. For people working, five (27.8%) were visitors and 13 (72.2%) were residents of the farm. For bystanders, there were four (80.0%) visitors and one (20.0%) resident. For other farm fatalities, one (25.0%) was of a visitor, one (25.0%) was a resident and for the other two (50.0%) persons it was not known if they were a visitor to the farm or not.

DAMS

Dams are generally placed in various locations on farms as water storage for animals, irrigation or water supply for houses (farm residences). Animals need ready access to drinking water. There is often more than one dam per farm and the dam can be located quite close to the farm residence. Dams can be various shapes and sizes and often are surrounded by steep, slippery embankments.

Between 1989 and 1992, there were 51 fatal incidents on Australian farms involving dams. This is an average of 12 fatalities per year or a fatality every month. There were more fatal incidents involving dams in 1989 and 1990 than there were in 1991 and 1992. Of the 51 fatal incidents involving dams, seven (13.7%) were of workers and 44 (86.3%) were of bystanders (Table 5.74).

Table 5.74 Number of fatalities per year by work status, dams, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Total	%
1989	3	13	16	31.4
1990	1	15	16	31.4
1991	2	7	9	17.6
1992	1	9	10	19.6
Total	**7**	**44**	**51**	**100.0**

Gender and Age

The age of the seven workers ranged from 20 to 71 years. Two-thirds of the bystander fatalities were of children less than five years of age, but persons from all age ranges were included. Most of the bystanders (37: 84.1%), and all of the workers, were male (Table 5.75).

Table 5.75 Age group by work status, dams, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Total	%
<5	-	30	30	58.8
5 - 14	-	3	3	5.9
15 - 24	3	3	6	11.8
25 - 34	1	2	3	5.9
35 - 44	1	1	2	3.9
45 - 54	-	1	1	2.0
55 - 64	-	1	1	2.0
65 - 74	2	2	4	7.8
75+	-	1	1	2.0
Total	**7**	**44**	**51**	**100.0**

State or Territory of Fatal Incident

The two states with the largest number of fatalities were Victoria (17: 33.3%) and New South Wales (15: 29.4%). This was true for both working and bystander incidents (Table 5.76).

Table 5.76 State or Territory of incident by work status, dams, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Total	%
QLD	1	5	6	11.8
NSW	2	13	15	29.4
VIC	3	14	17	33.3
TAS	-	5	5	9.8
SA	-	1	1	2.0
WA	1	6	7	13.7
Total	**7**	**44**	**51**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 30 (58.8%) incidents. The most common farm enterprise was cereal grains, sheep, cattle and pigs (9: 17.6%), but most enterprise types had at least one such incident (Table 5.77).

Table 5.77 Farm enterprise by work status, dams, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Total	%
Agriculture	**7**	**44**	**51**	**100.0**
Poultry	*-*	*1*	*1*	*2.0*
Vegetables Including Potatoes	*1*	*1*	*2*	*3.9*
Orchard and Other Fruit	*-*	*3*	*3*	*5.9*
Plantation Fruit	*-*	*2*	*2*	*3.9*
Cereal Grains, Sheep, Cattle, Pigs	*-*	*9*	*9*	*17.6*
Sheep, Meat Cattle	*1*	*1*	*2*	*3.9*
Sheep	*-*	*1*	*1*	*2.0*
Meat Cattle	*2*	*2*	*4*	*7.8*
Dairy	*1*	*3*	*4*	*7.8*
Pigs	*-*	*1*	*1*	*2.0*
Nurseries	*1*	*-*	*1*	*2.0*
Agriculture Not Known	*1*	*20*	*21*	*41.2*
Total	**7**	**44**	**51**	**100.0**

Mechanism of Fatal Incident

All fatalities in dams resulted from drowning.

Activity at Time of Fatal Incident

Most of the bystander fatalities were of persons undertaking play or recreation (40: 90.9%) activities. Four of the seven (57.1%) workers were performing maintenance activities at the time of the fatal incident (Table 5.78).

Table 5.78 Activity at time of fatal incident by work status, dams, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Total	%
Constructing or Installing	1	-	1	2.0
Maintenance	4	-	4	7.8
Monitoring, Observing, Inspecting	1	-	1	2.0
Work Break	1	-	1	2.0
Recreation or Playing	-	40	40	78.4
Other	-	1	1	2.0
Not Known / Not Stated	-	3	3	5.9
Total	**7**	**44**	**51**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

All fatalities in dams resulted from drowning.

Blood alcohol tests were conducted for six (85.7%) of the working deaths and 21 (47.7%) of the bystander deaths. Of those workers who had a blood alcohol test, four (66.7%) had a nil reading. Fifteen (71.4%) bystanders had a nil reading. Of those with known blood alcohol levels, two of the workers (33.3%) and five of the bystanders (23.8%) had readings greater than 0.05g/100ml.

DROWNED IN IRRIGATION DAM

A two year old child was found floating face downwards in an irrigation dam. The child had been playing with some ducks in the backyard of the residence. The child followed the ducks through an opening in a fence to a small irrigation dam on an adjoining property, where he fell or slipped into the dam. Owing to the young age and small size of the child, he was not able to get out of the dam.

Month and Day of Fatal Incident

There was no consistent monthly pattern in the number of fatal incidents (Table 5.79).

Table 5.79 Month of incident per year, dams, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	2	3	2	-	7	13.7
February	1	-	1	1	3	5.9
March	-	2	-	-	2	3.9
April	1	1	-	2	4	7.8
May	3	1	1	1	6	11.8
June	-	-	1	2	3	5.9
July	-	1	2	2	5	9.8
August	2	3	1	-	6	11.8
September	2	2	1	1	6	11.8
October	3	1	-	-	4	7.8
November	1	1	-	-	2	3.9
December	1	1	-	1	3	5.9
Total	**16**	**16**	**9**	**10**	**51**	**100.0**

The incidents predominantly occurred on Saturdays (14: 27.5%) and Sundays (13: 25.5%) (Table 5.80).

Table 5.80 Day of incident by work status, dams, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Total	%
Sunday	3	10	13	25.5
Monday	3	4	7	13.7
Tuesday	-	6	6	11.8
Wednesday	-	5	5	9.8
Thursday	-	1	1	2.0
Friday	-	4	4	7.8
Saturday	1	13	14	27.5
Not Known	-	1	1	2.0
Total	**7**	**44**	**51**	**100.0**

Visitor to the Farm

Of the 51 fatalities, 19 (37.3%) were of visitors and 32 (62.7%) were of residents of the farm. For people working, three (42.9%) were visitors and four (57.1%) were residents. For bystanders, there were 16 (36.4%) visitors and 28 (63.6%) residents.

HORSES

Horses play a significant role in farming activities in Australia, either for work or recreation. Environmental conditions, and the size and the unpredictable nature of horses provide a mix of factors which can result in injury or death.

Between 1989 and 1992, there were 33 fatal incidents on Australian farms involving horses. This was an average of eight fatalities per year or two fatalities every three months. There were 75% more incidents in 1991 and 1992 then in 1989 and 1990. Of the 33 fatal incidents involving horses, 21 (63.6%) were of persons working at the time of the incident, three (9.1%) were of bystanders and nine (27.3%) were other farm fatalities (Table 5.81).

Table 5.81 Number of fatalities per year by work status, horses, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	4	-	1	5	15.2
1990	5	-	2	7	21.2
1991	7	1	2	10	30.3
1992	5	2	4	11	33.3
Total	**21**	**3**	**9**	**33**	**100.0**

Gender and Age

Fatalities most commonly were of persons aged 25 to 34 years (8: 24.2%) or 55 to 64 years (6: 18.2%). Workers of all ages were involved, and most were male (18: 85.7%). The three bystanders were aged two, five and 59 years, and two of the three were male. The nine other farm persons ranged in age from six to 64 years, and five (55.6%) were male (Table 5.82).

Table 5.82 Age group by work status, horses, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	1	-	1	3.0
5 - 14	1	1	2	4	12.1
20 - 24	3	-	2	5	15.2
25 - 34	6	-	2	8	24.2
35 - 44	4	-	1	5	15.2
45 - 54	2	-	1	3	9.1
55 - 64	4	1	1	6	18.2
70 - 74	1	-	-	1	3.0
Total	**21**	**3**	**9**	**33**	**100.0**

State or Territory of Fatal Incident

Victoria (11: 33.3%), Queensland (9: 27.3%) and New South Wales (8: 24.2%) had the highest number of fatalities. Queensland (8: 38.1%) and Victoria (6: 28.6%) had the highest number of working fatalities and New South Wales (4: 44.4%) and Victoria (4: 44.4%) the highest number of other farm fatalities (Table 5.83).

Table 5.83 State or Territory of incident by work status, horses, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	8	1	-	9	27.3
NSW	3	1	4	8	24.2
VIC	6	1	4	11	33.3
TAS	1	-	-	1	3.0
SA	1	-	-	1	3.0
WA	2	-	1	3	9.1
Total	**21**	**3**	**9**	**33**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 30 (90.9%) incidents. The most common farm enterprises were agriculture NEC (10: 30.3%) and meat cattle (8: 24.2%) (Table 5.84).

Table 5.84 Farm enterprise by work status, horses, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**20**	**3**	**9**	**32**	**97.0**
Vegetables Including Potatoes	*1*	*-*	*-*	*1*	*3.0*
Cereal Grains, Sheep, Cattle, Pigs	*1*	*-*	*1*	*2*	*6.1*
Meat Cattle, Cereal Grains	*1*	*-*	*-*	*1*	*3.0*
Sheep, Meat Cattle	*2*	*-*	*1*	*3*	*9.1*
Sheep	*1*	*1*	*-*	*2*	*6.1*
Meat Cattle	*7*	*1*	*-*	*8*	*24.2*
Dairy	*-*	*-*	*1*	*1*	*3.0*
Agriculture NEC	*6*	*-*	*4*	*10*	*30.3*
Services To Agriculture NEC	*1*	*-*	*-*	*1*	*3.0*
Agriculture Not Known	*-*	*1*	*2*	*3*	*9.1*
Other	**1**	**-**	**-**	**1**	**3.0**
Total	**21**	**3**	**9**	**33**	**100.0**

Location of Fatal Incident

The most common location where the fatal incident occurred was stockyards, including horse yards, (17: 51.5%). Two-thirds of the working and bystander fatalities and one-third of the other farm fatalities occurred there. Other common places were paddocks clear for grazing for working fatalities (5: 23.8%); and roads and lanes for other farm fatalities (3: 33.3%) (Table 5.85).

Table 5.85 Location on farm by work status, horses, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Clear for Grazing	5	-	2	7	21.2
Natural Vegetation	-	1	1	2	6.1
Stockyards Including Horse Yards	12	2	3	17	51.5
Roads, Lanes	2	-	3	5	15.2
Farm Excluding Residence NEC	1	-	-	1	3.0
Other Place Associated with Agriculture Work	1	-	-	1	3.0
Total	**21**	**3**	**9**	**33**	**100.0**

CHILD ENTANGLED IN REINS OF HORSE

A six year old child was walking a pony in a horse yard on a rural property when the pony's reins fell to the ground and the child's feet became entangled in the reins. The pony took fright and bolted, dragging the child around the yard. The child was an inexperienced rider of horses and was asked repeatedly to pick up the pony's reins.

Mechanism of Fatal Incident

The mechanisms involved were most commonly being hit by an animal (usually the horse) (17: 51.5%) or falling from a height (usually from a horse) (13: 39.4%). Similar mechanisms were involved in working, bystander and other farm incidents (Table 5.86).

Table 5.86 Mechanism of fatal incident by work status, horses, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Other Farm	Total	%
Falls From a Height	8	1	4	13	39.4
Hitting Stationary Objects	1	-	1	2	6.1
Being Hit by an Animal	11	2	4	17	51.5
Being Hit by Moving Objects	1	-	-	1	3.0
Total	**21**	**3**	**9**	**33**	**100.0**

Activity at Time of Fatal Incident

Most of the people fatally injured in horse-related incidents were riding the horse, or working with it in some other way, at the time of the incident (24: 72.7%) (Table 5.87).

Table 5.87 Activity at time of incident by work status, horses, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Recreation	-	-	3	3	9.1
Working with Animals	21	-	3*	24	72.7
Monitoring, Observing, Inspecting	-	1	-	1	3.0
Recreation or Playing	-	2	3	5	6.1
Total	**21**	**3**	**9**	**33**	**100.0**

* Three other farm fatalities were clearly involved in recreational activities with horses at the time of the fatal incident.

FALL FROM HORSE

A female consultant was riding a horse for recreation in a paddock, when she fell and was dragged by the horse. While being dragged by the horse, she was kicked in the head. At the time, she was not wearing a helmet. The incident occurred on a horse farm where her horse was on agistment. She was a competent rider and the horse was well behaved. The owners of the property and some others on the farm looked for the consultant and found her lying on the ground in the paddock.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death was head injuries (17: 51.5%). This was the case for both workers and other farm persons (Table 5.88).

Table 5.88 Pathophysiological cause of death by work status, horses, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	10	1	6	17	51.5
Chest Injuries	5	1	2	8	24.2
Trunk Injuries	-	-	1	1	3.0
Abdominal Injuries	-	1	-	1	3.0
Multiple Injuries to Head and Other Body Parts	1	-	-	1	3.0
Multiple Injuries - Other	2	-	-	2	6.1
Fat Embolism Crush Injury Syndrome	1	-	-	1	3.0
Not Known	1	-	-	1	3.0
Medical Complications	1	-	-	1	3.0
Total	**21**	**3**	**9**	**33**	**100.0**

Blood alcohol tests were available for seven (33.3%) of the working group, none of the bystanders, and for four (44.4%) of the other farm fatalities. All of the known blood alcohol readings had no alcohol detected.

Month and day of Fatal Incident

There was no consistent monthly (Table 5.89) or daily (Table 5.90) pattern in the number of incidents, although one-third of the working fatalities occurred on a Saturday.

Table 5.89 Month of incident per year, horses, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	-	1	-	1	2	6.1
February	-	1	1	-	2	6.1
March	1	2	-	-	3	9.1
April	2	1	-	1	4	12.1
May	1	-	3	-	4	12.1
June	-	-	-	1	1	3.0
July	-	-	3	-	2	9.1
August	-	-	1	1	1	6.1
September	-	1	1	2	4	12.1
October	1	-	-	-	1	3.0
November	-	2	1	2	5	15.2
December	-	-	1	1	2	6.1
Total	**5**	**8**	**11**	**9**	**33**	**100.0**

Table 5.90 Day of incident by work status, horses, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	1	1	2	4	12.1
Monday	3	1	1	5	15.2
Tuesday	3	-	-	3	9.1
Wednesday	5	-	2	7	21.2
Thursday	2	-	2	4	12.1
Friday	-	1	2	3	9.1
Saturday	7	-	-	7	21.2
Total	**21**	**3**	**9**	**33**	**100.0**

Visitor to the Farm

Of the 33 fatalities, seven (21.2%) were of visitors, 23 (69.7%) were of residents of the farm and for three (9.1%) it was not known if they were visitors to the farm. For people working, two (9.5%) were visitors, 17 (81.0%) were residents and for two (9.5%) it was not known if they were visitors. For bystanders to work, there was one (33.3%) visitor, one (33.3%) resident and for one (33.3%) it was not known if they were a visitor. For other farm fatalities involving a horse, four (44.4%) were visitors and five (55.6%) were residents of the farm.

TREES BEING FELLED

Felling trees is a common activity on Australian farms, either to clear land or to use the timber for fencing, heating or building.

Between 1989 and 1992, there were 22 fatal incidents on Australian farms involving trees being felled. This is an average of five fatalities per year or a fatality approximately every two months. Of the 22 fatal incidents involving trees being felled, 17 (77.3%) were of persons working on farm at the time of the incident, three (13.6%) were of bystanders and two (9.1%) were other farm fatalities (Table 5.91).

Table 5.91 Number of fatalities per year by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	5	-	1	6	27.3
1990	1	1	-	2	9.1
1991	6	2	1	9	40.9
1992	5	-	-	5	22.7
Total	**17**	**3**	**2**	**22**	**100.0**

Gender and Age

Fatalities most commonly were of persons aged over 35 years (17: 77.3%). Two of the three (66.7%) bystanders were aged less than nine years and the two persons fatally injured in other farm fatalities were aged 19 and 46 years (Table 5.92). All of the workers, one of the three (33.3%) bystanders and both of the persons involved in other farm fatalities were males.

Table 5.92 Age group by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	1	-	1	4.5
5 - 14	-	1	-	1	4.5
15 - 19	-	-	1	1	4.5
20 - 24	1	-	-	1	4.5
25 - 34	1	-	-	1	4.5
35 - 44	2	-	-	2	9.1
45 - 54	6	-	1	7	31.8
55 - 64	4	1	-	5	22.7
65 - 69	2	-	-	2	9.1
70 - 74	1	-	-	1	4.5
Total	**17**	**3**	**2**	**22**	**100.0**

State or Territory of Fatal Incident

New South Wales (9: 40.9%), Queensland (5: 22.7%) and Victoria (5: 22.7%) were the three states with the highest number of fatal incidents. New South Wales (7: 41.2%) had the highest number of working fatalities (Table 5.93).

Table 5.93 State or Territory of incident by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	5	-	-	5	22.7
NSW	7	1	1	9	40.9
VIC	3	1	1	5	22.7
TAS	2	1	-	3	13.6
Total	**17**	**3**	**2**	**22**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 14 (63.6%) incidents. The most common farm enterprise type was cereal grains, sheep, cattle and pigs (9: 40.9%) (Table 5.94).

Table 5.94 Farm enterprise by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**16**	**3**	**2**	**21**	**95.5**
Cereal Grains, Sheep, Cattle, Pigs	*6*	*3*	*-*	*9*	*40.9*
Sheep, Meat Cattle	*1*	*-*	*-*	*1*	*4.5*
Meat Cattle	*3*	*-*	*-*	*3*	*13.6*
Agriculture Not Known	*6*	*-*	*2*	*8*	*36.4*
Other	**1**	**-**	**-**	**1**	**4.5**
Total	**17**	**3**	**2**	**22**	**100.0**

Location of Fatal Incident

Ten (45.5%) of the fatal incidents occurred on areas of natural vegetation, with paddocks clear for grazing (5: 22.7%) being the next most common location where the fatal incidents occurred (Table 5.95).

Table 5.95 Location on farm by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Under Crop	2	-	-	2	9.1
Paddock Clear for Grazing	4	1	-	5	22.7
Natural Vegetation	9	-	1	10	45.5
Unspecified	1	-	-	1	4.5
Farm Excluding Residence NEC	-	1	-	1	4.5
Farm Yard or Garden	-	-	1	1	4.5
Other Place Associated with Agriculture Work	1	1	-	2	9.1
Total	**17**	**3**	**2**	**22**	**100.0**

Mechanism of Fatal Incident

The majority of fatal incidents involving trees being felled involved persons being hit by a falling tree (19: 86.4%) (Table 5.96).

Table 5.96 Mechanism of fatal incident by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Mechanism	Working	Bystander	Other Farm	Total	%
Being Hit by Falling Objects	15	3	1	19	86.4
Being Hit by Moving Objects	2	-	1	3	13.6
Total	**17**	**3**	**2**	**22**	**100.0**

HIT BY FALLING TREE

An experienced woodcutter was felling a tree in an area of flat, dense bush, which had undergrowth of small wattle trees and ferns. The woodcutter had a long-standing relationship with a local farmer in that he could cut down trees on the farmer's land and sell the wood, giving the farmer royalty payments. The woodcutter was cutting down a burnt-out eucalypt stag that was about 1.5 metres wide and about five metres tall. The woodcutter cut a scarf on one side of the tree and used an axe as a wedge on the other side of the tree as he made the horizontal cut. The tree began to fall in the planned direction, then slid off the stump, remained vertical for a few seconds and then fell back towards the woodcutter. The woodcutter saw this, turned and ran. However, his escape was impeded by the dense undergrowth and the felled tree struck him.

Activity at Time of Fatal Incident

All working persons were engaged in felling trees or clearing land (17: 77.3%). Two of the three (66.7%) bystanders were engaged in recreation activities and both of the other farm fatalities involved persons who were engaged in recreational pursuits at the time of the fatal incident (Table 5.97).

Table 5.97 Activity at time of incident by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Felling Trees or Clearing Land	17	-	-	17	77.3
Monitoring, Observing, Inspecting	-	1	-	1	4.5
Recreation or Playing	-	2	2	4	18.2
Total	**17**	**3**	**2**	**22**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death was head injuries (11: 50.0%), with chest injuries (4: 18.2%) being the next most common. Head injuries was the most common cause of death in both workers and bystanders (Table 5.98)

Table 5.98 Pathophysiological cause of death by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	8	3	-	11	50.0
Chest Injuries	2	-	2	4	18.2
Trunk Injuries	1	-	-	1	4.5
Abdominal Injuries	1	-	-	1	4.5
Limb Injuries	1	-	-	1	4.5
Crush Asphyxia	2	-	-	2	9.1
Multiple Injuries to Head and Other	1	-	-	1	4.5
Medical Complications	1	-	-	1	4.5
Total	**17**	**3**	**2**	**22**	**100.0**

Blood alcohol tests were available for seven (41.2%) of the working group, none of the bystanders and both of the other farm fatalities. Of those with known blood alcohol readings, none of the workers and one (50.0%) of the other farm fatalities had a blood alcohol reading above 0.05 g/100ml (Table 5.99).

Table 5.99 Blood alcohol content by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	7 (100.0%)	-	1 (50.0%)	8 (88.9%)
Blood Alcohol Reading Greater than 0.05%	-	-	1 (50.0%)	1 (11.1%)
Total	**7 (100.0%)**	**-**	**2 (100.0%)**	**9 (100.0%)**

HIT BY FALLING TREE BRANCH

A woman was sitting under a tree observing her husband felling trees and splitting wood on a farm, when a large tree limb fell and struck her on the head. Her husband had felled a tree about 16 metres away from where his wife was sitting. However, the tree that was felled clipped a limb from the tree the woman was sitting under, causing the limb to fall.

Month and Day of Fatal incident

There was no consistent monthly (Table 5.100) or daily (Table 5.101) pattern in the number of incidents.

Table 5.100 Month of incident per year, trees being felled, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	2	-	2	1	5	22.7
February	1	-	2	1	4	18.2
March	-	-	-	1	1	4.5
April	-	-	1	-	1	4.5
June	1	2	1	-	4	18.2
August	1	-	2	-	3	13.6
September	1	-	-	-	1	4.5
October	-	-	-	1	1	4.5
December	-	-	1	1	2	9.1
Total	**6**	**2**	**9**	**5**	**22**	**100.0**

Table 5.101 Day of incident by work status, trees being felled, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	2	2	-	4	18.2
Monday	2	1	-	3	13.6
Tuesday	3	-	-	3	13.6
Wednesday	3	-	-	3	13.6
Thursday	4	-	-	4	18.2
Friday	1	-	-	1	4.5
Saturday	1	-	2	3	13.6
Not Known	1	-	-	1	4.5
Total	**17**	**3**	**2**	**22**	**100.0**

Visitor to the Farm

Of the 22 fatal incidents, nine (40.9%) were of visitors, 12 (54.5%) involved residents of the farm and for one (4.5%) it was not known if the person was a visitor to the farm or not. Most of those working (10: 58.8%) were residents of the farm and two (66.7%) of the bystanders were residents of the farm. One (50.0%) of the other farm persons was a visitor to the farm.

SUMMARY SECTION 5

Trucks

- There were 23 fatal incidents involving trucks between 1989 and 1992 on Australian farms. The majority of fatal incidents were of people working. All except one of the fatal incidents involved males.
- New South Wales and Victoria had the highest number of fatal incidents.
- The most common enterprise where the fatal incidents occurred was sheep.
- The most common locations of the fatal incident were roads and lanes, and paddocks.
- The two most common mechanisms of the fatal incident were vehicle accidents and being hit by the truck.
- The most common activity at the time of the fatal injury was traveling in or on the truck for work purposes.
- The majority of fatalities were of residents of the farm.

Utilities

- There were 20 fatal incidents between 1989 and 1992 on Australian farm involving utes. More bystanders than working persons were fatally injured in incidents involving utes. The majority of the fatal incidents were of males.
- The majority of bystanders where the fatal incident involved utilities were aged less than 14 years of age.
- The three most common states where the fatal incident occurred were New South Wales, Victoria and Queensland.
- The most common farm enterprises where the fatal incident occurred were sheep, and cereal grains, sheep, cattle and pigs.
- The most common locations of the fatal incident were roads and lanes, paddocks, and areas of natural vegetation.
- The most common mechanisms of the fatal incident were vehicle accidents and being hit by the ute.
- Transport, either for recreation or work purposes, and recreation or playing, were the two most common activities performed at the time of the fatal incident.
- The majority of fatalities were residents of the farm, but there were also a significant number who were visitors to the farm.

Cars

- There were 32 fatalities between 1989 and 1992 on Australian farms involving cars. Only half of these fatalities were of people working at the time of the fatal incident. The majority of persons fatally injured were males and the fatal incidents involving bystanders were mainly of younger persons.

- The three most common states where the fatal incident occurred were Victoria, New South Wales and Queensland.
- The most common farm enterprises where the fatal incident occurred were meat cattle; and cereal grains, sheep, cattle and pigs.
- Road and lanes were the most common location of the fatal incident.
- Fatal incidents largely involved vehicle accidents or persons being hit by the car. However, there were also five incidents where the person was underneath the vehicle, performing maintenance on the vehicle, when the vehicle fell on the person.
- Most commonly, people were involved in transport, either for recreation or work purposes, at the time of the fatal incident.
- Only half of the fatal incidents involved residents of the farm and a third occurred on a public roadway.

Two-Wheel Motorcycles

- There were 24 fatal incidents between 1989 and 1992 involving two-wheel motorcycles on Australian farms. Most commonly, people were working at the time of the fatal incident. The fatal incidents involving two-wheel motorcycles were all of males. The fatal incidents most commonly involved persons aged 15 to 24 years.
- Queensland, New South Wales and Victoria were the three states most commonly involved in incidents.
- The most common farm enterprises where the fatal incident were meat cattle, and sheep.
- Road and lanes were the most common location of the fatal incident involving two-wheel motorcycles.
- The majority of the fatal incidents were vehicle accidents.
- The most common activities at the time of the fatal incident were transport, either for work purposes or recreation.
- Half of the people fatally injured in incidents were residents of the farm and the other half were visitors to the farm.

Aircraft

- There were 46 fatalities during 1989 and 1992 involving aircraft. All were of working persons between 19 and 62 years of age. All except one was male.
- The industries employing the working person were commonly aerial agricultural services or meat cattle.
- The fatal incidents commonly occurred in Queensland and New South Wales.
- The common activities of the working person were transport for work purposes; mustering; crop dusting; and inspecting.
- Half of the fatal incidents involved visitors to the farm.

Tractors

- There 87 fatal incidents during 1989 and 1992 on Australian farms involving tractors. Three-quarters of the persons fatally injured were working at the time of the fatal incident. The majority of persons were males. Workers were commonly aged over 44 years and over one-third of bystander fatalities involved children less than five years of age.
- The most common states where the fatal incident occurred were Queensland, New South Wales and Victoria.
- The enterprises most commonly involved in fatal incidents were meat cattle, and cereal grains, sheep, cattle and pigs.
- Paddocks, either under crop or clear for grazing; roads and lanes; and areas of natural vegetation were the most common locations of the fatal incident.
- Common circumstances in fatal incidents were rollovers of the tractor or being hit by the tractor, including runovers after falling from the tractor. All bystander fatal incidents involved the person (mainly children) being runover by the tractor, usually following a fall from the tractor.
- Working with crops and transport were the most common activities of workers at the time of the fatal incident. Playing or recreation activities and transport for recreation were the most common activities for bystanders.
- The majority of persons fatally injured were residents of the farm.

Firearms

- There were 27 fatal incidents involving firearms on Australian farms. Incidents involving firearms commonly involved workers, but bystanders and other farm persons made up a third of those fatally injured. All persons fatally injured were male and the incidents commonly involved persons aged 15 to 24 years of age.
- New South Wales was the most common state where the fatal incident.
- The known enterprise type most commonly involved in fatal incidents was cereal grains, sheep, cattle and pigs.
- The most common locations of fatal incident were paddocks, either clear for grazing or under crop; and areas of natural vegetation.
- Hunting was the main activity of the working persons at the time of the fatal incident.
- Half of the persons fatally injured from a firearm were residents of the farm and a third were visitors to the farm.

Dams

- There were 51 fatal incidents on Australian farms involving people drowning in dams during 1989 and 1992. The majority of incidents involved bystanders who were aged four years or less. All of the workers were male and the majority of bystanders were male.
- New South Wales and Victoria were the most common states where fatal incidents occurred.

- Often the type of farm enterprise could not determined from information in the coronial file for incidents involving bystanders. However, the enterprise type most commonly involved in fatal incidents was cereal grains, sheep, cattle and pigs.
- The most common activity performed at the time of the fatal incident was recreation or playing activities.
- Fatalities usually were of residents of the farm, but over one third involved visitors.

Horses

- There were 33 fatal incidents involving horses on Australian farms during 1989 and 1992. The incidents largely involved workers, but a quarter of the incidents were of persons involved in other farm fatalities. Fatal incidents commonly involved persons aged 25 to 34 years.
- Victoria, Queensland and New South Wales were the states where the fatal incidents commonly occurred.
- The most common type of enterprises on which fatal incidents occurred were agriculture NEC, and meat cattle.
- The most common locations of the fatal incident were stockyards, including horseyards, and paddocks.
- Fatal incidents commonly involved persons either being hit by the horse or falling from the horse.
- The most common activity performed at the time of the fatal incident was working with animals.
- The majority of fatal incidents involved residents of the farm.

Trees Being Felled

- There were 22 fatal incidents involving trees being felled on Australian farms during 1989 and 1992. The majority of fatal incidents were of people working and who were aged over 35 years.
- The most common states where the fatal incidents occurred were New South Wales, Queensland and Victoria.
- The most common type of enterprises on which fatal incidents occurred were cereal grains, sheep, cattle and pigs, and meat cattle.
- The most common locations of the fatal incident were areas of natural vegetation and paddocks.
- The majority of fatal incidents were of persons being hit by a falling tree.
- The activities at the time of the fatal incident involving farm workers were felling trees or clearing land.
- There were almost equal number of visitors to the farm and residents of the farm who were fatally injured in incidents.

Section 6: Fatal Injuries on Farms by Specific Mechanisms

Three mechanisms of injury of work-related traumatic farm deaths are examined in this Section. These are falling from a height, drowning and electrocution fatalities. Falling from a height and drowning were identified as priority areas by the National Injury Prevention Advisory Council (NIPAC, 1999). Both falls and electrocution fatalities were two of the most common mechanisms of the fatal incident that did not necessarily involve mobile machinery or vehicles for workers. Drowning fatalities were identified as a problem area for children on a farm, especially for those under four years of age.

FALLS FROM A HEIGHT

One of the recommendations from Farmsafe Australia's Goals, Targets and Strategy 1996-2001, Mid-term Review (Fragar & Franklin, 1999) was that "Further examination of the issues of injury due to falls on farms should be undertaken to define the nature and scale of the problem and solutions".

Falls from a height include all people who fall from any height, but exclude slips, trips and falls on the same level.

Between 1989 and 1992, there were 42 fatalities on Australian farms where an individual fell from a height. This is an average of ten fatalities per year. Of the 42 fatalities, 29 (69.0%) were of persons working at the time of the incident, five (11.9%) were of bystanders and eight (19.0%) were other farm fatalities (Table 6.1).

Table 6.1 Number of fatalities per year by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Year	Working		Bystander		Other Farm		Total	
	n	%	n	%	n	%	n	%
1989	6	20.7	2	40.0	4	50.0	12	28.6
1990	7	24.1	-	-	1	12.5	8	19.0
1991	8	27.6	3	60.0	1	12.5	12	28.6
1992	8	27.6	-	-	2	25.0	10	23.8
Total	**29**	**100.0**	**5**	**100.0**	**8**	**100.0**	**42**	**100.0**

There were 25 additional fatalities that involved a worker falling from a height where the main mechanism of the fatal incident was not a fall. A common example was falling from a vehicle and subsequently being runover by the vehicle. In this instance, the main mechanism of the incident was described as 'hit by moving objects', rather than falling from a height. These fatalities are not considered in this analysis, but are briefly considered here.

The 25 fatalities consisted of 13 (52.0%) workers, nine (36.0%) bystanders and three (12.0%) other farm fatalities. For the workers, seven (53.8%) incidents involved the worker falling from a tractor and subsequently being runover by the tractor; three (23.1%) incidents involved a worker falling from a horse and then being either trapped under the horse, colliding with a tree or falling into a flooded river and drowning; one (7.7%) worker fell from a truck and was

subsequently runover by the truck; one (7.7%) worker fell from a ladder after receiving an electric shock; and one (7.7%) worker fell down a well and drowned. Six (66.7%) of the bystanders fell from a tractor and were subsequently runover by the tractor; one (11.1%) bystander fell from a utility and then was runover by the utility; one (11.1%) bystander fell, whilst climbing over a fence while intoxicated; and one (11.1%) bystander fell into a bore hole and drowned. The three other farm fatalities involved a person falling from a panel van and subsequently being runover; a person falling from a bridge and then drowning; and a person receiving an electric shock while up a ladder and then falling from the ladder.

Gender and Age

Thirty-one of the forty-two fatalities (73.8%) involving persons falling from a height were of persons aged 20 to 64 years, although persons of all ages were involved. All except one of the workers were adults (28: 96.6%). The majority (80.0%) of bystanders were aged under 14 years, with the remaining bystander aged between 50 and 54 years. Persons who were fatally injured in other farm fatalities ranged in ages from eleven to 69 years. Twenty-eight (96.6%) workers, three (60.0%) bystanders and five (62.5%) of the persons killed in other farm fatalities were males (Table 6.2).

Table 6.2 Age group by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	1	-	1	2.4
5 - 9	1	2	-	3	7.1
10 - 14	-	1	1	2	4.8
15 - 19	-	-	-	-	-
20 - 24	2	-	1	3	7.1
25 - 29	1	-	-	1	2.4
30 - 34	2	-	2	4	9.5
35 - 39	3	-	-	3	7.1
40 - 44	4	-	-	4	9.5
45 - 49	3	-	-	3	7.1
50 - 54	2	1	1	4	9.5
55 - 59	2	-	1	3	7.1
60 - 64	5	-	1	6	14.3
65 - 69	1	-	1	2	4.8
70 - 74	1	-	-	1	2.4
75+	2	-	-	2	4.8
Total	**29**	**5**	**8**	**42**	**100.0**

State or Territory of Fatal Incident

Queensland (16: 38.1%), New South Wales (10: 23.8%) and Victoria (9: 21.4%) had the largest number of fatalities. Queensland had the highest number of working (13: 44.8%) and bystander (2: 40.0%) fatalities. Half of the other farm fatalities occurred in Victoria (4: 50.0%) (Table 6.3).

Table 6.3 State or Territory of incident by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	13	2	1	16	38.1
NSW	7	1	2	10	23.8
VIC	5	-	4	9	21.4
TAS	-	1	-	1	2.4
SA	2	1	-	3	7.1
WA	2	-	1	3	7.1
Total	**29**	**5**	**8**	**42**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 39 (92.9%) incidents. The most common farm enterprise where the fatal incident occurred was meat cattle (9: 21.4%) (Table 6.4).

Table 6.4 Farm enterprise by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**27**	**5**	**8**	**40**	**95.2**
Poultry for Meat	*1*	-	-	*1*	*2.4*
Fruit	*1*	-	-	*1*	*2.4*
Orchard and Other Fruit	*2*	-	-	*2*	*4.8*
Vegetables Including Potatoes	-	*1*	-	*1*	*2.4*
Cereal Grains, Sheep, Cattle, Pigs	*3*	-	*2*	*5*	*11.9*
Meat Cattle, Cereal Grains	*3*	-	-	*3*	*7.1*
Sheep, Meat Cattle	*2*	*1*	-	*3*	*7.1*
Sheep	*4*	-	-	*4*	*9.5*
Meat Cattle	*5*	*2*	*2*	*9*	*21.4*
Dairy	-	*1*	-	*1*	*2.4*
Sugar Cane	*2*	-	-	*2*	*4.8*
Agriculture NEC	*2*	-	*2*	*4*	*9.5*
Services to Agriculture	*1*	-	-	*1*	*2.4*
Agriculture Not Known	*1*	-	*2*	*3*	*7.1*
Other	**2**	**-**	**-**	**2**	**4.8**
Total	**29**	**5**	**8**	**42**	**100.0**

Location of Fatal Incident

Six (14.3%) of the fatalities occurred in areas of natural vegetation, with paddocks under crop (5: 11.9%), paddocks clear for grazing (5: 11.9%) and stockyards (5: 11.9%) being the next most common locations where the fatal incident occurred (Table 6.5).

Table 6.5 Location on farm by working status, falls from a height, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Under Crop	4	1	-	5	11.9
Paddock Clear for Grazing	3	-	2	5	11.9
Natural Vegetation	3	2	1	6	14.3
Stockyards Including Horse Yards	3	-	2	5	11.9
Roads, Lanes	2	1	1	4	9.5
Hay Shed	1	-	-	1	2.4
Shed, Farm Building NEC	1	1	1	3	7.1
Woolshed Shearing Shed	1	-	-	1	2.4
Storage Shed Other	1	-	-	1	2.4
Disposal Pit	1	-	-	1	2.4
Windmill Including Troughs	3	-	-	3	7.1
Animal Shed Other Including Broiler Shed	1	-	-	1	2.4
Farm Residence	2	-	-	2	4.8
Farm Yard or Garden	1	-	1	2	4.8
Other Place Associated with Agricultural Work	1	-	-	1	2.4
Not Relevant	1	-	-	1	2.4
Total	**29**	**5**	**8**	**42**	**100.0**

FALL FROM SHED ROOF

A trades assistant was employed by a licenced builder (who had been contracted by a chicken farmer) to remove some old insulation and install new insulation in one of the farmer's chicken sheds. The assistant was using a claw hammer to remove nails from the corrugated iron roof of a chicken shed when he fell backward through an open area of roof, 4.3 metres to the concrete floor below. The assistant was not wearing a fall protection device and no safety mesh or barriers had been installed around the perimeter of the roof.

Agent and Mechanism of Fatal Incident

Horses were the most common agents involved in working (8: 27.6%) and other farm (4: 50.0%) incidents involving falls from a height. Cars (2: 40.0%) were the most common agents involved in bystander incidents (Table 6.6).

Table 6.6 Agent of fatal incident by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Other Farm	Total	%
Farm Vehicles					
Truck	2	-	-	2	4.8
Utility	-	1	-	1	2.4
Car	-	2	-	2	4.8
Bicycle	-	-	1	1	2.4
Total Farm Vehicles	**2**	**3**	**1**	**6**	**14.3**
Mobile Farm Machinery and Plant					
Tillage Seeder	1	1	-	2	4.8
Slasher	1	-	-	1	2.4
Total Mobile Farm Machinery and Plant	**2**	**1**	**-**	**3**	**7.1**
Workshop Equipment					
Ladder Excluding Ladder Attached to Structure	1	-	1	2	4.8
Total Workshop Equipment	**1**	**-**	**1**	**2**	**4.8**
Other Equipment and Materials					
Other Equipment and Materials NEC	1	-	-	1	2.4
Total Other Equipment and Materials	**1**	**-**	**-**	**1**	**2.4**
Materials					
Steel	2	-	-	2	4.8
Hay Bales Other	2	-	-	2	4.8
Total Materials	**4**	**-**	**-**	**4**	**9.5**
Farm Structures					
House Yard	1	-	-	1	2.4
Tank	1	-	-	1	2.4
Windmill	3	-	-	3	7.1
Silo Grain	1	-	-	1	2.4
Other Farm Structure NEC	2	-	1	3	7.1
Total Farm Structures	**8**	**-**	**1**	**9**	**21.4**
Animals					
Horse	8	1	4	13	31.0
Total Animals	**8**	**1**	**4**	**13**	**31.0**
Working Environment					
Ground, Rock, Stump*	3	-	1	4	9.5
Total Working Environment	**3**	**-**	**1**	**4**	**9.5**
Total	**29**	**5**	**8**	**42**	**100.0**

* For the working fatalities, one worker fell down a ravine, one worker fell out of a tree and one worker fell from a roof of a structure. The other farm fatality resulted from a fall from a fence.

Agent / Situation From Which Person Fell

Horses (12: 28.6%) and ladders (6: 14.3%) were the most common items that the person fell from at the time of the fatal incident. Other common items or structures that workers fell from were windmills (3: 10.3%), tractors (2: 6.9%), roofs (2: 6.9%) and trees (2: 6.9%). For bystanders, trailers (2: 40.0%) were the most common item fallen from. Other farm fatalities commonly involved falls from horses (4: 50.0%) or ladders (2: 25.0%) (Table 6.7).

Table 6.7 Agent / situation from which person fell by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Item	Working	Bystander	Other Farm	Total	%
Machinery and Mainly Fixed Plant					
Windmill	3	-	-	3	7.1
Escalator	1	-	-	1	2.4
Total Machinery and Mainly Fixed Plant	**4**	**-**	**-**	**4**	**9.5**
Mobile Plant and Transport					
Tractor	2	1	-	3	7.1
Trailer	-	2	-	2	4.8
Trucks, Semi-Trailers, Lorries	1	-	-	1	2.4
Tray, Loading Board or Table Top of Truck or Semi-Trailer	1	-	-	1	2.4
Cars, Station Wagons, Vans, Utilities	-	1	-	1	2.4
Pushbikes	-	-	1	1	2.4
Horse Drawn Sulky	1	-	-	1	2.4
Total Mobile Plant and Transport	**5**	**4**	**1**	**10**	**23.8**
Non-Powered Handtools, Appliances and Equipment					
Ladders, Mobile Ramps and Stairways	3	-	2	5	11.9
Step Ladders	1	-	-	1	2.4
Total Non-Powered Handtools, Appliances and Equipment	**4**	**-**	**2**	**6**	**14.3**
Environmental Agencies					
Pits	1	-	-	1	2.4
Embankment or Ravine	1	-	-	1	2.4
Roof	2	-	-	2	4.8
Buildings Under Construction or Demolition	1	-	-	1	2.4
Fencing	-	-	1	1	2.4
Trees	2	-	-	2	4.8
Horse	7	1	4	12	28.6
Haystack	1	-	-	1	2.4
Total Environmental Agencies	**15**	**1**	**5**	**21**	**50.0**
Not Known	1	-	-	1	2.4
Total	**29**	**5**	**8**	**42**	**100.0**

Activity at Time of Fatal Incident

Working with animals (9: 31.0%) and performing maintenance activities (6: 20.7%) were the two most common activities workers were performing at the time of the fatal incident. Bystanders were commonly involved in transport for recreation (3: 60.0%) and recreation or playing activities (2: 40.0%). Persons who were fatally injured in other farm incidents were commonly involved in transport for recreation (3: 37.5%) and recreation or playing activities (2: 25.0%) at the time of the fatal incident (Table 6.8).

Table 6.8 Activity at time of fatal incident by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	1	-	-	1	2.4
Transport for Recreation	-	3	3	6	14.3
Constructing or Installing	2	-	1	3	7.1
Maintenance	6	-	1	7	16.7
Earthmoving or Digging	1	-	-	1	2.4
Hunting	1	-	-	1	2.4
Working with Animals	9	-	-	9	21.4
Working with Crops	3	-	-	3	7.1
Monitoring, Observing, Inspecting	1	-	-	1	2.4
Moving Goods	4	-	-	4	9.5
Recreation or Playing	-	2	2	4	9.5
Other	1	-	-	1	2.4
Not Known / Not Stated	-	-	1	1	2.4
Total	**29**	**5**	**8**	**42**	**100.0**

FALL FROM A TRUCK

A farm labourer was on board a truck, loading hay out of a paddock on a farm. The farm labourer fell two metres from the back of the truck to the ground after some bales of hay fell on him. The farm labourer fractured his cervical spine in the fall and died from a pulmonary embolus four days after the incident occurred.

Pathophysiological Cause of Death and Blood Alcohol Content

The most common pathophysiological cause of death was head injuries (23: 54.8%). This was true for working (14: 48.3%), bystander (3: 60.0%) and other farm fatalities (6: 75.0%) (Table 6.9).

Table 6.9 Pathophysiological cause of death by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	14	3	6	23	54.8
Neck Injuries	2	-	-	2	4.8
Chest Injuries	3	-	-	3	7.1
Trunk Injuries	-	-	2	2	4.8
Abdominal Injuries	1	-	-	1	2.4
Multiple Injuries to Head and Other Body Parts	1	-	-	1	2.4
Multiple Injuries - Other	2	1	-	3	7.1
Fat Embolism Crush Injury Syndrome	1	-	-	1	2.4
Not Known	1	-	-	1	2.4
Medical Complications	4	1	-	5	11.9
Total	**29**	**5**	**8**	**42**	**100.0**

Blood alcohol tests were available for eleven (37.9%) of the working group, one of the bystanders and half of the other farm fatalities (4: 50.0%). Of those with known blood alcohol readings, one (9.1%) of the workers and one (25.0%) of the other farm fatalities had a blood alcohol reading above 0.05g/100ml (Table 6.10).

Table 6.10 Blood alcohol content by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	9 (81.8%)	1 (100.0%)	3 (75.0%)	13 (81.3%)
Blood Alcohol Reading Between 0.001% and 0.05%	1 (9.1%)	-	-	1 (6.3%)
Blood Alcohol Reading Greater than 0.05%	1 (9.1%)	-	1 (25.0%)	2 (12.5%)
Total	**11 (100.0%)**	**1 (100.0%)**	**4 (100.0%)**	**16 (100.0%)**

Month and Day of Fatal Incident

There was no clear monthly pattern in the number of fatal incidents (Table 6.11).

Table 6.11 Month of incident per year, falls from a height, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
February	3	1	1	-	5	11.9
March	-	3	1	2	6	14.3
April	3	-	2	1	6	14.3
May	1	-	2	-	3	7.1
June	-	1	1	1	3	7.1
July	-	-	2	-	2	4.8
August	-	-	-	2	2	4.8
September	1	1	1	1	4	9.5
October	2	1	-	1	4	9.5
November	-	1	1	1	3	7.1
December	2	-	1	1	4	9.5
Total	**12**	**8**	**12**	**10**	**42**	**100.0**

There was no clear daily pattern in fatal incidents, but seven (24.1%) of the fatal incidents involving workers occurred on a Saturday (Table 6.12).

Table 6.12 Day of incident by work status, falls from a height, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	2	1	2	5	11.9
Monday	5	1	2	8	19.0
Tuesday	5	1	-	6	14.3
Wednesday	5	1	-	6	14.3
Thursday	2	-	2	4	9.5
Friday	3	1	1	5	11.9
Saturday	7	-	1	8	19.0
Total	**29**	**5**	**8**	**42**	**100.0**

Visitor to the Farm

Of the 42 fatalities, 15 (35.7%) were of visitors, 25 (59.5%) were of residents of the farm and for two (4.8%) it was not relevant or not known if the person was a visitor to the farm. For people working, seven (24.1%) were visitors, 20 (69.0%) were residents and for two (6.9%) their visitor status was not relevant or not known. For bystanders, there were two (40.0%) visitors and three (60.0%) residents. For the other farm fatalities, there were six (75.0%) visitors and two (25.0%) residents of the farm.

DROWNING

Drowning in rural areas, in particular on farms, continues to be a significant component of farm deaths, especially for children. The Australian Water Safety Council, of which Farmsafe Australia is a member, has identified rural communities as a priority area for prevention of drowning deaths, in particular in the farming community (Australian Water Safety Council, 1998).

Between 1989 and 1992 there were 89 fatalities on Australian farms where a person drowned. This is an average of 22 fatalities per year or approximately two fatalities every month. The number of fatalities in any given year fluctuated between 17 and 26 (Table 6.13). Of the 89 fatalities due to drowning, 21 (23.6%) were of persons working at the time of the incident, 57 (64.0%) were of bystanders and eleven (12.4%) were other farm fatalities.

Table 6.13 Number of fatalities per year by work status, drowning, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	6	15	2	23	25.8
1990	8	18	-	26	29.2
1991	5	14	4	23	25.8
1992	2	10	5	17	19.1
Total	**21**	**57**	**11**	**89**	**100.0**

DROWNING WHILE REPAIRING DAM WALL

A professional scuba diver was attempting to repair a leak in the base of a dam wall, when a rip pulled the diver down through the hole in the wall. The dam covered approximately 25 acres and had a holding capacity of 80 million gallons. The diver was wearing a full length wet suit, booties, balaclava type head protection, diving mask and breathing apparatus. It appears a number of the criteria for a dive to take place as set out by the Australian Standard (AS 2299) were not observed.

Gender and Age

The people who drowned were predominantly young, with 49 (55.1%) people being less than 15 years of age (Table 6.14). Of the 21 working people who drowned, 18 (85.7%) were males aged between 15 and 78 years. There were three (14.3%) female workers aged 51, 64 and 72 years. Of the 57 bystanders, 48 (84.2%) were males aged between one and 79 years. There were nine (15.8%) female bystanders who were aged between one and 70 years. Of the eleven other farm fatalities, eight (72.7%) were of males aged between two and 69 years. There were three (27.3%) females involved in other farm fatalities who were aged one, 28 and 52 years.

Table 6.14 Age group by work status, drowning, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	39	3	42	47.2
5 - 14	-	4	3	7	7.9
15 - 24	5	4	-	9	10.1
25 - 34	3	3	1	7	7.9
35 - 44	1	1	1	3	3.4
45 - 54	3	1	2	6	6.7
55 - 64	3	1	-	4	4.5
65 - 74	4	3	1	8	9.0
75+	2	1	-	3	3.4
Total	**21**	**57**	**11**	**89**	**100.0**

State or Territory of Fatal Incident

The three states with the highest number of fatalities were New South Wales (29: 32.6%), Victoria (26: 29.2%) and Queensland (15: 16.9%) (Table 6.15). The Northern Territory had no farm-related drowning deaths. For working fatalities, just over half of the fatalities occurred in New South Wales (11: 52.4%). Victoria (20: 35.1%) and New South Wales (14: 24.6%) had the most drowning fatalities involving bystanders. The other farm fatalities involving drowning commonly occurred in New South Wales (4: 36.4%), Queensland (3: 27.3%) and Western Australia (3: 27.3%).

Table 6.15 State or Territory of incident by work status, drowning, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	3	9	3	15	16.9
NSW	11	14	4	29	32.6
VIC	5	20	1	26	29.2
TAS	-	5	-	5	5.6
SA	-	3	-	3	3.4
WA	2	6	3	11	12.4
Total	**21**	**57**	**11**	**89**	**100.0**

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 60 (67.4%) incidents. The most common type of farm enterprises where the fatal incident occurred were meat cattle (15: 16.9%) and cereal grains, sheep, cattle and pigs (12: 13.5%) (Table 6.16).

Table 6.16 Farm enterprise by work status, drowning, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**21**	**57**	**11**	**89**	**100.0**
Poultry	*-*	*2*	*-*	*2*	*2.2*
Grapes	*2*	*1*	*-*	*3*	*3.4*
Plantation Fruit	*-*	*2*	*-*	*2*	*2.2*
Orchard and Other Fruit	*-*	*5*	*-*	*5*	*5.6*
Vegetables Including Potatoes	*1*	*1*	*-*	*2*	*2.2*
Cereal Grains, Sheep, Cattle, Pigs	*2*	*9*	*1*	*12*	*13.5*
Meat Cattle, Cereal Grains	*1*	*-*	*-*	*1*	*1.1*
Sheep, Meat Cattle	*1*	*1*	*2*	*4*	*4.5*
Sheep	*2*	*2*	*1*	*5*	*5.6*
Meat Cattle	*7*	*4*	*4*	*15*	*16.9*
Dairy	*2*	*4*	*-*	*6*	*6.7*
Pigs	*-*	*1*	*-*	*1*	*1.1*
Nurseries	*2*	*-*	*-*	*2*	*2.2*
Agriculture Not Known	*1*	*25*	*3*	*29*	*32.6*
Total	**21**	**57**	**11**	**89**	**100.0**

Location of Fatal Incident

The majority of fatalities occurred in dams, water reservoirs and irrigation channels (64: 71.9%) or in rivers and creeks (12: 13.5%) (Table 6.17). Dams, water reservoirs and irrigation channels were the main location of for both bystanders (52: 91.2%) and workers (10: 47.6%). For other farm fatalities, rivers and creeks were the most common location (7: 63.6%).

Table 6.17 Location on farm by work status, drowning, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Clear for Grazing	-	1	-	1	1.1
Stockyards Including Horse Yards	-	1	-	1	1.1
Roads, Lanes	1*	-	-	1	1.1
Dam, Water Reservoir, Irrigation Channel	10	52	2	64	71.9
River, Creek	5	-	7	12	13.5
Dairy	1	1	-	2	2.2
Farm Excluding Residence NEC	1	1	-	2	2.2
Farm Yard or Garden	1	1	2	4	4.5
Not Relevant	2	-	-	2	2.2
Total	**21**	**57**	**11**	**89**	**100.0**

* Drowning occurred whilst crossing a flooded roadway on horseback.

Agent and Mechanism of Fatal Incident

Dams (51: 57.3%) and creeks and rivers (19: 21.3%) were the most common agents involved. Three of the fatalities involved incidents with farm vehicles which resulted in the person drowning (Table 6.18).

Table 6.18 Agent of fatal incident by work status, drowning, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Other Farm	Total	%
Farm Vehicles					
Motorcycle 3 Wheel	-	1	-	1	1.1
Aircraft	2	-	-	2	2.2
Total Farm Vehicles	**2**	**1**	**-**	**3**	**3.4**
Farm Structures					
Swimming Pool	1	-	1	2	2.2
Tank	-	4	1	3	3.4
Dam	7	44	-	51	57.3
Creek, River	8	2	9	19	21.3
Irrigation Channel	1	4	-	5	5.6
Other Farm Structure NEC*	2	2	-	4	4.5
Total Farm Structures	**19**	**56**	**11**	**86**	**96.6**
Total	**21**	**57**	**11**	**89**	**100.0**

* Other farm structure were a sludge pit, a drain, a cattle trough and a well.

CHILD DROWNED IN FARM DAM

A four year old child was in the company of his parents who were poultry farmers. The family was attending a field day at the farm of another grower. As part of the field day, there was an inspection of the farm. During this time, the child's mother went inside a chook shed for the inspection and let the child play outside the shed. The mother of the child emerged from the shed a few minutes later and was unable to see her son. A search for the child commenced and about 30 minutes later the boy was found in one of the three dams at the back of the property. The dams were separated from the chook shed area by a three strand wire fence, with the lowest strand about 40 cm from the ground. There was also a single strand electric fence about 65 cm above the ground between the dams and the shed.

Activity at Time of Fatal Incident

Overall, the most common activity at the time of the fatal incident was recreation or playing (59: 66.3%) (Table 6.19). For people working, the most common activities were transport for work purposes (6: 28.6%) and maintenance activities (5: 23.8%). The most common activity for both bystanders (51: 89.5%) and persons involved in other farm fatalities (8: 72.7%) was recreation or playing.

Table 6.19 Activity at time of fatal incident by work status, drowning, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	6	-	-	6	6.7
Transport for Recreation	-	2	-	2	2.2
Transport NEC	-	-	1	1	1.1
Constructing or Installing	1	-	-	1	1.1
Maintenance	5	-	-	5	5.6
Working with Animals	3	-	1*	4	4.5
Monitoring, Observing, Inspecting	2	-	1	3	3.4
Moving Goods	1	-	-	1	1.1
Rescuing	1	-	-	1	1.1
Work Break	2	-	-	2	2.2
Recreation or Playing	-	51	8	59	66.3
Other	-	1	-	1	1.1
Not Known / Not Stated	-	3	-	3	3.4
Total	**21**	**57**	**11**	**89**	**100.0**

* The one other farm fatality was clearly involved in recreational activities with a horse at the time of the fatal incident.

Pathophysiological Cause of Death and Blood Alcohol Content

All fatalities resulted from persons drowning.

Blood alcohol tests were conducted for 14 (66.7%) of the working group, 25 (43.9%) bystanders and six (54.5%) other farm fatalities. Of those with known blood alcohol readings, four (28.6%) workers, six (24.0%) bystanders and one (16.7%) person involved in an other farm fatality had blood alcohol readings above 0.05 g/100ml (Table 6.20).

Table 6.20 Blood alcohol content by work status, drowning, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	9 (64.3%)	18 (72.0%)	4 (66.7%)	31 (68.9%)
Blood Alcohol Reading Between 0.001% and 0.05%	1 (7.1%)	1 (4.0%)	1 (16.7%)	3 (6.7%)
Blood Alcohol Reading Greater than 0.05%	4 (28.6%)	6 (24.0%)	1 (16.7%)	11 (24.4%)
Total	**14 (100.0%)**	**25 (100.0%)**	**6 (100.0%)**	**45 (100.0%)**

TWO PERSONS DROWN IN WATERHOLE

A woman, her husband and their two children were at a waterhole swimming. While swimming, one of the children got into difficulties. The mother, who could not swim, dived in to assist her child, but was unable to help him and as a result both drowned. The waterhole was on an 80 acre private rural property that was used for cattle. The property was fenced and usually if the owner of the property saw people using the waterhole he would ask them to leave his property.

Month and Day of Fatal Incident

There was no clear monthly pattern for drowning fatalities. However, January (15: 16.9%) and April (11: 12.4%) were the months with the highest number of deaths (Table 6.21).

Table 6.21 Month of incident per year, drowning, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	5	4	5	1	15	16.9
February	1	-	2	2	5	5.6
March	-	3	1	-	4	4.5
April	2	6	1	2	11	12.4
May	3	2	2	2	9	10.1
June	-	-	2	3	5	5.6
July	-	1	3	2	6	6.7
August	2	5	1	-	8	9.0
September	2	2	1	1	6	6.7
October	5	1	1	-	7	7.9
November	2	1	1	-	4	4.5

December	1	1	3	4	9	10.1
Total	**23**	**26**	**23**	**17**	**89**	**100.0**

There was no clear daily pattern for drowning fatalities. However, on average a higher number of fatalities occurred on the weekend than on a weekday (Table 6.22).

Table 6.22 Day of incident by work status, drowning, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	5	10	1	16	18.0
Monday	4	7	1	12	13.5
Tuesday	-	7	-	7	7.9
Wednesday	-	8	5	13	14.6
Thursday	2	2	-	4	4.5
Friday	3	7	3	13	14.6
Saturday	5	15	1	21	23.6
Not Known	2	1	-	3	3.4
Total	**21**	**57**	**11**	**89**	**100.0**

Visitor to the Farm

Of the 89 persons who drowned, 35 (38.3%) were visitors, 50 (56.2%) were residents and for four (4.5%) their visitor status was not known or not relevant. For people working, nine (42.9%) were visitors, nine (42.9%) were residents and for three (14.3%) their visitor status was not relevant. For bystanders, there were 21 (36.8%) visitors and 36 (63.2%) residents. For other farm fatalities, five (45.5%) were of visitors, five (45.5%) were of residents and for one (9.1%) person their visitor status was not known.

Electrocution

In the most recent study of work-related deaths in Australia, the agricultural industry had the second highest number of deaths involving contact with electricity (NOHSC, 1998). Deaths involving electrocution, although not common on farms, have a specific cause (ie. contact with electricity) and prevention of this type of fatal incident has known strategies / controls that are easily employed.

Between 1989 and 1992, there were 28 fatalities on Australian farms where a person was electrocuted. This is an average of seven fatalities per year. The number of fatalities in any given year fluctuated between five and ten. Of the 28 fatalities due to electrocution, 23 (82.1%) were of persons working at the time of the fatal incident, one (3.6%) was of a bystander and four (14.3%) were other farm fatalities (Table 6.23).

Table 6.23 Number of fatalities per year by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	5	-	2	7	25.0
1990	5	-	1	6	21.4
1991	4	1	-	5	17.9
1992	9	-	1	10	35.7
Total	**23**	**1**	**4**	**28**	**100.0**

Gender and Age

Two-thirds of persons were aged between 15 and 44 years, with 19 (67.9%) persons in this age bracket (Table 6.24). Of the 23 electrocutions of people working, 21 (91.3%) were of males aged between 18 and 86 years. There were two (8.7%) female workers who were aged 22 and 49 years. The bystander was a female aged five years. The four other farm fatalities were all of males aged between 18 and 64 years.

Table 6.24 Age group by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
5 - 14	-	1	-	1	3.6
15 - 24	5	-	1	6	21.4
25 - 34	6	-	1	7	25.0
35 - 44	5	-	1	6	21.4
45 - 54	5	-	-	5	17.9
55 - 64	1	-	1	2	7.1
75+	1	-	-	1	3.6
Total	**23**	**1**	**4**	**28**	**100.0**

State or Territory of Fatal Incident

Queensland (11: 39.3%) and New South Wales (9: 32.1%) were the two states with the largest number of fatalities. There were no farm-related electrocution fatalities in the Northern Territory or Tasmania. Queensland (11: 47.8%) and New South Wales (7: 30.4%) had the highest number of working fatalities. The one bystander fatality occurred in Victoria. Half of the other farm fatalities occurred in New South Wales (2: 50.0%) (Table 6.25).

Table 6.25 State or Territory of incident by work status, electrocution, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	11	-	-	11	39.3
NSW	7	-	2	9	32.1
VIC	-	1	1	2	7.1
SA	3	-	-	3	10.7
WA	2	-	1	3	10.7
Total	**23**	**1**	**4**	**28**	**100.0**

FATAL ELECTRIC SHOCK

A farmer was arranging for the transfer of grain out of a truck and into wheat bins. The farmer climbed into a field bin containing an auger. The auger was not operating, but had electrical power connected to it. It appears that there was a short circuit in the electricity supply, causing the auger to be electrified, which in turn electrified the field bin. The farmer received a fatal electric shock as he lent against the field bin. Electrical power for the auger came from a shearing shed via a 30 metre extension cord, which was connected to a 100 metre extension cord. The switchboard had a 15 amp fuse with thick copper wiring instead of the proper tinned fuse wire. One of the extension cords was incorrectly wired, with the earth wire disconnected from the pin, causing a short circuit to the neutral wire. Wiring on the auger switch had also perished. The auger was insulated from the ground, but the field bin was not earthed because it was sitting on a concrete base.

Farm Enterprise

The type of farm enterprise where the fatal incident occurred could be identified in 24 (85.7%) incidents. The most common farm enterprises where fatal incidents occurred were cereal grains (5: 17.9%) and vegetables including potatoes (4: 14.3%) (Table 6.26).

Table 6.26 Farm enterprise by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**23**	**1**	**4**	**28**	**100.0**
Poultry	*2*	-	-	*2*	*7.1*
Fruit	*1*	-	-	*1*	*3.6*
Vegetables Including Potatoes	*4*	-	-	*4*	*14.3*
Cereal Grains, Sheep, Cattle, Pigs	*2*	-	-	*2*	*7.1*
Cereal Grains	*5*	-	-	*5*	*17.9*
Meat Cattle, Cereal Grains	*1*	-	-	*1*	*3.6*
Sheep, Cereal Grains	*1*	-	-	*1*	*3.6*
Sheep, Meat Cattle	-	-	*1*	*1*	*3.6*
Sheep	-	-	*1*	*1*	*3.6*
Meat Cattle	*2*	-	-	*2*	*7.1*
Dairy	-	*1*	-	*1*	*3.6*
Pigs	*1*	-	-	*1*	*3.6*
Sugar Cane	*1*	-	-	*1*	*3.6*
Cotton	*1*	-	-	*1*	*3.6*
Agriculture Not Known	*2*	-	*2*	*4*	*14.3*
Total	**23**	**1**	**4**	**28**	**100.0**

FAULTY ELECTRICAL WORK

A five year old child was playing in the rear yard of a farm when she touched an outdoor tap and received a fatal electric shock. Prior to the incident, the father of the child had attempted to perform some electrical work around the residence and had accidentally reconnected the electrical wires incorrectly, so that the active wire was connected to the neutral terminal and vice versa. At the time of the incident, the house was not properly earthed.

Location of Fatal Incident

For working fatalities, a shed or farm building NEC (7: 30.4%), paddocks under crop (4: 17.4%) and other places associated with agricultural work (3: 13.0%) were the most common locations of the fatal incident. The one bystander fatality occurred in a paddock clear for grazing and the four other farm fatalities occurred in a variety of locations (Table 6.27).

Table 6.27 Location on farm by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Under Crop	4	-	-	4	14.3
Paddock Clear for Grazing	1	1	-	2	7.1
Unspecified	1	-	-	1	3.6
Workshop	1	-	-	1	3.6
Roads, Lanes	1	-	-	1	3.6
Machinery Shed	1	-	-	1	3.6
Shed, Farm Building NEC	7	-	1	8	28.6
Piggery	1	-	-	1	3.6
Farm Excluding Residence NEC	2	-	1	3	10.7
Farm Yard or Garden	1	-	1	2	7.1
Farm Residence NEC	-	-	1	1	3.6
Other Place Associated with Agricultural Work	3	-	-	3	10.7
Total	**23**	**1**	**4**	**28**	**100.0**

CONTACT WITH OVERHEAD ELECTRICAL WIRES

An apprentice fitter and turner and a co-worker were moving some irrigation pipes, which were aluminium and about seven metres long, on a farm. Whilst moving one pipe, a snake emerged. The apprentice pinned the snake to the ground with one of the pipes and the co-worker went to get a stick to kill the snake. The pipe the apprentice was holding touched overhead high tension electrical wires which were carrying 11,000 volts and he received a fatal electric shock. The overhead electrical wires were about six metres above the ground, 12.5 centimetres under the legal minimum height.

Agent and Mechanism of Fatal Incident

For working fatalities, powerlines (11: 47.8%), electric drills (2: 8.7%) and other farm structures NEC (a metal panel on a pig pen and a caravan) (2: 8.7%) were the most common agents involved. The one bystander fatality involved an energised outdoor tap. Other equipment and materials NEC (a faulty fridge and a faulty washing machine) (2: 50.0%) were the most common agents involved in other farm fatalities (Table 6.28).

Table 6.28 Agent of fatal incident by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Agent	Working	Bystander	Other Farm	Total	%
Mobile Farm Machinery and Plant					
Grain Auger	1	-	-	1	3.6
Other Mobile Farm Machinery and Plant NEC	1	-	-	1	3.6
Total Mobile Farm Machinery and Plant	**2**	**-**	**-**	**2**	**7.1**
Fixed Plant and Equipment					
Pump	1	-	-	1	3.6
Generator	1	-	-	1	3.6
Total Fixed Plant and Equipment	**2**	**-**	**-**	**2**	**7.1**
Workshop Equipment					
Welder	1	-	-	1	3.6
Electric Drill	2	-	1	3	10.7
Other Workshop Equipment	1	-	-	1	3.6
Total Workshop Equipment	**4**	**-**	**1**	**5**	**17.9**
Other Equipment and Materials					
Other Equipment and Materials NEC	1	-	2	3	10.7
Total Equipment and Materials	**1**	**-**	**2**	**3**	**10.7**
Farm Structures					
Tank	1	-	-	1	3.6
Powerlines	11	-	1	12	42.9
Other Farm Structure NEC	2	1	-	3	10.7
Total Farm Structures	**14**	**1**	**1**	**16**	**57.1**
Total	**23**	**1**	**4**	**28**	**100.0**

Source of Exposure to Electricity

Aerial powerlines (12: 52.2%) and extension cords and accessories (4: 17.4%) were the two most common sources of exposure to electricity for workers. The one bystander fatality involved contact with an energised outdoor tap. Home appliances (3: 75.0%) were the most common source of electrical exposure for other farm fatalities (Table 6.29).

Table 6.29 Source of exposure to electricity by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Source of Exposure	Working	Bystander	Other Farm	Total	%
Aerial Powerlines	12	-	1	13	46.4
Fixed Wiring in Premises	1	-	-	1	3.6
Extension Cords and Accessories	4	-	-	4	14.3
Home Appliances	1	-	3	4	14.3
Equipment Industrial and Work Tools	1	-	-	1	3.6
Underground Powerlines	1	-	-	1	3.6
Other*	3	1	-	4	14.3
Total	**23**	**1**	**4**	**28**	**100.0**

* Other comprises a meterbox, a field bin, a caravan and an outdoor tap.

Activity at Time of Fatal Incident

For working fatalities, maintenance activities (11: 47.8%), constructing or installing tasks (4: 17.4%), working with crops (3: 13.0%) and moving goods (3: 13.0%) were the most common activities being performed at the time of the fatal incident. The one bystander was involved in recreation or playing activities. For other farm fatalities, maintenance activities (3: 75.0%) were the most common activities being performed at the time of the fatal incident (Table 6.30).

Table 6.30 Activity at time of fatal incident by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Activity	Working	Bystander	Other Farm	Total	%
Transport for Work Purposes	1	-	-	1	3.6
Constructing or Installing	4	-	1	5	17.9
Maintenance	11	-	3	14	50.0
Working with Animals	1	-	-	1	3.6
Working with Crops	3	-	-	3	10.7
Moving Goods	3	-	-	3	10.7
Recreation or Playing	-	1	-	1	3.6
Total	**23**	**1**	**4**	**28**	**100.0**

Pathophysiological Cause of Death and Blood Alcohol Content

All fatalities resulted from persons contacting electricity.

Blood alcohol tests were conducted for 13 (56.5%) of the working group and one (25.0%) of the four other farm fatalities. The bystander did not have a blood alcohol test conducted. Of those with known blood alcohol readings, none of the persons had a blood alcohol reading above 0.05 g/100ml (Table 6.31).

Table 6.31 Blood alcohol content by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Blood Alcohol Content	Working	Bystander	Other Farm	Total
Nil Blood Alcohol Reading	11 (84.6%)	-	1 (100.0%)	12 (85.7%)
Blood Alcohol Reading Between 0.001% and 0.05%	2 (15.4%)	-	-	2 (14.3%)
Blood Alcohol Reading Greater than 0.05%	-	-	-	-
Total	**13 (100.0%)**	**-**	**1 (100.0%)**	**14 (100.0%)_**

Month and Day of Fatal Incident

There was no clear monthly pattern in the number of fatal incidents (Table 6.32).

Table 6.32 Month of incident per year, electrocution, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
January	1	-	2	-	3	10.7
February	-	-	1	1	2	7.1
March	2	1	-	1	4	14.3
April	-	-	1	2	3	10.7
May	1	-	-	-	1	3.6
July	1	1	-	1	3	10.7
September	1	-	-	1	2	7.1
October	-	1	-	1	2	7.1
November	-	2	-	-	2	7.1
December	1	1	1	3	6	21.4
Total	**7**	**6**	**5**	**10**	**28**	**100.0**

There was no clear daily pattern in fatal incidents, but Monday and Saturday each had seven (25.0%) of the fatal incidents (Table 6.33).

Table 6.33 Day of incident by work status, electrocution, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	-	-	1	1	3.6
Monday	6	-	1	7	25.0
Tuesday	3	1	-	4	14.3
Wednesday	3	-	1	4	14.3
Thursday	4	-	-	4	14.3
Friday	-	-	1	1	3.6
Saturday	7	-	-	7	25.0
Total	**23**	**1**	**4**	**28**	**100.0**

MACHINERY CONTACTING OVERHEAD POWER LINES

A cane farmer was operating a Toft Hydro-loader attached to a tractor, in order to lift a bag of fertiliser to fill a three row fertilising box. The farmer was working underneath 11,000 volt overhead power lines. The loader, when raised, contacted the overhead power lines, and when the farmer stepped from the tractor and touched the Toft loader he received a fatal electric shock.

Visitor to the Farm

Of the 28 fatalities, five (17.9%) were of visitors, 22 (78.6%) were of residents and for one (3.6%) person their visitor status was not known. For people working, five (21.7%) were visitors and 18 (78.3%) were residents. The bystander was a resident of the farm. For the other farm fatalities, none were of visitors, three (75.0%) were of residents and for one (25.0%) person their visitor status was not known.

SUMMARY SECTION 6

Falls From a Height

- There were 42 fatal incidents on Australian farms between 1989 and 1992 where an individual fell from a height. The majority of fatalities involving falls from a height were of workers. The majority of fatal incidents involved males, aged 20 to 64 years.
- Queensland, New South Wales and Victoria were the three states which had the highest number of falls from a height.
- There were a large number of different farm enterprises where the fatal incidents occurred, but meat cattle was the most common.
- Paddocks, either under crop or clear for grazing; areas of natural vegetation; and stock yards, including horse yards were the most common locations of the fatal incidents.
- Falls commonly occurred from horses and a variety of machinery and farm vehicles for workers. Bystanders commonly fell from farm vehicles and persons involved in other farm fatalities commonly fell from horses.
- Workers were commonly working with animals or performing maintenance activities at the time of the fatal incident. Bystanders and persons involved in other farm fatalities were commonly undertaking transport for recreation.
- Head injuries was the most common cause of death for all three groups.
- The fatally injured people were most commonly residents of the farm, but a third were visitors to the farm.

Drowning

- There were 89 fatal incidents on Australian farms between 1989 and 1992 where an individual drowned in a dam. The majority were bystanders, but workers and other farm fatalities made up over one-third of all farm-related drowning deaths. The majority of bystanders were of children aged less than five years.
- New South Wales and Victoria were the two states with the largest number of drowning fatalities.
- There were a large number of different farm enterprises where a fatal incident occurred, but meat cattle; and cereal grains, sheep, cattle and pigs, were the most common.
- The most common locations were dams, water reservoirs and irrigation channels.
- Workers who drowned were commonly engaged in transport for work purposes or maintenance activities at the time of the incident. Bystanders and persons involved in other farm fatalities were commonly engaged in recreation or playing activities.
- More than half of the persons who drowned were residents of the farm, although over a third were visitors to the farm.

Electrocution

- There were 28 fatal incidents involving electrocution on Australian farms during 1989 to 1992. The majority of fatalities were of workers. Two thirds of the persons who were electrocuted were aged between 15 and 44 years and the majority were males.
- Queensland and New South Wales were the two states with the highest number of electrocution fatalities
- There were a large number of different farm enterprises where a fatal incident occurred, but cereal grains; and vegetables including potatoes, were the most common.
- A shed or farm building NEC; and paddocks, were the most common locations of the fatal incident.
- Overhead electrical powerlines; and extension cords and accessories, were the two most common agents involved for workers.
- At the time of the fatal incident, workers were most commonly performing maintenance activities; or constructing or installing activities.
- The majority of persons fatally injured were residents of the farm.

Section 7: Intentional Fatal Incidents on Farms Fatalities

Intentional farm-related fatalities have been studied as a separate group, as interpersonal violence was the contributing factor to the incidence occurring. In many instances, different preventative strategies should be employed to reduce these types of fatalities than would be used to prevent unintentional deaths.

Between 1989 and 1992, there were 20 intentional fatalities on Australian farms. Of these, 12 (60.0%) were of males and eight (40.0%) were of females.

There were on average five intentional fatalities per year. Of the 20 fatalities, nine (45.0%) were of people working, ten (50.0%) were of bystanders to work and one (5.0%) was of another person on the farm (Table 7.1).

Table 7.1 Number of fatalities per year by work status, intentional fatalities, farm-related fatalities, Australia, 1989-1992

Year	Working	Bystander	Other Farm	Total	%
1989	3	1	1	5	25.0
1990	1	5	-	6	30.0
1991	1	1	-	2	10.0
1992	4	3	-	7	35.0
Total	**9**	**10**	**1**	**20**	**100.0**

Gender and Age

The age group with the most intentional fatal incidents was the 50-54 years group. Of the nine people working at the time of their death, six (66.7%) were males, with an average age of 46 years (age range 23 to 63 years). There were also three (33.3%) females working at the time of their death, aged 19, 51 and 81 years. Of the ten bystanders, six (60.0%) were males, with an average age of 25 years (age range three to 54 years). Of the four (40.0%) females who were bystanders, their average age was 27 years (age range one to 48 years). The one other farm fatality involved a female, aged 29 years (Table 7.2).

Table 7.2 Age group by work status, intentional fatalities, farm-related fatalities, Australia, 1989-1992

Age Group	Working	Bystander	Other Farm	Total	%
<5	-	3	-	3	15.0
15 - 19	1	-	-	1	5.0
20 - 24	1	1	-	2	10.0
25 - 29	-	2	1	3	15.0
30 - 34	-	1	-	1	5.0
35 - 39	1	1	-	2	10.0
45 - 49	-	1	-	1	5.0
50 - 54	4	1	-	5	25.0
60 - 64	1	-	-	1	5.0
75+	1	-	-	1	5.0
Total	**9**	**10**	**1**	**20**	**100.0**

State or Territory of Fatal Incident

Only four of the states had intentional fatalities on farms during the study period. New South Wales had eight (40.0%) – two were of people working, five were of bystanders and there was one other farm fatality. Queensland had five (25.0%) intentional fatalities, all of bystanders. Victoria had five (25.0%) intentional fatalities, all of persons working at the time of the incident. Western Australia had two (10.0%) fatalities, both of persons working at the time of the fatal incident (Table 7.3).

Table 7.3 State or Territory of incident by work status, intentional fatalities, farm-related fatalities, Australia, 1989-1992

State or Territory	Working	Bystander	Other Farm	Total	%
QLD	-	5	-	5	25.0
NSW	2	5	1	8	40.0
VIC	5	-	-	5	25.0
WA	2	-	-	2	10.0
Total	**9**	**10**	**1**	**20**	**100.0**

Farm Enterprise

The type of farm where the fatal incident occurred could be identified in 14 (70.0%) incidents. The most common type of farm enterprises were sheep (8: 40.0%), cereal grains, sheep, cattle and pigs (3: 5.0%) and sheep-meat cattle (2: 10.0%) (Table 7.4).

Table 7.4 Farm enterprise by work status, intentional fatalities, farm-related fatalities, Australia, 1989-1992

Farm Enterprise	Working	Bystander	Other Farm	Total	%
Agriculture	**9**	**10**	**1**	**20**	**100.0**
Cereal Grains, Sheep, Cattle, Pigs	*1*	*2*	*-*	*3*	*15.0*
Sheep, Meat Cattle	*-*	*2*	*-*	*2*	*10.0*
Sheep	*6*	*1*	*1*	*8*	*40.0*
Agriculture NEC	*1*	*-*	*-*	*1*	*5.0*
Agriculture Not Known	*1*	*5*	*-*	*6*	*30.0*
Total	**9**	**10**	**1**	**20**	**100.0**

Location of Fatal Incident

The most common location of the person at the time of the incident was the farm residence (10: 50.0%). This was true for workers, bystanders and other farm fatalities (Table 7.5).

Table 7.5 Location on farm by work status, intentional fatalities, farm-related fatalities, Australia, 1989-1992

Location on Farm	Working	Bystander	Other Farm	Total	%
Paddock Clear for Grazing	-	1	-	1	5.9
Shed, Farm Building NEC	1	-	-	1	5.9
Farm Excluding Residence NEC	1	3	-	4	23.5
Farm Residence	5	4	1	10	50.0
Farm Yard or Garden	1	1	-	2	11.8
Shearers Quarters	1	1	-	2	11.8
Total	**9**	**10**	**1**	**20**	**100.0**

Agent and Mechanism of Fatal Incident

The most common agent and mechanism was shot by firearm (18: 90.0%). Eight of the working (88.9%) and all of the bystanders were shot by a firearm. The one other farm fatality involved the use of an axe (Table 7.6).

Table 7.6 Agent and mechanism of fatal incident by work status, intentional fatalities, farm-related fatalities, Australia, 1989-1992

Agent	Mechanism	Working	Bystander	Other Farm	Total	%
Gun, Rifle, Shotgun	Shot by Firearm	8	10	-	18	90.0
Materials NEC	Assault with Other Weapon	1	-	-	1	5.0
Axe	Assault with Other Weapon	-	-	1	1	5.0
Total		**9**	**10**	**1**	**20**	**100.0**

Activity at Time of Fatal Incident

Of the nine fatalities of working persons, the activities being performed at the time of the fatal incident were self-defence (6: 66.7%), assault (1: 11.1%), moving goods (1: 11.1%) and

rescuing (1: 11.1%). Of the ten fatalities of bystanders, the activities being performed at the time of the fatal incident were self-defence (6: 60.0%), hunting (1: 10.0%) and other activities (3: 30.0%). The activity at the time of the fatal incident of the one person involved in an other farm fatality was self-defence.

Multiple Incidents

There were four multiple death incidents involving ten people in total. Of the multiple death incidents, two incidents involved two people, and two incidents involved three people. All were shot by a firearm.

Characteristics , Relationship and Motive of the Assailant

All assailants were male.

Assailants were commonly employees or former employees (4: 20.0%), a spouse or defacto (3: 15.0%) or a parent (3: 15.0%) of the victim. The remaining assailants were work colleagues (2: 10.0%), neighbours (2: 10.0%), a tenant (1: 5.0%), an investigator (1: 5.0%), an offspring (1: 5.0%) and a spouse's associate (1: 5.0%). In two (10.0%) incidents the relationship of the assailant to the victim was not known.

Personal difficulties (9: 45.0%) and disagreements and disputes with colleagues or neighbours (5: 25.0%) were the most common motives of the assailant for the killings. Eviction (1: 5.0%) and an investigation (1: 5.0%) were the remaining motives of the assailant. In four (20.0%) instances the motive of the killing was not clear.

Pathophysiological Cause of Death and Blood Alcohol Content

Of the 20 intentional fatalities, 12 (60.0%) persons died due to head injuries, four (20.0%) died due to chest injuries, two (10.0%) died following multiple injuries (Table 7.7).

Table 7.7 Pathophysiological cause of death by work status, intentional fatalities, farm-related fatalities, Australia, 1989-1992

Pathophysiological Cause of Death	Working	Bystander	Other Farm	Total	%
Head Injuries	3	8	1	12	60.0
Neck Injuries	1	-	-	1	5.0
Chest Injuries	4	-	-	4	20.0
Trunk Injuries	-	1	-	1	5.0
Multiple Injuries to Head and Other Body Parts	1	1	-	2	10.0
Total	**9**	**10**	**1**	**20**	**100.0**

The entire working group had blood alcohol tests conducted. Seven (77.8%) of the workers had a nil blood alcohol reading, one (11.1%) had a blood alcohol reading between 0.001% and 0.05% and one (11.1%) worker had a blood alcohol reading greater than 0.05%. Seven (70.0%) of the bystanders had a blood alcohol test conducted. Of those bystanders who had a blood alcohol test conducted, six (85.7%) had a nil blood alcohol reading and one (14.3%) had a blood alcohol reading greater than 0.05%. A blood alcohol test was not conducted for the other farm fatality.

Month and Day of Fatal Incident

March (4: 20.0%), June and October (each 3: 15.0%) were the most common months for intentional fatalities (Table 7.8).

Table 7.8 Month of incident per year, intentional fatalities, farm-related fatalities, Australia, 1989-1992

Month	1989	1990	1991	1992	Total	%
March	-	-	1	3	4	20.0
April	-	-	1	-	1	5.0
May	2	-	-	-	2	10.0
June	-	1	-	2	3	15.0
July	1	1	-	-	2	10.0
August	-	1	-	-	1	5.0
September	-	-	-	2	2	10.0
October	-	3	-	-	3	15.0
November	2	-	-	-	2	10.0
Total	**5**	**6**	**2**	**7**	**20**	**100.0**

Tuesday (5: 25.0%) was the most common day, followed by Wednesday (3: 15.0%) that the fatal incident occurred. There were six (30.0%) fatalities where the day of the week was not known (Table 7.9).

Table 7.9 Day of incident by work status, intentional fatalities, farm-related fatalities, Australia, 1989-1992

Day of Week	Working	Bystander	Other Farm	Total	%
Sunday	1	-	-	1	5.0
Monday	-	1	-	1	5.0
Tuesday	1	4	-	5	25.0
Wednesday	3	-	-	3	15.0
Friday	1	-	1	2	10.0
Saturday	2	-	-	2	10.0
Not Known	1	5	-	6	30.0
Total	**9**	**10**	**1**	**20**	**100.0**

Visitor to the Farm

Of the 20 intentional fatalities, four (23.5%) were of visitors to the farm at the time of the incident, 13 (64.7%) were of residents of the farm and for two (11.8%) it was not known if they were a visitor to the farm.

SUMMARY SECTION 7

- There were 20 intentional fatalities on Australian farms between 1989 to 1992. For intentional fatalities on farms, the male to female ratio was three to two.
- The majority of the intentional fatalities involving workers occurred in Victoria and all the intentional fatalities involving bystanders occurred in Queensland and New South Wales. The one other farm fatality was in New South Wales.
- The most common farm enterprise was sheep farms.
- The most common location of the fatal incident was the farm residence.
- The fatal incidents were most commonly due to firearms.
- Self defence was the most common activity performed by the fatally injured person at the time of the incident.
- Half of all fatalities were people killed in multiple incidents.
- Most commonly the person who was fatally injured was a resident of the farm, although a quarter were visitors to the farm.

Section 8: Workers' Compensation and OHS Reporting of Farm-Related Fatalities

The deaths identified in this study of unintentional farm-related fatalities were cross-checked with records from the same period kept by workers' compensation and OHS agencies for each state and territory (excluding Western Australia).

The information regarding workers' compensation and OHS reporting is presented for OHS agencies, compensation agencies, both OHS and compensation agencies, and the combined OHS and compensation information from the Northern Territory and Tasmania.

Compensation information from Western Australia was excluded from the analysis as access to compensation information was not possible via the compensation agency. Information regarding compensation coverage from this state was gained (with the agreement of the compensation agency) from Worksafe Western Australia. However, the completeness and accuracy of this information was uncertain and therefore it was not included in this analysis.

Workers' Compensation and OHS Reporting

An examination of the workers' compensation system coverage of all workers fatally injured in farm-related incidents revealed that one-third of fatalities were reported by this system (98: 28.2%), leaving 249 (71.8%) farm-related fatalities of workers not reported by the workers' compensation system. The OHS agencies reported 137 (39.4%) worker fatalities. Overall, 179 (51.6%) work-related farm fatalities were recorded by either the OHS or workers' compensation system, with 168 (48.4%) fatalities of workers not reported by any of these agencies. Eleven (8.9%) bystanders and five (7.8%) other farm fatalities were covered by an OHS agency, with one bystander and one other farm fatality being covered by a compensation agency (Figure 8.1 and Table 8.1).

Figure 8.1 Percent of fatalities reported by OHS and workers' compensation agencies by work status, farm-related fatalities, Australia (excluding WA), 1989-1992

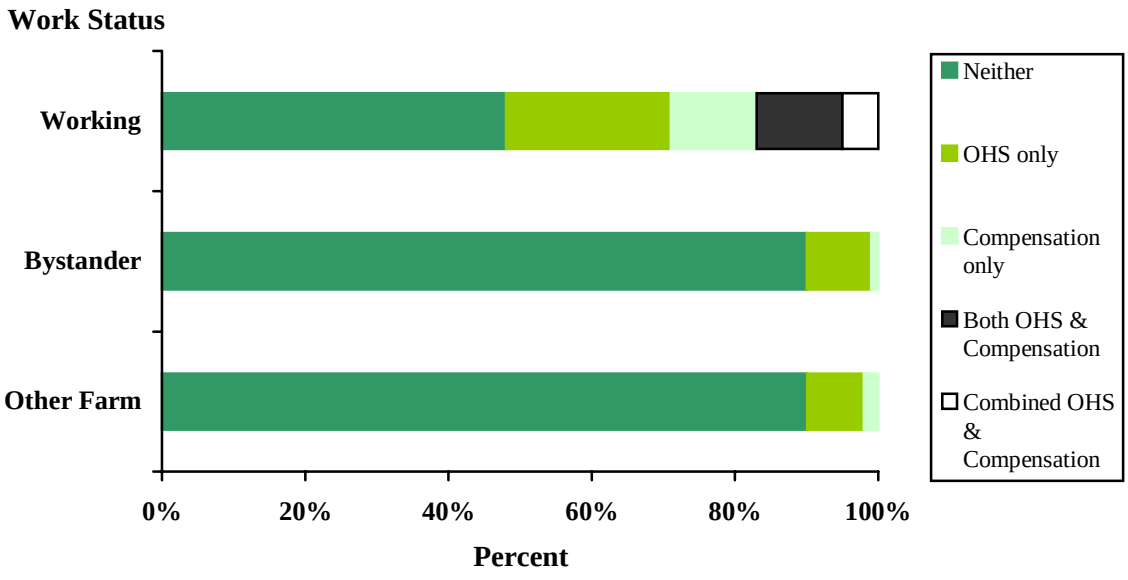


Table 8.1 Percent[1] of fatalities reported by OHS and workers' compensation agencies by work status, farm-related fatalities, Australia (excluding WA), 1989-1992

Industry	OHS[2]	Comp[3]	Both[4]	Neither[5]	Number[6]	OHS + Comp total[7]	OHS total[8]	Comp total[9]
Working	23.3	12.1	16.1	48.4	**347**	51.5	39.4	28.2
Bystander	8.9	0.8	-	90.3	**124**	9.7	8.9	0.8
Other Farm	7.8	1.6	-	90.6	**64**	9.4	7.8	1.6
Total	**18.1**	**8.2**	**10.5**	**63.2**	**535**	**36.8**	**28.6**	**18.7**

1: Percentages are based on the total number in each study category.
2: On OHS list only.
3: On compensation list only.
4: On both OHS and compensation lists or combined list.
5: Not on any list.
6: Number in study category.
7: Total on OHS and/or compensation list.
8: Total on OHS list.
9: Total on compensation list.

Age

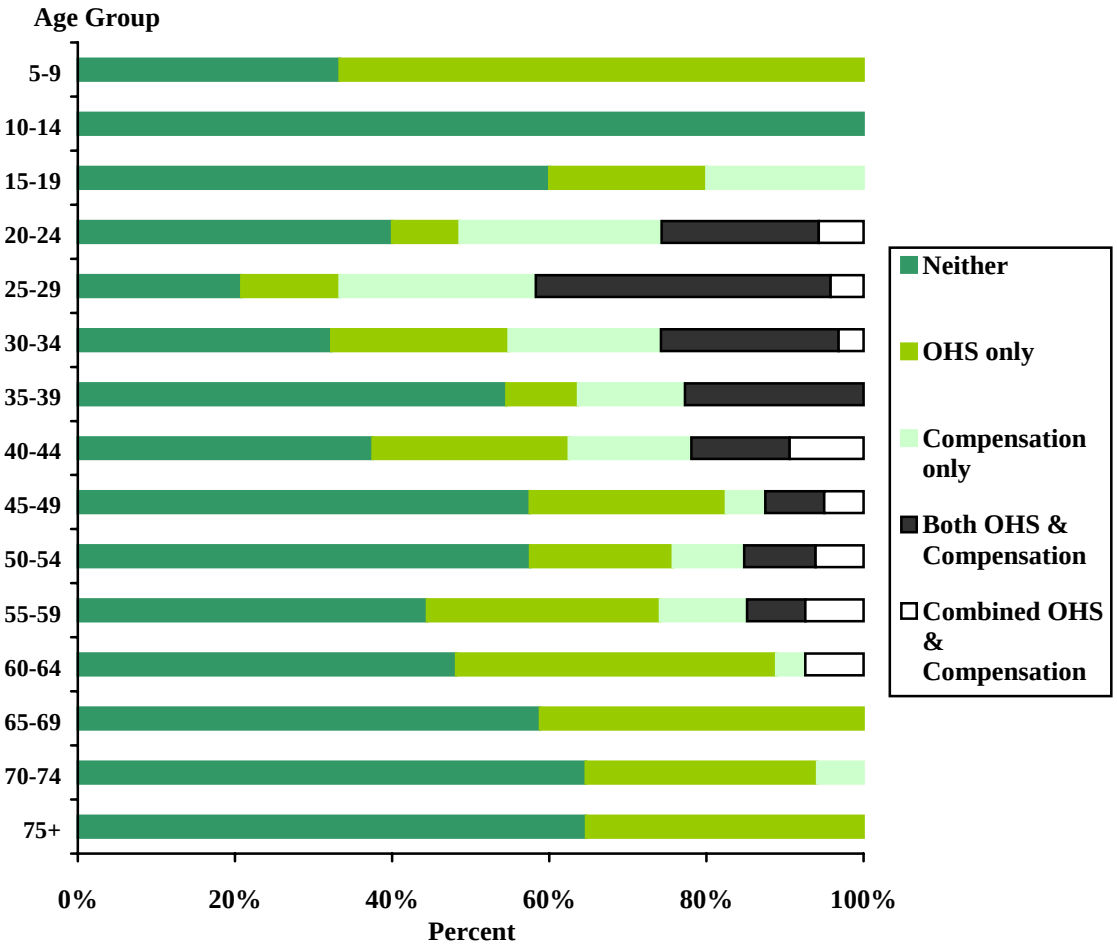
Reporting of working fatalities by OHS and compensation agencies varied by age group (Figure 8.2 and Table 8.2). Two-thirds of workers (16: 66.7%) 19 years of age or less were not reported by either the OHS or compensation agencies. Similarly, around two-thirds of workers aged 65 or older (32: 61.5%) were not reported by either agency. In comparison, less than one-third of workers aged 25-34 (15: 27.3%) were not reported by either the OHS or compensation agencies.

Table 8.2 Percent[1] of fatalities reported by OHS and workers' compensation agencies by age group for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992

Age	OHS[2]	Comp[3]	Both[4]	Neither[5]	Number[6]	OHS + Comp total[7]	OHS total[8]	Comp total[9]
5-9	66.7	-	-	33.3	**3**	66.7	66.7	-
10-14	-	-	-	100.0	**6**	-	-	-
15-19	20.0	20.0	-	60.0	**15**	40.0	20.0	20.0
20-24	8.6	25.7	25.7	40.0	**35**	60.0	34.3	51.4
25-29	12.5	25.0	41.7	20.8	**24**	79.2	54.2	66.7
30-34	22.6	19.4	25.8	32.3	**31**	67.8	48.4	45.2
35-39	9.1	13.6	22.7	54.5	**22**	45.4	31.8	36.3
40-44	25.0	15.6	21.9	37.5	**32**	62.5	46.9	37.5
45-49	25.0	5.0	12.5	57.5	**40**	42.5	37.5	17.5
50-54	18.2	9.1	15.2	57.6	**33**	42.5	33.4	24.3
55-59	29.6	11.1	14.8	44.4	**27**	55.5	44.4	25.9
60-64	40.7	3.7	7.4	48.1	**27**	51.8	48.1	11.1
65-69	41.2	-	-	58.8	**17**	41.2	41.2	-
70-74	27.8	5.6	5.6	61.1	**18**	39.0	33.4	11.2
75+	35.3	-	-	64.7	**17**	35.3	35.3	-
Total	**23.3**	**12.1**	**16.1**	**48.4**	**347**	**51.5**	**39.4**	**28.2**

1: Percentages are based on the total number in each study category.
2: On OHS list only.
3: On compensation list only.
4: On both OHS and compensation lists or combined list.
5: Not on any list.
6: Number in study category.
7: Total on OHS and/or compensation list.
8: Total on OHS list.
9: Total on compensation list.

Figure 8.2 Percent of fatalities reported by OHS and workers' compensation agencies by age group for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992



State or Territory of Fatal Incident

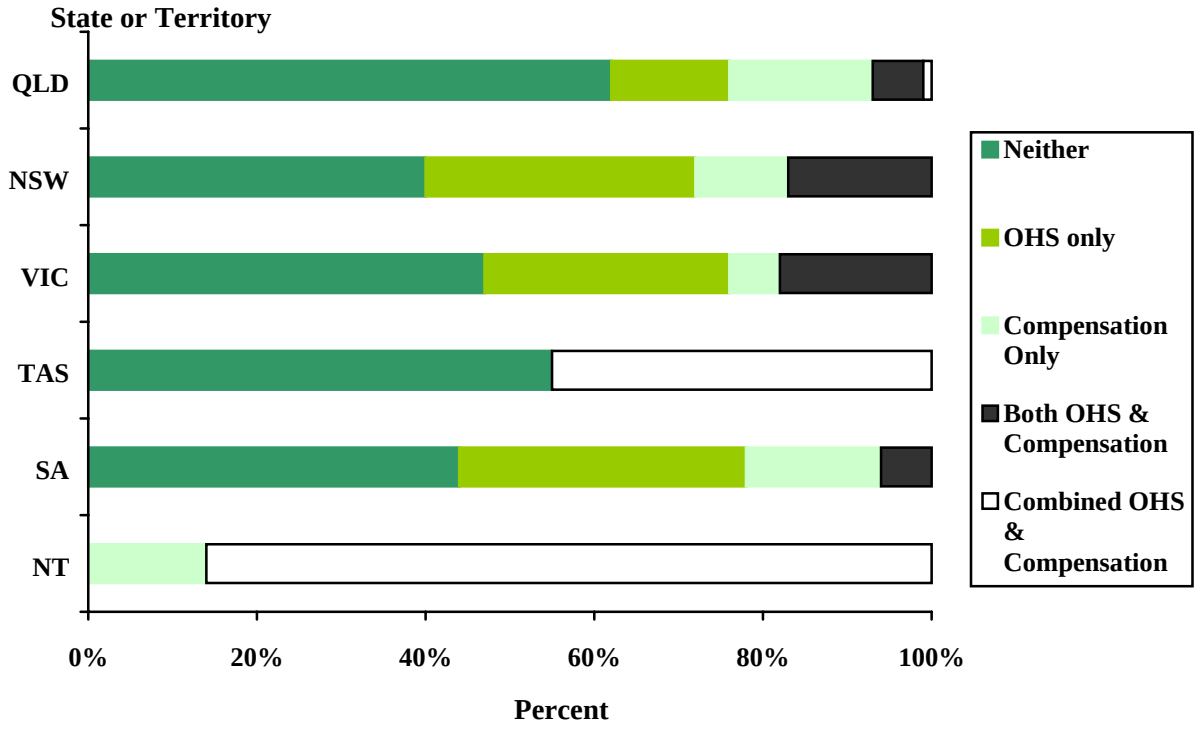
There was variation in reporting of OHS and compensation information for working fatalities between the states and territory, with between 61.5% (67: Queensland) and 40.3% (50: New South Wales) not being reported by any agency (Figure 8.3 and Table 8.3). Compensation agency reporting ranged from 21.9% (7: South Australia) to 45.0% (9: Tasmania) and OHS agency reporting ranged from 21.1% (23: Queensland) to 48.4% (60: New South Wales). The Northern Territory reported all agricultural working fatalities through either their compensation or combined OHS and compensation agencies.

Table 8.3 Percent[1] of fatalities reported by OHS and workers' compensation agencies by state or territory for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992

State or Territory	OHS[2]	Comp[3]	Both[4]	Neither[5]	Number[6]	OHS + Comp total[7]	OHS total[8]	Comp total[9]
QLD	13.8	17.4	7.3	61.5	**109**	38.5	21.1	24.7
NSW	31.5	11.3	16.9	40.3	**124**	59.7	48.4	28.2
VIC	29.1	5.5	18.2	47.3	**55**	52.8	47.3	23.7
TAS	-	-	45.0	55.0	**20**	45.0	45.0	45.0
SA	34.4	15.6	6.3	43.8	**32**	56.3	40.7	21.9
NT	-	14.3	85.7	-	**7**	100.0	85.7	100.0
Total	**23.3**	**12.1**	**16.1**	**48.4**	**347**	**51.5**	**39.4**	**28.2**

1: Percentages are based on the total number in each study category.
2: On OHS list only.
3: On compensation list only.
4: On both OHS and compensation lists or combined list.
5: Not on any list.
6: Number in study category.
7: Total on OHS and compensation list.
8: Total on OHS list.
9: Total on compensation list.

Figure 8.3 Percent of fatalities reported by OHS and workers' compensation agencies by state or territory for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992



Industry of Working Persons

There was variation in reporting of working fatalities by the OHS and compensation agencies for different industry sectors in the agriculture industry (Table 8.4). For example, of the sectors with more than five deaths, 87.5% of workers in aerial agricultural services were reported by an OHS or compensation agency compared to 33.3% of sugar cane workers, meat cattle and cereal grains workers, and workers in services to agriculture NEC whose deaths were reported by these agencies.

Table 8.4 Percent[1] of fatalities reported by OHS and workers' compensation agencies by industry for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992

Industry	OHS[2]	Comp[3]	Both[4]	Neither[5]	Number[6]	OHS + Comp total[7]	OHS total[8]	Comp total[9]
Agriculture	**23.4**	**11.9**	**14.9**	**49.8**	**303**	**50.2**	**38.3**	**26.8**
Poultry	-	-	-	*100.0*	***1***	-	-	-
Fruit (Grapes, Plantation, Orchard and Other Fruit)	*33.3*	-	*6.7*	*60.0*	***15***	*40.0*	*40.0*	*6.7*
Vegetables Including Potatoes	*43.8*	-	*12.5*	*43.8*	***16***	*56.3*	*56.3*	*12.5*
Cereal Grains, Sheep, Cattle, Pigs	*34.2*	*7.9*	*10.5*	*47.4*	***38***	*52.6*	*44.7*	*18.4*
Cereal Grains	*35.7*	-	*21.4*	*42.9*	***14***	*57.1*	*57.1*	*21.4*
Sheep, Cereal Grains	-	-	*100.0*	-	***1***	*100.0*	*100.0*	*100.0*
Meat Cattle, Cereal Grains	-	-	*33.3*	*66.7*	***6***	*33.3*	*33.3*	*33.3*
Sheep	*18.5*	*14.8*	*18.5*	*48.1*	***27***	*51.8*	*37.0*	*33.3*
Meat Cattle	*18.3*	*13.3*	*11.6*	*56.7*	***60***	*43.2*	*29.9*	*24.9*
Dairy	*27.3*	-	*18.2*	*54.5*	***11***	*45.5*	*45.5*	*18.2*
Pigs	-	-	*50.0*	*50.0*	***2***	*50.0*	*50.0*	*50.0*
Sugar Cane	*22.2*	*11.1*	-	*66.7*	***9***	*33.3*	*22.2*	*11.1*
Cotton	*20.0*	*20.0*	*60.0*	-	***5***	*100.0*	*80.0*	*80.0*
Nurseries	-	*50.0*	*50.0*	-	***2***	*100.0*	*50.0*	*100.0*
Agriculture NEC	*8.3*	*16.7*	*25.0*	*41.7*	***12***	*50.0*	*33.3*	*41.7*
Aerial Agricultural Services	-	*62.5*	*25.0*	*12.5*	***16***	*87.5*	*25.0*	*87.5*
Services To Agriculture NEC	-	*16.7*	*16.7*	*66.7*	***6***	*33.4*	*16.7*	*33.4*
Agriculture Not Known	*29.0*	*8.1*	*6.4*	*56.5*	***62***	*43.5*	*35.4*	*14.5*
Other Industry	**22.7**	**13.6**	**25.0**	**38.6**	**44**	**61.3**	**47.7**	**38.6**
Total	**23.3**	**12.1**	**16.1**	**48.4**	**347**	**51.5**	**39.4**	**28.2**

1: Percentages are based on the total number in each study category.
2: On OHS list only.
3: On compensation list only.
4: On both OHS and compensation lists or combined list.
5: Not on any list.
6: Number in study category.
7: Total on OHS and/or compensation list.
8: Total on OHS list.
9: Total on compensation list.

Agent of Fatal Incident

The reporting of incidents by either the OHS or compensation agencies varied by the agent of the incident. This was for the 347 workers who were working in the agricultural industry or who were employed in another industry but who were fatally injured on a farm in Australia (excluding WA) (Table 8.5). Fatal incidents involving agents such as pumps (100%), fixed plant and equipment (100%), grain augers (80.0%) and trees being felled (70.7%) were reported well by at least one of the agencies. However, fatalities involving agents such as firearms (11.8%), utilities (16.7%), dams (16.7%) and cars (20.0%) were not reported well by either agency. Separate reporting by OHS and compensation agencies also varied for each agent. Incidents involving agents such as pumps (100%), fixed plant and equipment (88.8%) and grain augers (80.0%) were generally reported well by OHS agencies. Agents such as pumps (66.7%), fixed plant and equipment (55.5%), aircraft (47.6%), two-wheel motorcycles (41.6%) and grain augers (40.0%) were the best reported of the agents by the compensation agencies.

Table 8.5 Percent[1] of fatalities reported by OHS and workers' compensation agencies by agent of fatal incident for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992

Agent	OHS[2]	Comp[3]	Both[4]	Neither[5]	Number[6]	OHS + Comp total[7]	OHS total[8]	Comp total[9]
Farm Vehicles	**6.6**	**24.5**	**9.4**	**59.4**	**106**	**40.5**	**16.0**	**33.9**
Truck	*29.4*	*17.6*	*5.9*	*47.1*	*17*	*52.9*	*35.3*	*23.5*
Utility	*16.7*	-	-	*83.3*	*6*	*16.7*	*16.7*	-
Car	-	*20.0*	-	*80.0*	*15*	*20.0*	-	*20.0*
Motorcycle 2 Wheel	*8.3*	*33.3*	*8.3*	*50.0*	*12*	*49.9*	*16.6*	*41.6*
Aircraft	-	*33.3*	*14.3*	*52.4*	*42*	*47.6*	*14.3*	*47.6*
Mobile Farm Machinery and Plant	**47.3**	**5.4**	**17.2**	**30.1**	**93**	**69.9**	**64.5**	**22.6**
Tractor	*47.7*	*4.6*	*15.4*	*32.3*	*65*	*67.7*	*63.1*	*20.0*
Grain Auger	*40.0*	-	*40.0*	*20.0*	*5*	*80.0*	*80.0*	*40.0*
Posthole Digger	*50.0*	-	-	*50.0*	*4*	*50.0*	*50.0*	-
Fixed Plant and Equipment	**44.4**	**11.1**	**44.4**	**-**	**9**	**100.0**	**88.8**	**55.5**
Pump	*33.3*	-	*66.7*	-	*3*	*100.0*	*100.0*	*66.7*
Workshop Equipment	**-**	**-**	**20.0**	**80.0**	**5**	**20.0**	**20.0**	**20.0**
Other Equipment and Materials	**4.2**	**8.3**	**20.8**	**66.7**	**24**	**33.3**	**25.0**	**29.1**
Gun, Rifle, Shotgun	-	*11.8*	-	*88.2*	*17*	*11.8*	-	*11.8*
Materials	**41.7**	**8.3**	**16.7**	**33.3**	**12**	**66.7**	**58.4**	**25.0**
Farm Structures	**26.2**	**4.8**	**11.9**	**57.1**	**42**	**42.9**	**38.1**	**16.7**
Dam	-	-	*16.7*	*83.3*	*6*	*16.7*	*16.7*	*16.7*
Windmill	*66.7*	-	-	*33.3*	*3*	*66.7*	*66.7*	-
Creek, River	-	-	-	*100.0*	*7*	-	-	-
Powerlines	*27.3*	*9.1*	*18.2*	*45.5*	*11*	*54.6*	*45.5*	*27.3*
Animals	**4.3**	**13.0**	**21.7**	**60.9**	**23**	**39.0**	**26.0**	**34.7**
Horse	*5.3*	*10.5*	*26.3*	*57.9*	*19*	*42.1*	*31.6*	*36.8*
Working Environment	**24.2**	**6.1**	**15.2**	**45.5**	**33**	**45.5**	**39.4**	**21.3**
Trees Being Felled	*41.2*	*5.9*	*23.6*	*29.4*	*17*	*70.7*	*64.8*	*29.5*
Total	**23.3**	**12.1**	**16.1**	**48.4**	**347**	**51.5**	**39.4**	**28.2**

1: Percentages are based on the total number in each study category.
2: On OHS list only.
3: On compensation list only.
4: On both OHS and compensation lists or combined list.
5: Not on any list.
6: Number in study category.
7: Total on OHS and/or compensation list.
8: Total on OHS list.
9: Total on compensation list.

Mechanism of Fatal Incident

For the 347 workers who were fatally injured in farm-related incidents in Australia (excluding WA), the reporting of working fatalities by either OHS or workers' compensation agencies varied depending on the mechanism involved (Table 8.6). Incidents involving landslides or cave-ins (100%), workers being trapped between stationary and moving objects (83.4%), being hit by falling objects (73.4%) and being trapped by moving machinery (71.5%) were reported well by at least one of the agencies. However, fatalities involving being shot with a

firearm (11.8%) and drowning (17.7%) were not reported well by either agency. Separate reporting by OHS and workers' compensation agencies varied for each mechanism. Incidents involving being hit by falling objects (70.1%), being trapped by moving machinery (71.5%), being trapped between stationary and moving objects (66.7%), contact with a chemical or substance (66.6%) and the rollover of tractors or other mobile machinery (62.8%) were generally reported well by OHS agencies. Vehicle accidents (39.7%) and being hit by falling objects (36.7%) were the mechanisms best reported by the workers' compensation list.

Table 8.6 Percent[1] of fatalities reported by OHS and workers' compensation agencies by mechanism of fatal incident for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992

Mechanism	OHS[2]	Comp[3]	Both[4]	Neither[5]	Number[6]	OHS + Comp total[7]	OHS total[8]	Comp total[9]
Falls From a Height	22.2	3.7	18.5	55.6	**27**	44.4	40.7	22.2
Falls on the Same Level	-	-	-	100.0	**1**	-	-	-
Hitting Stationary Objects	-	-	-	100.0	**3**	-	-	-
Being Hit by Falling Objects	36.7	3.3	33.4	26.7	**30**	73.4	70.1	36.7
Being Bitten by an Animal	-	-	-	100.0	**1**	-	-	-
Being Hit by an Animal	9.1	18.2	18.2	54.5	**11**	45.5	27.3	36.4
Being Trapped by Moving Machinery	42.9	-	28.6	28.6	**14**	71.5	71.5	28.6
Being Trapped Between Stationary and Moving Objects	50.0	16.7	16.7	16.7	**6**	83.4	66.7	33.4
Being Hit by Moving Objects	40.4	5.8	19.2	34.6	**52**	65.4	59.6	25.0
Contact with Flames or Heat	-	-	25.0	75.0	**4**	25.0	25.0	25.0
Exposure to Environmental Heat	-	100.0	-	-	**1**	100.0	-	100.0
Exposure to Environmental Cold	-	-	-	100.0	**1**	-	-	-
Contact with Electricity	25.0	5.0	20.0	50.0	**20**	50.0	45.0	25.0
Drowning	5.9	5.9	5.9	82.4	**17**	17.7	11.8	11.8
Explosion	-	-	-	100.0	**1**	-	-	-
Single Contact with Chemical or Substance	33.3	-	33.3	33.3	**3**	66.6	66.6	33.3
Insect and Spider Bites and Stings	-	-	-	100.0	**1**	-	-	-
Shot by Firearm	-	11.8	-	88.2	**17**	11.8	-	11.8
Stabbed by Knife	-	-	100.0	-	**1**	100.0	100.0	100.0
Slide or Cave-In	66.7	-	33.3	-	**3**	100.0	100.0	33.3
Vehicle Accident	2.3	29.5	10.2	58.0	**88**	42.0	12.5	39.7
Rollover	48.8	7.0	14.0	30.2	**43**	69.8	62.8	21.0
Mechanism Not Known	50.0	-	-	50.0	**2**	50.0	50.0	-
Total	**23.3**	**12.1**	**16.1**	**48.4**	**347**	**51.5**	**39.4**	**28.2**

1: Percentages are based on the total number in each study category.
2: On OHS list only.
3: On compensation list only.
4: On both OHS and compensation lists or combined list.
5: Not on any list.
6: Number in study category.
7: Total on OHS and/or compensation list.
8: Total on OHS list.
9: Total on compensation list.

Work Arrangements

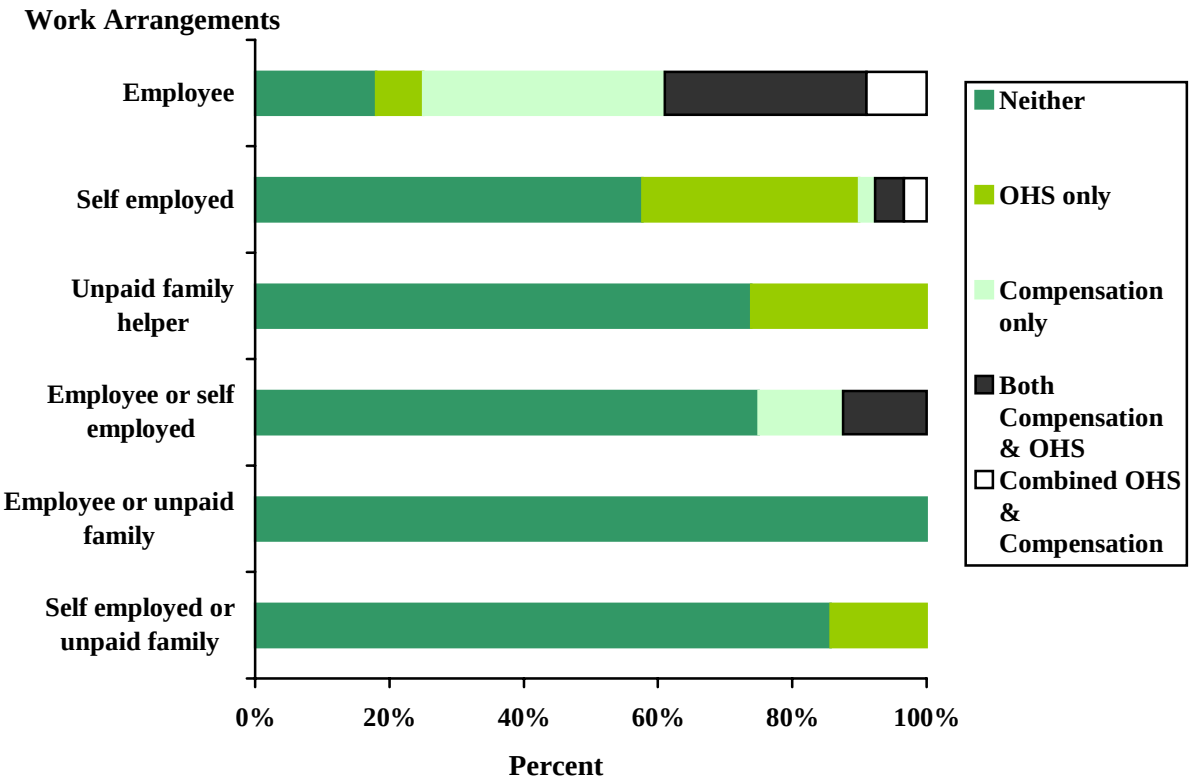
The majority of workers were either self employed (208: 59.9%) or employees (100: 28.8%). Other workers were unpaid family helpers (23: 6.6%) and for 16 (4.6%) people who were working at the time of the fatal incident it was not able to be determined what their specific work arrangements were. The reporting of working fatalities by either OHS or workers' compensation agencies varied depending on the type of work arrangements involved (Figure 8.4 and Table 8.7). Over half of the self employed workers (120: 57.7%) were not reported by either the OHS or workers' compensation agencies, whereas only 18 (18.0%) employees were not reported by either agency. Three quarters of the employees, but only 10% of self employed workers, were reported by workers' compensation.

Table 8.7 Percent[1] of fatalities reported by OHS and workers' compensation agencies by work arrangements for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992

Industry	OHS[2]	Comp[3]	Both[4]	Neither[5]	Number[6]	OHS + Comp total[7]	OHS total[8]	Comp total[9]
Employee	7.0	36.0	39.0	18.0	**100**	82.0	46.0	75.0
Self Employed	32.2	2.4	7.7	57.7	**208**	42.3	39.9	10.1
Unpaid Family Helper	26.1	-	-	73.9	**23**	26.1	26.1	-
Employee or Self Employed	-	12.5	12.5	75.0	**8**	25.0	12.5	25.0
Employee or Unpaid Family	-	-	-	100.0	**1**	-	-	-
Self Employed or Unpaid Family	14.3	-	-	85.7	**7**	14.3	14.3	-
Total	**23.3**	**12.1**	**16.1**	**48.4**	**347**	**51.5**	**39.4**	**28.2**

1: Percentages are based on the total number in each study category.
2: On OHS list only.
3: On compensation list only.
4: On both OHS and compensation lists or combined list.
5: Not on any list.
6: Number in study category.
7: Total on OHS and/or compensation list.
8: Total on OHS list.
9: Total on compensation list.

Figure 8.4 Percent of fatalities reported by OHS and workers' compensation agencies by work arrangements for working fatalities, farm-related fatalities, Australia (excluding WA), 1989-1992



SUMMARY SECTION 8

- Overall, just over half of the farm-related fatalities of workers were recorded by either the OHS or workers' compensation system. Under a third of workers were reported by the workers' compensation system. Similarly, just over a third of workers were reported by OHS agencies.
- Approximately 9% of bystander deaths and 8% of other farm fatalities were recorded by an OHS agency.
- Reporting of working fatalities by OHS and compensation agencies varied by age group. Less than a third of workers aged between 25-34 were not reported by either the OHS or workers' compensation agencies, whereas two-thirds of workers 19 years of age or less, or aged 65 or older, were not reported by either the OHS or workers' compensation agencies.
- Reporting of working fatalities by the OHS and workers' compensation agencies varied by state and territory, with between 61.5% in Queensland and 40.3% in New South Wales not being reported by either agency.
- There was some variation in the reporting of working fatalities by the OHS and workers' compensation agencies for different sectors in the agricultural industry. This reporting varied from 87.5% of workers employed in aerial agricultural services to 33.3% of workers in the sugar cane; meat cattle and cereal grains; and services to agriculture NEC sectors who were reported by these agencies.
- Reporting of working fatalities by OHS and workers' compensation agencies varied for the different agents that were involved in the fatal incident. Some agents, such as pumps, fixed plant and equipment, grain augers and trees being felled were generally reported well by at least one agency. However, farm-related fatalities involving agents such as firearms, utilities, dams and cars were not reported well by either agency.
- Reporting of working fatalities by OHS and workers' compensation agencies varied for the different mechanisms of the fatal incidents. Fatal incidents involving workers being trapped between stationary and moving objects, being hit by falling objects and being trapped by moving machinery were generally reported well by at least one agency. However, fatal incidents involving being shot with a firearm and drowning were not reported well by either agency.
- Over half the fatalities of workers who were self employed were not recorded by either the OHS or workers' compensation agencies, whereas, only 18% of employees were not reported by either agency.

CHAPTER 4: DISCUSSION

The information presented in this report represents the most detailed analysis of farm-related fatalities in Australia to date. The use of coronial records to identify farm-related fatalities allowed for the most complete enumeration of farm-related deaths to be conducted in Australia. It also allowed for a detailed examination of persons fatally injured while bystanders to farm work and persons fatally injured in other farm fatalities.

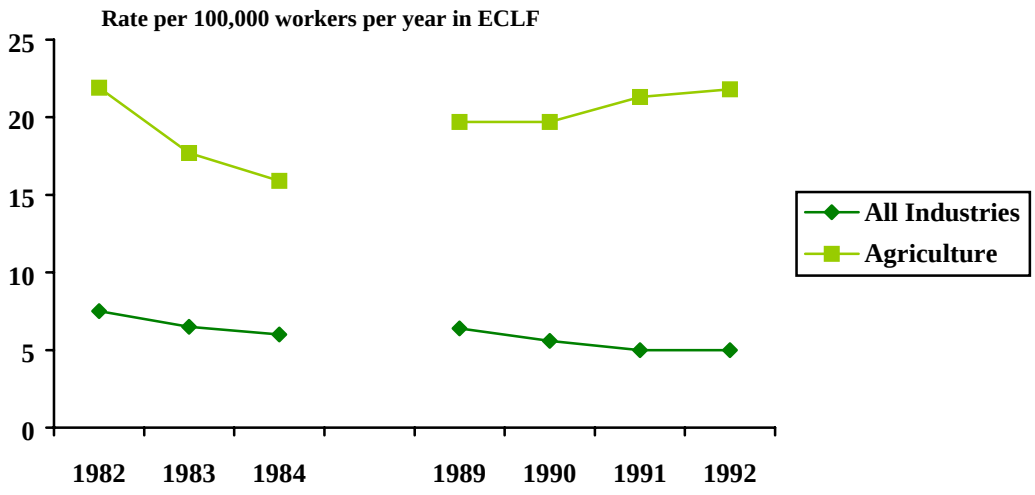
In this discussion the findings of the current study will be compared to prior information regarding work-related fatalities in the agricultural industry in Australia from 1982-1984 (Erlich, 1990; Erlich et al, 1993). The discussion will examine any similarities or differences found between the current study and other farm-injury information available in Australia and internationally. Methodological issues concerning the study will also be discussed. Finally, the discussion will highlight areas where information gaps exist regarding both fatal and non-fatal farm-related injury.

Farm-related Fatalities

There were 607 farm-related fatalities in Australia during 1989-1992, of which 587 were unintentional and 20 were intentional (homicides). The 587 fatalities involved 373 people working at the time of the fatality (workers), 142 people who were bystanders to work (bystanders) (the majority of whom were children less than 15 years) and 72 people who were fatally injured in other farm incidents (other farm) between 1989-1992.

Of the 373 people working at the time of the fatality, 327 were workers employed in the agricultural industry in Australia. This was a rate of fatal injury of 20.6 per 100,000 workers per year, almost four times the all industry rate during the same timeframe (NOHSC, 1998).

Figure 9.1 Workers' fatality rate per year, farm-related fatalities, Australia, 1982-1984, 1989 to 1992



Erlich et al (1993) reported a fatality rate for the agriculture industry of 19.4 per 100,000 workers. The small increase in the fatality rate in the current study is well within the limits of expected random variation, but the results provide good evidence that there has not been a decrease in the fatality rate for the agriculture industry from the early 1980's to the early 1990's (Figure 9.1).

Fatality rates for workers employed in the agricultural industry overseas ranged from 5.0 to 13.2 per 100,000 workers in Quebec, Canada to 48 per 100,000 farm workers per year in the United States (Table 9.1). Difficulties arise when attempting to make comparisons between fatality rates in the agricultural industry across and within countries, as different denominator data and different reporting mechanisms regarding fatalities exist in each country. However, Australia's rate of 20.6 deaths per 100,000 workers per year in the agricultural industry during 1989-1992 suggests that the fatality rate for agricultural workers in Australia is fairly similar to fatality rates for this working group overseas (Table 9.1).

Table 9.1 Comparison of agricultural workers' fatality rates

Country	Timeframe	Rate per year	Reference
Australia	1982-1984	19.4 per 100,000 workers per year 15 per 100,000 farm managers per year 28 per 100,000 farm workers per year	Erlich et al (1993)
Australia	1989-1992	20.6 per 100,000 workers per year 20.6 per 100,000 farmers per year 18.1 per 100,000 farm hands per year	Current Study
Canada	1991-1995	11.6 per 100,000 workers per year	CAISP (1997)
Canada -Quebec	1991-1998	5.0 to 13.2 per 100,000 workers[1]	Rossignol & Pineault (1993)
Mexico	1980-1991	21.3 per 100,000 worker	Crandal et al (1997)
New Zealand[2]	1975-1984	22.6 per 100,000 workers 23.1 per 100,000 employees 22.0 per 100,000 self-employed	Cryer & Fleming (1987)
United States – North Carolina	1977-1991	38 per 100,000 worker years (farmers) 16 per 100,000 workers years (farm labourers)	Richardson et al (1997)
United States	1980-1985	20.7 per 100,000 farmers	Myers (1990)
United States – Alberta[3]	1980-1986	20.3 per 100,000 workers	Coury et al (1999)
United States[3]	1980-1989	18.3 per 100,000 workers	US Department of Health and Human Services (1993)
United States	1988 1993	48 per 100,000 farm workers 35 per 100,000 farm workers	Gerberich et al (1996)
United States	1992 1992	37 per 100,000 workers in agriculture 24 per 100,000 workers in agriculture	Zwerling et al (1995)
United States	1991-1993	17 to 42 per 100,000 workers	Myers & Hard (1995)

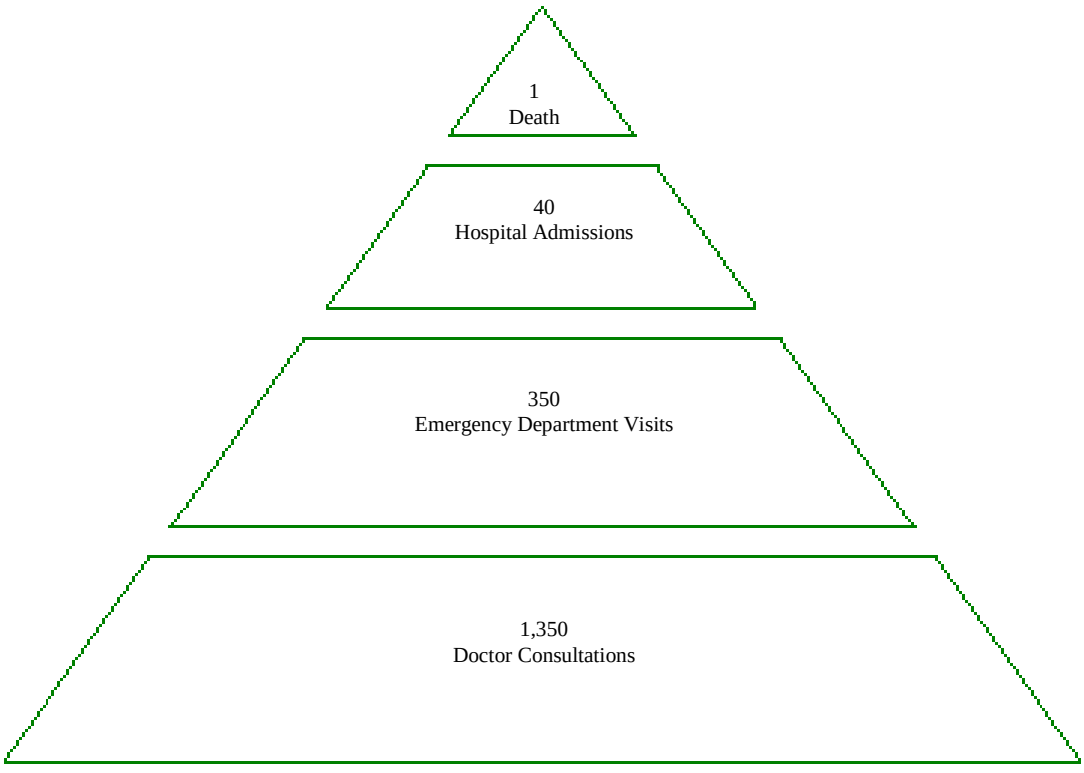
[1] There was only a 46% coverage of fatalities for the calculation of the fatality rates.
[2] Rate calculated for the agriculture, hunting, forestry and fishing industry.
[3] Rate calculated for the agriculture, forestry and fishing industry.

The overall fatality rate for all farm-related fatalities during the study period was 9.8 per 10,000 agricultural establishments. However, it should be noted that due to changes in the EVAO during the study period from $20,000 to $5,000, it is difficult to calculate comparable yearly fatality rates. This is demonstrated by the increase of 22.1% in the number of establishments between 1990 and 1991.

Injury professionals often use the number of deaths in a given population as an indication of the amount of morbidity in the population. Harrison (1992 in Ozanne-Smith 1995) found that there was a ratio of 1:40:350:1,350 for death:hospital admissions:emergency department visits:doctor consultations (Figure 9.2). Using these proportions as a guide, about 6,000 hospital admissions would be expected each year as a result of non-fatal farm injury.

Currently, information regarding all farm-related, non-fatal injury in Australia is not routinely collected on a national scale. To obtain an indication of the injury profile for the rural population in Australia, multiple data sources need to be examined.

Figure 9.2 Injury severity by frequency



Source: Harrison (1992) In Ozanne-Smith & Williams (1995)

One of the regularly available sources of farm injury information in Australia comes from the National Data Set (NDS) of workers' compensation statistics. However, there are some problems with using the workers' compensation statistics (mainly that it does not include the whole workforce, i.e. self employed, self-insured and people with no benefactors are excluded).

Workers' compensation data for the 1997/98 financial year in Australia (excluding ACT and VIC) showed 117,464 new compensated injury and disease cases reported. For the agriculture and services to agriculture industries there were 3,730 and 789 new compensated injury and disease cases, respectively, in Australia (excluding ACT and VIC). The injury and disease incidence rate for the 1997/98 period was 31.7 per 1,000 wage and salary earners for the agriculture industry, which was almost one and a half times the rate for all industries of 22 per 1,000 wage and salary earners. There was a substantial variation in the incidence rates for particular commodity groups, from 30.3 for grain, sheep and beef cattle farming to 57.3 per 1,000 wage and salary earners for other livestock farming.

Injury rates for Australian farming from various other sources include 13,400 per 100,000 farmers or 280 per 1,000 farms for Central New South Wales hospital admissions in 1989/90 (Clarke & Wolfenden, 1991); 339 per 1,000 farms in Latrobe Valley for emergency department presentations in 1994/95 (Valuri & Routley, 1994); an injury and illness rate of 20.2 per 100 farms per year in Queensland during 1994/95 (Ferguson, 1996); 20 per 100 farms per year in selected shires in New South Wales for medical treatment, one day off work or 5 days restricted activity in 1990/91 (Low & Griffith, 1994); and 8.3 per 100 farms per year in selected shires in New South Wales where there was five or more days off work during 1990/91 (Low & Griffith, 1994). Ferguson (1994) found during 1992/92 in Queensland that injury and illness rates per 100 farms varied for commodity groups from 7.2 for cereal grains to 36.8 for plantation farms.

The fatality rates for this study varied between states quite dramatically. This, and variation in the non-fatal injury rates shows that, depending on the location (i.e. state or part of state) and the method of collection, there is the possibility of large variation in the rates between regions. This suggests that, although an Australian rate is very effective in informing stakeholders how Australia as a whole is performing, looking at commodity groups may be a be a better way of prioritising work for prevention purposes. Other ways of usefully targeting groups for prevention purposes include examining specific types of fatal or non-fatal injuries through focusing on particular agents involved in the incident or by looking at the circumstances surrounding each incident for particular target groups, such as for different age groups. However, for this study, rates were not calculated for establishments for each of the commodity groups as there was a large number of farms where commodity classification was not available.

Information regarding deaths of bystanders and other farm persons has not been comprehensively reported in Australia. However, some information regarding bystanders and other farm persons has been obtained in other studies of injuries involving presentations to hospital and emergency departments (Day et al, 1997; Franklin et al, 2000). Wilk (1993) states that better data is needed to document work-related injuries and illness in the agricultural sector, especially among children. The inclusion of all bystander and other farm deaths in the current study was aimed at filling the information gap regarding this area in Australia.

Generally, comprehensive information regarding all farm-related fatalities is not routinely collected, even overseas. For example, in the United States, the system used to monitor work-related fatalities, the National Traumatic Occupational Fatalities (NTOF) surveillance system does not capture the deaths of persons less than 16 years of age (Myers & Hard, 1995).

This study has attempted to collect all traumatic farm-related fatalities in Australia, whether they are work-related or not. It may be possible that some farm-related fatalities may have been missed due to lack of detail regarding the location of the incident in the coronial files. This would be particularly true for incidents involving children and other farm fatalities that occurred at residences in rural areas. It is hoped that with the development of the National Coronial Information System in Australia, that it will be possible to obtain information regarding all farm-related deaths in a timely manner.

Gender and Age

The majority of farm-related fatalities in Australia were of males. The ratio of males to females was 20:1 for people who were over 15 years of age and working at the time of the fatality. The predominance of males being fatally injured was consistent throughout the results of the study. Possible reasons for the gender imbalance in the number of fatalities are probably due to the differences in the type of work tasks performed by each gender. This effect is not unique to Australia and has also been reported in other international studies (Cryer & Fleming, 1987; Schelp, 1992; Rossignol & Pineault, 1993; Stone, 1993; Myers & Hard, 1995; Pickett & Brison, 1995; Coury et al, 1999**)**.

Workers fatally injured in the current study were commonly aged between 20 to 64 years. The majority of bystanders were aged less than five years and the age groups of persons fatally injured in other farm fatalities varied. It was not possible to calculate a fatality rate for each age group, due to the problems experienced with denominator data that are discussed at the end of this chapter.

Some international studies have attempted to calculate fatality rates for different age groups. Rivara (1997), who looked at non-fatal and fatal injuries on farms involving children and adolescents aged less than 19 years during 1991-1993 in the United States, found a fatality rate of 8.0 deaths per 100,000 people per year for this age group. However, this rate is likely to be an underestimation of the total number of child and adolescent deaths on farms, as Rivara did not include transport-related fatalities due to problems separating injuries that occurred either on farm roads or public roads. Evidence from the current study of farm-related fatalities indicates that 32% of persons aged less than 19 years were involved in farm-related vehicle accidents which would mean that around one third of children and adolescents were not taken into account when the above rate was calculated.

Children less than 15 years of age made up one-fifth of all fatalities. Most of the children who were fatally injured were bystanders, but there were nine who were performing work tasks at the time of the fatal incident.

For children less than five years, drowning in dams was the most common cause of death. The National Water Safety Council (1998) has identified children drowning in rural areas, particularly in dams, as a priority area. Although drowning has been identified by other studies as an area of concern, children often fall outside the parameters of work-related studies as they are not part of the work force (Stallones, 1990; Lemen et al, 1993; Stone, 1993). For older children aged 10-14 years, farm vehicle accidents were the most common cause of the fatal injury.

In farming, unlike other industries, the workplace is also a place of residence. This particular situation poses unique problems with issues for child care, play areas for the children and common hazards that farm children are exposed to that other children are not. Lexau et al (1993) stated that protecting children on farms from injury or death in the United States is problematic because the home, work site and playground are often one and the same. Wilk (1993), who studied injuries involving children less than 18 years of age in the United States, found that farm machinery (including tractors) was the most common cause of fatal and non-fatal injury. However, Wilk's study did not include deaths from drowning. Similar to Wilk (1993), Cameron et al (1992) found that farm children in England were commonly exposed to hazardous machinery (especially tractors). They also found that incidents involving farm machinery increased by 44%, whereas deaths involving non-farm machinery decreased by 79%, between 1930 and 1980. Furthermore, Cameron et al found that there was a slight increase in the number of fatalities during the summer school holidays and when the farms were busiest.

Farmsafe Australia (1999) has developed a national strategy for child safety on farms. The information regarding child deaths provided by this study was extremely useful for the Farmsafe Australia National Child Farm Safety Strategy (Farmsafe Australia, 1999) and will be used to drive the formulation of policy regarding prevention of injury to children on farms in Australia.

Although child deaths on farms are an important issue, two other groups of particular concern are those entering the workforce and those at the end of their working life. Increased fatality rates in the older age groups has been shown in other studies involving agricultural workers (Cryer & Flemming, 1987; Cameron et al, 1992) and has also been found for non-agricultural workers in a study of all work-related fatalities in Australia (NOHSC, 1998). Younger workers are thought to be vulnerable because of their inexperience with work tasks. For these reasons this report examined fatal incidents involving young adults (15-29 years, those entering the workforce) and older adults (55+ years, those at the end of their working life).

The current study found that one-fifth of all fatalities involving young adults aged 15-29 years occurred in New South Wales, Queensland and Victoria, and most commonly occurred on meat cattle farms. Locations such as road and lanes; paddocks and areas of natural vegetation are consistent with the agents involved in the fatal incidents which were cars, trucks, firearms and aircraft. The most common mechanism was vehicle accidents, which is expected, since the most common activity performed was transport (both for work and recreation). The majority of young adults fatally injured were residents of the farm, although a third were visitors. The results regarding mechanism and agents from the present study are similar to those found in studies from other countries (Zwerling et al, 1995; CAISP, 1997).

Although there has not been a lot of research examining young adults on farms, this group is also well know for their risk taking behaviors (Irwin et al, 1997; Hawthorn, 1999). Workers in this age group are often new to the job, have unbridled enthusiasm, are lacking in experience, often fail to see potential hazards and do not think that they could receive an injury (Hawthorn, 1999). In the farming environment, these workers are often asked to take responsibility for much of their work, and to work on their own. A high number of injuries involving young adults on farms has been found in other studies (Zwerling et al, 1995; CAISP, 1997; Gerberich et al, 1998).

Older farmers (aged 55 years or older) were more likely to be from cereal grains, sheep, cattle and pigs; meat cattle and sheep farms. They were most commonly injured on roads and lanes; areas of natural vegetation; paddocks; and farmyards or gardens. The fatal injuries often resulted from rollovers of machinery (mainly tractors); being hit by moving objects (mainly tractors); and being hit by falling objects (trees or machinery they were working under). There were also a number of older farmers who drowned. The two most common activities that older adults were undertaking at the time of the incident were transport for work purposes and maintenance activities. The majority of the older farmers were residents of the farm.

Findings regarding the mechanism and agent involved in the fatal injury of older farmers in the current study were similar to those of other studies (Cameron & Bishop, 1992; Zwerling et al, 1995). Zwerling et al (1995) found that at-work fatalities were mainly caused by motor vehicle crashes, falls, falling objects and incidents involving machinery.

Some studies have found that older farmers have less injuries overall (Castillo & Rodriguez, 1997), although their outcomes from injury tend to be poorer, with longer absences and higher fatality rates (Myers & Hard, 1995). This finding may be due to reduced tolerance following experiencing an injury (Chapman et al, 1989 in Castillo & Rodriguez, 1997). Possible reasons suggested for the lower rate of non-fatal injury among older workers are greater experience; less exposure to hazards resulting from job selection or seniority; the healthy worker effect; and greater commitment to work safety (Castillo & Rodriguez, 1995).

There were a relatively small number of fatalities involving women in the current study (65: 11.1%). Strudland et al (1997), in a case-control study of injuries in women in agriculture, found that there was an increasing number of injuries, especially those involved in "the third shift phenomenon", where women have to fulfill multiple roles of mother, housewife, off-farm employee, and on-farm worker.

Industry and Occupation of Working Persons

Obtaining accurate information regarding the industry employing the worker is particularly important, as specific industries within agriculture are actively trying to reduce the number of injuries and deaths in their industry. Accurate information is necessary to determine any rise or fall in injury rates. The occupation of the worker is also important, as different occupations involve different tasks and a lot of work has been conducted in Australia to define the competencies that are required for a specific job in the agricultural sector (RTCA, 1998a; RTCA, 1998b; RTCA, 1998c; RTCA, 1998d). In this study, the industry and the occupation were examined for workers. This information is different from farm enterprise, which describes the nature and production type of the farm.

Of the 373 people who were working at the time of the fatal incident, the majority were employed in the agricultural industry, most commonly in the meat cattle; cereal grains, sheep, cattle and pigs; and sheep sub-industries. There were 69 workers who were employed in agriculture, but for whom no specific agricultural industry classification could be determined due to a lack of information in the coronial file. There were 46 other workers who were fatally injured on farms or involved in agricultural work, but were employed in non-agricultural industries. Of the 46 people employed in non-agricultural industries, construction, and forestry and logging, were the most common industries involved. There was only one worker whose industry classification could not be ascertained.

Over half of the workers were managers and administrators, largely farmers. However, for half of these farmers, the particular agricultural enterprise of the farm was not known. The next largest occupation group, with one quarter of the fatal incidents, was labourers and related workers. Of these, half were livestock and field crop farm hands. The two other large occupational groups were para-professionals (predominately aircraft pilots) and plant and machinery operators (predominately heavy truck drivers and farm machinery operators).

Workers employed in the agricultural industry in Australia during 1989-1992 had a rate of fatal injury of 20.6 per 100,000 workers per year. This rate was the fifth highest industry rate in Australia after forestry and logging (97.2), fishing and hunting (95.7), mining (36.4), and transport and storage (23.0). However, agriculture had the second highest number of fatalities after transport and storage which had 370 deaths (NOHSC, 1999).

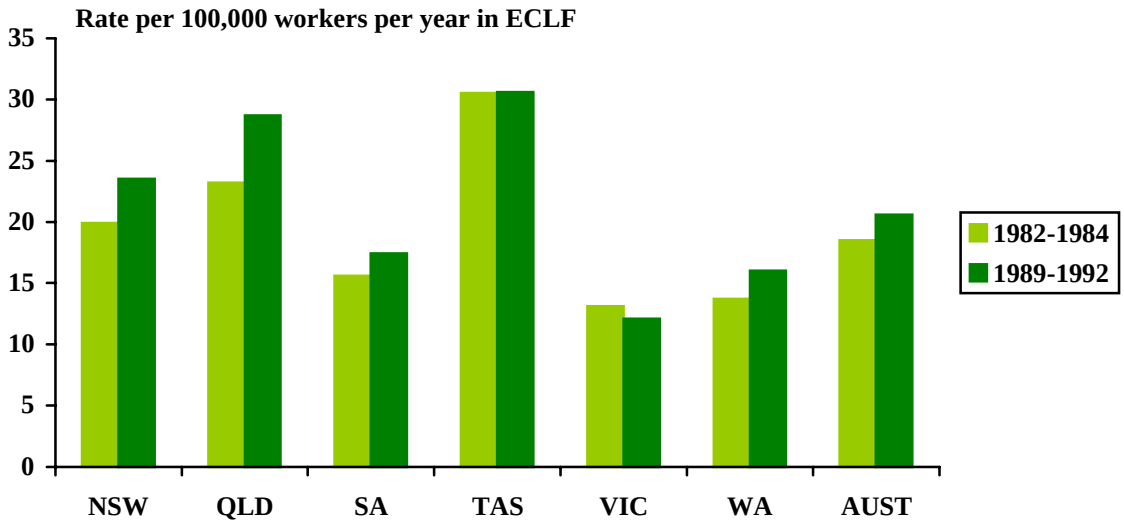
As the information used in this study was collected from coronial records, in some cases there was a lack of information pertaining to the industry or the occupation of the person fatally injured. In such instances, information from the Australian Bureau of Statistics (ABS) regarding the occupation of the fatally injured worker was used as a guide in identifying the most appropriate occupation code. However, there are known problems with ABS data regarding occupation, especially for females (Burke, 1998).

States and Territory of Fatal Incident

The larger states of New South Wales, Queensland and Victoria (respectively) had the highest number of farm-related fatalities between 1989 and 1992. The states or territory with the highest rate per establishment were Northern Territory, Tasmania, Queensland and New South Wales (respectively). For the state occupational rates, Tasmania, Queensland and New South Wales (respectively) had the highest rates. For farm hands, there were only three states (Queensland, New South Wales and Victoria, highest to lowest respectively) where rates were able to be calculated.

Overall, there was a 5.6% rise in the fatality rate for agricultural workers between 1982-1984 and 1989-1992, and for most states (Northern Territory was excluded due to low numbers) there was a rise in the rate of work-related fatalities between 1982-1984 and 1989-1992 (Figure 9.3). The only state where there was a decrease in the fatality rate between the two timeframes was in Victoria where the rate went from 13.1 per 100,000 workers (1982-1984) to 12.1 per 100,000 workers (1989-1992).

Figure 9.3 Workers' fatality rate by state, farm-related fatalities, Australia, 1982-1984, 1989-1992



On the whole, the work-related fatality information from each state was very similar. There were no major differences in the work-related agricultural fatalities between the states that could not be attributed to the different commodity mix. The common commodity groups that appeared in every state included cereal grains, sheep, cattle and pigs; meat cattle; and sheep. The main commodity differences were in Queensland, where there was a relatively large number of fatalities on sugar cane farms, and Victoria, where there was a large number of fatalities on dairy farms. The common locations of the fatal incident were relatively similar, except in South Australia, where sheds and other farm buildings were also a common location of the fatal incident.

The common agents associated with farm-related fatalities were similar, although in South Australia, posthole diggers and two-wheeled motorcycles were relatively more common than elsewhere. The common mechanisms were also similar except that trapped by moving objects was relatively more common in South Australia than elsewhere.

The activities performed by the fatally injured worker or bystander between the states were very similar with exceptions being South Australian workers for whom moving goods was relatively more common, and Western Australia workers for whom monitoring, observing or inspecting was relatively more common.

Farm Enterprise

The major commodity or commodities produced by a farm defines the farm enterprise. The farm enterprise can be different to, although it is often the same as, the industry the person was working in at the time of the fatal incident. There can be a problem when using industry or occupation to group farm fatalities, as these variables cannot be used to identify bystanders to work or those who are fatally injured in other farm fatalities.

Of the 587 people who were unintentionally fatally injured, the farm enterprise was able to be determined in 563 cases. There were 14 fatalities were the enterprise was not agriculture and ten where the enterprise of the establishment could not be determined but the person was fatally injured due to agricultural work or agricultural work equipment.

In this report, the ten commodity groups with the highest number of fatalities were examined in detail, for workers and bystanders. These commodities were orchard and other fruit (21 deaths), vegetables including potatoes (22 deaths), cereal grains (23 deaths), sheep-cereal grains (11 deaths) meat cattle-cereal grains (13 deaths), sheep-meat cattle (27 deaths), sheep (48 deaths), meat cattle (98 deaths), pigs (23 deaths) and sugar cane (14 deaths).

There are very few studies which have examined farm fatalities or injuries by commodity groups. However, some of the research that has been conducted includes work by Brison and Picket (1992), who examined non-fatal injuries on beef and dairy farms, Boyle et al (1997), who investigated injury from dairy cattle, and Casey et al (1997a & 1997b, who looked at injuries to workers from bull and cows.

Browning et al (1998) found that non-fatal injury risk was elevated on farms with animals, especially beef and dairy farms. However, it is possible that this finding could be due to the relative ease of identifying animal-related farm enterprises as opposed to other types of farm enterprises.

The majority of fatalities on dairy farms were in Victoria, and all of the fatalities on sugar cane farms were in Queensland. The most common incident locations were similar for most commodity groups. Tractors were a common agent involved in the fatal incident on all farms except meat cattle-cereal grain farms, where firearm fatalities were common, and dairy farms, where there were no common agents. As expected, the activity performed at the time of the fatal incident reflected the type of enterprise where the fatal incident occurred.

Location of Fatal Incident

The location of fatal incident referred to the location on a farm where the incident occurred. Overall, the five most common locations were: roads and lanes; paddocks under crop; paddocks clear for grazing; dams, water reservoirs and irrigation channels; and areas of natural vegetation.

For people who were working at the time of the fatal incident, the four most common locations were roads and lanes; paddocks under crop; paddocks clear for grazing; and areas of natural vegetation.

Similar results regarding the location of the fatal incident have been found in other overseas studies. Lyman et al (1999) in a survey of agricultural injuries among farmers in Alabama and Mississippi during January 1994 to June 1996 found that injuries most commonly occurred in open areas (e.g. fields or pastures) and enclosed locations (e.g. workshop, shed, barn).

Likewise, Zhou & Roseman (1994), in a survey of agricultural injuries in Alabama during October 1990 to September 1991, found that farmers were commonly injured in fields, pastures or ranges, and around animal facilities, farm buildings, and barns or barn yards.

Gerberich et al (1998) found that the three most common locations on farms for injuries related to agricultural machinery (including tillage and planting equipment, harvesting equipment, augers, and wagons) were farm yards (72: 47.7%), crops or fields (32: 21.2%), and farm outbuildings or barns (26: 17.2%). In comparison, the three most common locations of the fatal incident for trucks and tractors on Australian farms in the current study were roads and lanes; paddocks under crop; and paddocks clear for grazing. The absence of roads and lanes as a location in the Gerberich et al study is a concern, as it suggests roads and lanes were not included as a location in the study. The exclusion of roads and lanes as a location could have lead to an underestimation of the number of fatalities in that study.

For bystanders, the three most common locations were dams, water reservoirs and irrigation channels; roads and lanes; and paddocks clear for grazing.

The large number of bystander deaths in the current study where the location was water-related is directly related to their age, as most bystanders were aged less than ten years of age. Other studies that do not include information regarding particular locations or mechanisms of deaths on farms will lead to an underestimation of the total number of child or adolescent deaths. For example, drowning deaths were not examined by Wilk (1993) and transport-related deaths were not considered by Rivara (1997).

For other farm fatalities, the three most common locations were roads and lanes; the farm residence; and the farm yard or garden.

There were 50 (8.5%) fatalities that occurred in or around the farm residence or shearers quarters. Of these, half (25: 50.0%) were classified as other farm fatalities, fifteen (30.0%) were of workers and ten (20.0%) were of bystanders. In comparison, Schelp (1992), in a study of presentations and admittances of persons injured on farms to hospitals and health centres in a Swedish municipality over a 12 month period, found that 30% of farm injuries occurred in the home environment. This is over three times the number of deaths that occurred in the home environment in the current study. This finding may be due to the differences in locations where fatal and non-fatal farm related injuries occur.

Information regarding the location of the fatal incident is not generally adequate on its own for prevention programs, as contextual detail regarding the circumstances of the incident is lacking. There are many different types of equipment in use and activities being undertaking in the same location on a farm. However, one particular area where information regarding location is important for prevention purposes is water reservoirs. The number of fatalities involving young children drowning in dams was significant in the current study.

Agent and Mechanism of Fatal Incident

This study identified over 70 agents that were involved in fatal incidents on Australian farms between 1989 and 1992. The ten most common agents were examined in detail in Section 5 of the Results. These ten agents were trucks, utilities, cars, two-wheeled motorcycles, aircraft, tractors, firearms, dams, horses and trees being felled.

Workers were commonly fatally injured in incidents involving aircraft, horses, trucks, guns, rifles, shotguns, cars, and trees being felled. The most common mechanisms of the fatal incident for workers were vehicle accidents, being hit by moving objects (commonly vehicles or mobile machinery) and rollovers of mobile machinery (mainly involving tractors).

Bystanders were commonly fatally injured in incidents involving dams, tractors, utilities and cars. The most common mechanisms of the fatal incident for bystanders were drowning, vehicle accidents and being hit by moving objects. For other farm fatalities the fatal incident commonly involved fire or smoke; creeks or rivers; and horses. Common mechanisms of the fatal incident for these other farm fatalities were contact with flames or heat, drowning, and falls from a height.

The tractor was the most common agent involved in farm fatalities, predominantly while people were working and mainly involving older workers. However, just under half of the bystanders who were fatally injured in incidents involving tractors were under the age of 15 years. Other studies have also found that the tractor is the most common agent involved in agricultural fatalities (Jones, 1993; Rossignol & Pineault, 1993; MMWR, 1995; Myers & Hard, 1995; Lyman et al, 1999).

For tractor fatalities, the three states with the most fatalities were Queensland, New South Wales and Victoria. The two farm enterprises with the most fatalities involving tractors were meat cattle; cereal grains, sheep, cattle, and pigs. The most common locations of fatalities involving tractors were paddocks (mainly under crop), roads and lanes, and areas of natural vegetation.

The two most common mechanisms involved in tractor fatalities were rollovers and being hit by moving objects. Of those tractor fatalities where the mechanism was being hit by a moving object, nearly three-quarters were runover by the tractor, often after falling off, and one-quarter were struck by the tractor following an attempt to start the tractor. Of the tractors involved in rollovers, three-quarters did not have a rollover protective structure (ROPS) fitted. A ROPS has been identified as an effective prevention method (MMWR, 1993; Layne & Landen, 1997; Day & Rechnitzer, 1999), and if a ROPS had been employed these fatalities may have been avoided.

The activities that were being undertaken at the time of fatal incident involving tractors were working with crops and transport, mainly for work purposes. Head injuries, multiple injuries and crush asphyxia were the three most common pathophysiological causes of death for person fatally injured in incidents involving tractors. Of the 60% of people who had a blood alcohol reading taken, three had a blood alcohol reading greater than 0.05%. Fourteen percent of visitors to Australian farms were fatally injured by a tractor. To monitor the number and type of tractor deaths on Australian farms each year, the National Farm Injury Data Centre is

developing a database to collect all farm-related tractor deaths. This will lead to timely access to information regarding the circumstances involving tractor deaths on farms.

The next most common agent involved in fatal incidents on Australian farms between 1989 and 1992 was dams. The people who drowned in dams were predominantly male bystanders under the age of five years. Dams present a unique hazard on Australian farms, as they need to be accessible by animals and thus are usually easily accessible to young children. In the current study, it was often hard to ascertain from the coronial file the proximity of the dam to the farm residence, and whether this could be a factor for prevention efforts. It was also often hard to ascertain from the coronial records the type of farm enterprise in incidents involving dams.

The three states in which most drowning deaths occurred were Victoria, New South Wales and Western Australia. Due to the large number of young bystanders involved, the most common activity being performed at the time of the fatal incident was recreation or playing. There was no consistent monthly pattern in the number of drownings (although school holidays and public holidays were not examined as possible factors), but certainly drownings were more likely to occur on weekends than during the week. Of the people who drowned in dams on Australian farms, one-third were visitors to the farm.

Aircraft were the third most common agent involved in fatal incidents on Australian farms. In contrast, Erlich et al (1993, in a prior study of Australian farm related deaths between 1982-1984), did not identify any aircraft differences, apparently due primarily to different inclusion criteria. A further investigation of the data from the Erlich et al study found that there were six aircraft and two helicopter fatal incidents related to Australian farms. In the current study, all of those fatally injured in the 33 aircraft incidents were working at the time and were aged between 25 years and 55 years. The states with the most aircraft fatalities were Queensland and New South Wales. The three most common activities of person involved in aircraft incidents were transport for work purposes, mustering and crop dusting.

This study found that different age groups were associated with particular agents involved in the fatal incident. Incidents involving trucks mostly involved people aged 25-34 years. Incidents involving utilities most often involved people less than 25 years of age. Incidents with cars often involved people less than 25 years of age or over 45 years of age, as did incidents with two-wheeled motorcycles. Incidents connected with firearms involved people aged between 15 and 24 years. Incidents involving horses were consistent throughout all the age groups (excluding people age less than 5 years) and trees being felled involved people aged between 35 and 69 years.

Roads and lanes were a common location for vehicle fatalities and paddocks were a common location for all other farm fatalities, except for horses, where horse yards were the most common. There were many different mechanisms involved in the incident for any given agent. As expected, vehicle accidents and being hit by a moving objects were common mechanisms for vehicles and being shot was a common mechanism for firearms. Being hit by an animal and falls were common for fatalities involving a horse and being hit by a falling object was common for people fatally injured by trees being felled. For fatalities involving vehicles, transport (mainly for work purposes) was the activity being undertaken at the time of the fatality, hunting was a common activity for people fatally injured by a firearm. Working with animals was common when the agent was a horse and felling trees or clearing land was common for people fatally injured by trees being felled.

Injuries to the head and neck, and multiple injuries, were common pathophysiological causes of death for all agents. Chest injuries were common pathophysiological causes of death for horses and trees being felled. For the ten most common agents, the percentage of fatally injured persons who were visitors ranged from 13.8% (for tractors) to 50.0% (for aircraft), with the median percentage being 37%.

The three mechanisms that were examined in detail were falls from a height, electrocution and drowning. For falls from a height and electrocution, there was no common age group. However, for drowning the most common age group was the 0-4 year olds. Although these mechanisms were common in all states, Western Australia had a higher proportion of drowning incidents, and Victoria a lower proportion of electrocutions, compared to other states. Meat cattle was the most common farm enterprise for falls from a height. For nearly one-third (29: 32.6%) of people who drowned, the enterprise type could not be determined. Cereal grains and vegetables were common enterprises types where electrocutions occurred.

For these three mechanisms, both the location of the fatal incident and agent involved were different. For falls from a height, paddocks; areas of natural vegetation; yards; and roads and lanes were common locations and horses, ladders or mobile ramps or stairways were common agents. For fatal incidents involving a person who drowned, the most common locations and agents were dams, irrigation channels and river or creeks. For fatal incidents involving an electrocution, the most common locations were sheds or farm buildings, and paddocks. Power-lines were the most common agent involved in electrocutions.

The most common activities being undertaken at the time of the fatal incident involving a fall from a height were working with animals, transport and maintenance. Maintenance activities were also common activities being performed at the time of the fatal incident for electrocutions. Recreation or playing was the most common activity for people who drowned, this was due to the large number of young people involved. Electrocution deaths did not often involve visitors to the farm. Over two-thirds of people who were visitors to the farm fell from a height or drowned (35.7% and 38.3%, respectively).

The information regarding these three mechanism found in the current study is not unique to Australia. Myers & Hard (1995) in a study of work-related fatalities during 1980-1989 in the United States, found that tractors were the single most common machine causing death in the agricultural industry. Other common types of fatal incidents in the United States were motor vehicle accidents, being hit by falling objects (such as trees and tree branches) and electrocutions, which is similar to the current study.

Farmsafe Australia has developed a machinery safety strategy. This strategy is being financially supported by RIRDC. The development of strategies to reduce deaths involving augers, post-hole diggers and power-take-off devices started in early 2000.

Activity at Time of Fatal Incident

There were 24 different activities used to classify farm-related fatalities on Australian farms between 1989 and 1992. Overall, workers were performing a variety of activities at the time of the fatal incident, whereas there were few activities that bystanders were undertaking (e.g. transport for recreation; monitoring, observing or inspecting; and recreation or playing).

Transport for work purposes; working with animals; working with crops; and maintenance activities were the most common activities being performed by workers at the time of the fatal incident. These activities were similar to those found in Sweden where Schelp (1992), who studied farm injuries resulting from work and home activities, found that most work-related injuries occurred during repair and maintenance work; and animal care. Zhou & Roseman (1994), in their study of agricultural injuries in Alabama, found that farmers were often involved in machinery operation or maintenance and livestock caretaking when they sustained an injury.

Gerberich et al (1998) considered the type of activity being performed for machinery-related injuries and found that the three most common activities were lifting, pulling and pushing; adjusting the machine; and general repairing.

In the current study, bystanders were mostly involved in recreation or playing activities. Other farm persons were commonly involved in recreation or playing; and transport for recreation. Similarly, Nordstrom et al (1995), in a study of agricultural injuries involving bystanders, using medical centre data in Wisconsin during May 1990 to April 1992, found that the activities bystanders were performing at the time of the fatal incident were either playing or observing.

Work-related agricultural injuries in four regions in Queensland during 1994/95 were examined by Fergurson (1996), who found that the most common activities being performed at the time of the incident were animal handling; general maintenance; cropping practice; and producing handling/processing.

Hockey et al (1999), in a study of all farm-related injuries that resulted in attendance at hospital emergency departments in Queensland, found that the most common activity performed by males at the time of the incident was working for income, other types of work, horse riding, playing and trail bike riding. In contrast, for females, horse riding, other types of work, working for income and playing were common activities being performed at the time of the incident.

The problem of inconsistency between coding frames for farm-related activity in Australia has been a problem for the identification of common activities performed at the time of an incident. The “Farm Injury Optimal Dataset” (Fragar, Franklin & Coleman, 2000) provides a suggested coding frame for each phase of the agricultural production process which allows for accurate coding of the activity that the farmer was conducting at the time of the injury. Wide adoption of the Farm Injury Optimal Dataset to code farm-related injuries would be beneficial, especially in identifying particular injuries that occur at different phases of production. It is consistent with, but provides more detail than, national collections such as the NDS.

Multiple incidents

There were 566 incidents that resulted in the 587 farm-related fatalities. The number of persons killed in multiple incidents ranged from two to five, with a total of 38 persons being killed in 17 incidents.

Aircraft crashes were the most common type of incident that resulted in multiple deaths involving farm-related fatalities. Aircraft crashes were also the most common mechanism of fatal injury for all work-related fatalities in Australia during 1989-1992 that involved multiple deaths (NOHSC, 1998).

The fishing, defence and mining industries had the highest proportion of work-related deaths of workers in all multiple death incidents during 1989-1992 in Australia. However, consideration of only those incidents that resulted in the deaths of 2-3 working persons revealed that the most common industries employing the working persons were transport and storage, agriculture and fishing (NOHSC, 1998).

Pathophysiological Cause of Death, Blood Alcohol Content and other Drugs

The pathophysiological cause of death for persons in the current study was generally consistent with major trauma. The four most common causes of death were head injuries, drowning, chest injuries and multiple injuries. For workers, head injuries, multiple injuries and drowning were the most common pathophysiological causes of death. For bystanders, drowning and head injuries were the two most common pathophysiological causes of death, as was the case for other farm fatalities.

The pathophysiological cause of death differed depending on the agent, mechanism and activity involved. Injuries involving horses and trees being felled often resulted in head and chest injuries. Tractor rollovers often resulted in crushing injuries, and dams, as expected involved drowning deaths. Contact with overhead power-lines involved electrocution deaths, and incidents involving vehicles often resulted in head injuries and multiple injuries. Fatal injuries from horse-related activities, or following a fatal fall from a height, often resulted in head injuries. Similarly, Brison and Pickett (1992), studying non-fatal farm injuries, found that head injuries were common following incidents involving horses and falling. There were 25 deaths that resulted from medical complications, such as pneumonia.

The pathophysiological cause of death differed somewhat between different commodity groups, although most had head injuries as a common cause. Drowning was common on orchard and other fruit farms, meat cattle, and dairy farms. Crush injuries were the most common pathophysiological cause of death for injuries sustained on sugar cane farms. Electrocution was common on both vegetable including potato farms and cereal grain farms. Multiple injuries were common on sheep-meat cattle farms.

Although there were similar types of injuries experienced by persons following both the fatal and non-fatal horse-related incidents and falls, it should be noted that there are often significant differences in the injuries sustained in fatal incidents compared with non-fatal incidents. The most common body location injured in a fatality was the head, whereas for non-fatal injuries, the lower extremities, hand and back are often common body locations that are injured (NOHSC, 1995; Cole & Foley, 1995; Franklin et al, 1999). This finding has also been reported in other studies (Brison & Pickett, 1991; Schelp, 1992; Brison & Pickett, 1992; Castillo & Rodriguez, 1997; Layne & Landen 1997; Browning et al, 1998; Lyman et al, 1999).

Investigation of the pathophysiological cause of death can often direct where research into prevention should start. For example, there were a number of people who sustained head

injuries after falling from a horse, usually while not wearing a helmet. If a helmet had been worn at the time of the incident, this may have reduced the severity of the injury. Similarly, those who sustained crush asphyxia in incidents involving tractors with no ROPS may have been prevented by having a ROPS fitted and wearing appropriate restraints.

Of the 338 (57.6%) people who were tested for alcohol, 66 (19.5%) people had an alcohol reading greater than zero and 45 (13.3%) had a blood alcohol reading of 0.05%. There were three incidents where drugs contributed to the fatality. Of the 45 people who had a blood alcohol reading greater than 0.05%, 16 (35.6%) were working, 16 (35.6%) were bystanders and 13 (28.9%) were other farm fatalities.

Compared to all other work-related fatalities of workers employed in non-agricultural industries in Australia during 1989-1992, there was a lower proportion of workers in agriculture (63.8% compared to 70.1%) who had a test for alcohol performed (NOHSC, 1998). The proportion of workers on a farm or who had an alcohol reading greater than 0.05g/100ml were slightly greater (6.7%) than all industries (6.1%). This was lower than the fishing industry (11%) (NOHSC, 1999d) and the timber industry (9%) (NOHSC, 1999e), but higher than the construction industry (3%) (NOHSC, 1999f). There are, however, some problems with comparing information regarding blood alcohol content between industries, due to the large numbers of workers who were not tested for blood alcohol levels.

Month, Day and Time of Fatal Incident

Overall, information regarding the month and day of the fatal incident did not show noticeable variations in the number of incidents. There was, however, a peak in the months of November to January, with smaller peaks during March to May reflecting the seasonal nature of farming in Australia. Workers were involved in slightly more incidents during the week than on weekends, and bystanders were more likely to be fatally injured on the weekend than during the week.

There were some slight variations in the time of year that the incident occurred depending upon agent, mechanism, commodity groups, age and the state or territory involved. Incidents involving children or drowning deaths had the most noticeable monthly patterns. There were some variations in daily patterns for particular groupings of fatal incidents. However, the variation was often accounted for by the work status of the injured person (e.g. incidents involving bystanders, children, young adults, drowning and dams were more likely to occur on weekends).

Jones (1993), who studied agricultural-related fatalities in Iowa during 1990 to 1991, found no real variation in the number of fatalities per month. In contrast, Pickett et al (1995), in a survey of non-fatal injury on farms, and Gerberich et al (1998), in a study of machinery-related injuries, both found that that machinery injuries were concentrated during the summer and fall months when farm machinery is in heavy use. During the winter months, Pickett and colleagues (1995) found that animal-related injuries and accidental falls were common. Increasingly, as more farm injury information is collected, a better profile regarding the monthly patterns of farm-related injuries will emerge.

For workers, the time that the fatal incident occurred peaked between 0700 and 1300 hours and between 1400 and 1700 hours. For bystanders, the number of fatal incidents rose around

0900 hours and remained high, peaking at 1700 hours. For other farm fatalities, the number of fatal incidents increased between 0900 and 1300 hours and between 1500 and 1800 hours.

The pattern of the time that the fatal incident occurred for workers in the agriculture industry was similar to all working deaths in Australia during 1989-1992 (NOHSC, 1998). The pattern is also similar to the forestry and logging, mining, manufacturing and construction industries (NOHSC, 1998). Other studies regarding both fatal and non-fatal injury also found similar patterns regarding time of incident (Jones, 1993; Zhou & Roseman, 1994; Low et al, 1996; Gerberich, 1998).

Low et al (1996), in a study of Australian farm work injuries in the wheat/sheep belt of NSW, found the bulk of injuries occurred between 0800 and 1700 hrs, with a decline during the lunch period. Jones (1993) and Gerberich et al (1998) found that about 50% of agricultural fatalities occurred between noon and 1800 hrs, with an additional 30% occurring between 0600 hrs and noon. This pattern is extremely similar to that found in the current study (45.7% and 35.3%, respectively). Zhou & Roseman (1994), in a study of agricultural injuries in Alabama during October 1990 to September 1991, found that the peak times for injury for farmers were 0700 to 1100 hrs and 1300 to 1900 hrs.

In Australia, there is no accurate information routinely collected concerning the number of people working in a given industry at a given time. This means that no accurate fatality rates could be calculated for the timeframe of the study. However, the number of deaths in any given time period does tend to reflect when farmers and farm workers are working on Australian farms.

Visitor to the Farm

The majority of persons fatally injured in farm-related incidents were residents of the farm. About 30% of people fatally injured on farms were visitors, although this percentage did range from 8.3% of meat cattle-cereal grain farms to 57.1% of people fatally injured on farms in the Northern Territory. Nordstrom et al (1995), using data from a medical centre in Wisconsin during 1990 to 1992, found that 19.3% of injuries involved neighbours and friends, 7.5% involved service and repair personnel and 2.5% involved other visitors to the farm. However, in Sweden, Schelp (1992) found that only 14% of injuries on farms involved visitors.

In the current study, the percentage of visitors on farms in different states and the Northern Territory were reasonably consistent. Victoria had the smallest percentage (22.3%) and the Northern Territory (57.1%) had the highest, with most of the other states having around 30% of fatal incidents to visitors of the farm. Of young children fatally injured on farms, 30.4% were visitors. Thirty six percent of young adults were visitors, but only 19.5% of older adults were visitors.

The percentage of visitors to the farm fatally injured by different agents ranged from 13.8% for tractors to 50.0% for aircraft. Those agents where over one-third of all fatalities were of visitors included utilities, two-wheeled motorcycles, aircraft, and trees being felled. Those agents where one-third of the fatal incidents involved visitors included firearms and dams. The agents where less than one-third of fatal incident were of visitors were trucks, cars, tractors and horses.

Less than one third of people fatally injured in each of the ten commodity groups examined in detail involved visitors to the farm. However, this information is based only on examination fatalities of bystanders and workers. Also, for a sizeable minority of people it was difficult to determine the commodity type of the farm where they were fatally injured and thus it is possible that the number of visitors fatally injured on Australian farms may be under or over reported.

Visitor status is an important issue for farms in Australia, although exposure information for visitors compared to those that live and work on the farm is not available. The finding in the current study that 30% of fatalities involved visitors to the farm indicates that people who are less familiar with the environment they are in, the tools they are using, the jobs they are performing (or others are performing) do have a risk of sustaining an injury.

Intentional Fatal Incidents on Farms

There were 20 (3.3%) intentional fatalities on Australian farms between 1989-1992. The majority of those involved the victim being shot with a firearm (18: 90%).

In comparison, Stallones (1990), in a study of farm-related fatal and non-fatal injury deaths in Kentucky during 1979-1985, found that 11.7% of farm-related deaths were intentional. This proportion was approximately three times higher than the proportion of intentional deaths on Australian farms in the current study. Possible reasons for the increased proportion of intentional injury deaths on Kentucky farms compared to Australian farms are numerous and may involve issues such as ease of access to firearms in the United States.

Nine (45.0%) of the intentional fatalities on Australian farms were of workers. For all workers in Australia during 1989-1992 there were 50 who were fatally injured intentionally in the workplace – 2.8% of all workers during this period. Similar to intentional farm-related fatalities, the most common weapon of fatal injury for these workers was a firearm (28: 56.0%). However, being stabbed (11: 22.0%) and other forms of assault (8: 16.0%) were also common mechanisms of the incident for all workers (NOHSC, 1999c).

Of the work-related fatalities examined in the United States during 1980-1992, workplace homicides were the second highest cause of fatal injury at work following vehicle accidents (Jenkins, 1996). In 76% of these incidents the victim was shot with a firearm (Jenkins, 1996).

For intentional injuries, the retail and other service industries were the most common industries where the victim was employed in the United States during 1980-1992 (Jenkins, 1996). This compares similarly with Australia where the community services, wholesale and retail trade and recreation, personal and other service industries were the most common industries where a worker was intentionally fatally injured (NOHSC, 1999c).

Consideration of factors relevant to the assailant as well as the victim can assist in providing information that could be used to identify possible intervention strategies in order to prevent intentional fatal injury on Australian farms.

Over 80% of the victims on Australian farms knew their attacker. This figure is similar to information regarding work-related physical assault from Minnesota during 1992, where

LaMar et al (1998) found that at least 80% of victims who were physically assaulted knew their attacker.

For intentional farm-related fatalities in Australia, personal difficulties and disagreements and disputes with colleagues or neighbours were the most common motives of the assailant for the killings. Information regarding all work-related homicides of workers in Australia during 1989-1992 suggests that the type of motive of the assailant often varied with the occupation of the victim.

In Australia, each state has it own firearm legislation, but following a special meeting of Police ministers in May 1996, the following firearms are banned apart from military, police and occupational categories who have been licensed for a specific purpose:

- self loading centre fire rifles:
- self loading and pump action shotguns: and
- self loading rim fire rifles. (Australian Centre for Agricultural Health and Safety, May 1998).

Workers' Compensation and OHS Coverage of Farm-related Fatalities

Overall, just over one-third (36.8%) of all farm-related deaths were recorded by either the OHS or workers' compensation systems. However, for farm-related fatalities of workers, just over half (51.5%) were recorded by either the OHS or workers' compensation systems. This is less than for all industries, for which just over two-thirds were recorded by the OHS or workers' compensation systems (67.6%) (NOHSC, 1998). For bystanders and other farm workers, about 10% (9.7% and 9.4% respectively) of deaths were recorded by the OHS or workers' compensation systems. Compared to other industries in Australia, agriculture had the fourth lowest percentage of deaths recorded by either OHS or workers' compensation systems, although all information was not available for defence and communication industries (NOHSC, 1998).

The coverage of only half of the agricultural fatalities by the OHS and workers' compensation systems is not unexpected, as many farms are not covered by workers' compensation. Furthermore, as farms are often small and spread out, it is often difficult for OHS authorities to investigate work-related fatal injuries on farms.

Coverage of agricultural fatalities by OHS and workers' compensation systems varied by age group, from 42.5% (45-54 age group) to 79.2% (25-29 age group). For workers, there was a large variability in the percent of fatalities reported by different age groups. People less than 20 and those over 65 years of age were less likely to have been recorded by the OHS or workers' compensation systems.

There was also large variability between states in the number of people who were recorded in either the OHS or workers' compensation systems. Queensland had the lowest number of farm-related fatalities recorded with 61.5% of all fatalities of workers not being recorded. This variability was also present for industry groups. There were some agricultural industries (sheep-cereal grains; cotton; and nurseries) where all of the fatalities were recorded, and some agricultural industries (meat cattle-cereal grains; sugar cane; and services to agriculture) where only one-third of the fatalities were recorded. However, most agricultural industries

had between 40% and 60% of workers covered by the OHS and workers' compensation systems.

The recording of farm fatalities by OHS and workers' compensation systems for each agent showed that agents such as utilities, cars, firearms and dams were less likely to be recorded. In contrast, tractors, grain augers, pumps, windmills and trees being felled were more likely to be recorded by OHS and workers' compensation systems. There was no clear pattern for the mechanism involved in the fatal incident, with the coverage by OHS and workers' compensation systems varying from a given mechanism from 0% to 100%.

Considering information regarding workers and their particular work arrangements, a clear pattern was established regarding the type of arrangements which were more likely to be included in the OHS and workers' compensation systems. Those who were employed were more likely to be recorded than those who were self employed or unpaid family helpers.

Using only OHS and workers' compensation information for fatality surveillance has problems, as some groups are not covered by these agencies i.e. the self employed, others who are self insured or where there are no benefactors to make a claim. The current study found that for young people, unpaid workers and the self employed, between half and three-quarters may not be recorded in the OHS and workers' compensation systems. OHS and workers' compensation information is not useful for monitoring bystanders and other farm fatalities, since only one-tenth of these fatalities were reported in the OHS and workers' compensation systems.

Other studies have also identified problems with using compensation data for injury surveillance (Bryson & Pickett, 1992; Rossignal & Pineault, 1993; Wilk, 1993; Hayden et al, 1995). Bryson & Pickett (1992) found that only 20% of farm related injuries in 1989/1990 were reported to the Ontario workers' compensation board. Rossignol & Pineault (1993) found that in Quebec in 1981-1988, agriculture had a low compensation coverage. Wilk (1993) stated that for the United States "…the use of workers' compensation data for national estimates of workplace injuries among farm workers is even more limiting because, in most states, the workers' compensation system either partially or completely exempts agriculture…" (p 285). Hayden et al (1995) found that, for agricultural fatalities in Minnesota, workers' compensation data is not useful for surveillance purposes because only a very small proportion of farmers are covered by this system.

In the United States, death certificates are also often used to identify work-related fatalities. In a comparison of coverage of farm-related fatalities in Minnesota between death certificates and a newspaper clipping service, it was found that between 1981 and 1986 there were a total of 350 farm-related fatalities. Eighty-two percent of these fatalities were identified using death certificates and 67% were identified using the newspaper clipping service (Hayden et al, 1995). Unfortunately, in Australia deaths certificates cannot be used to identify child deaths on farms because death certificates do not contain the required information.

When using only one particular source of information to identify work related deaths, it is possible that certain type of fatalities could be excluded for both known and unknown reason. For example, Zwerling et al (1995) noted two different fatality rates for the United States for 1992 from two different sources, with a difference of 35.1%. Hayden et al (1995), in a comparison of coverage of farm-related fatalities by death certificates versus a newspaper clipping service, found that a greater proportion of crushing injuries were identified through

the newspaper clipping service and that a greater proportion of fatalities associated with asphyxiation, amputation, mangling, fracture, electrocution and head and burn injuries were reported through death certificate data. Hayden et al (1995) demonstrated that a newspaper clipping service can not be accurately relied upon to reflect injury patterns as not all injuries are considered to be newsworthy.

The use of multiple data sources is generally a more effective method of obtaining information regarding both fatal and non-fatal farm-related injuries.

METHODOLOGICAL CONSIDERATIONS

Agriculture is one of the few industries where comprehensive information regarding all work-related and other farm-related fatalities has been examined in Australia. In conducting the study, particular care was taken in establishing and applying clear definitions, identifying all relevant deaths, coding the data consistently, using appropriate denominators and analysing and presenting the data in a meaningful way. Nevertheless, there were still several methodological issues remaining, and these should be taken into account when interpreting the results.

The Definition of a Farm

For some deaths, there were difficulties determining whether the incident occurred on a farm (or away from a farm but in connection with farm work), or whether the place of incident was a rural property with no intended productive capacity. The difficulties largely arose from lack of information in the coronial file, but in some instances there were difficulties deciding whether the activity that took place on a rural property amounted to farming activity. A final decision was made on a case-by-case basis, taking into account the available information about the purpose of the activity and the circumstances of the fatal incident.

The ABS defines a farm as “an establishment which is engaged in agricultural activity, regardless of the unit’s predominant activity” (ABS , 1999 p1120). However, there is much debate in Australia about the difference between a farm and a hobby farm. This study made no distinction between farms and hobby farms. This approach was taken for a number of reasons, including that information on the size of the farm and the amount of agricultural produce per farm was often not available.

Other studies have defined a farm according to more stringent criteria. One such study is Zhou & Roseman (1994), who used the United States Department of Agriculture 1978 definition of farm, which was “an establishment for which $1,000 or more of agricultural products were sold, or normally would be sold in a year” in their study of agricultural injuries in Alabama. Gerberich et al (1998) used the same definition.

Establishing the Enterprise Type

For many deaths, it was clear that the incident occurred on a farm, but the type of farm was not able to be determined on the basis of the information available in the coronial file. Even when detailed information was present, there were sometimes difficulties identifying the most appropriate agricultural industry group. This identification was made even more difficult by

the fact that farm enterprises might have different production activities from year to year, thereby changing the agricultural industry group that best described them. Decisions on agricultural industry groups were assigned as seemed appropriate and, where the information was limited or unclear, enterprises were assigned to the "Agriculture not known" category or, if possible, to the "cereal grains, sheep, cattle and pigs" group.

The effect of this problem with assigning enterprises to an agricultural industry group is not certain. Where incidents were assigned to the broader categories ("cereal grains, sheep, cattle and pigs" and "Agriculture not known"), the number and rate of deaths for the agricultural industry group to which the fatality should have been assigned will have been underestimated. If the degree of classification problems differed between agricultural industry groups, then the degree of underestimation will also have varied, complicating any comparison of numbers and rates between agricultural industry groups. Problems with identifying the correct agricultural industry groups were closely related to the amount of information in the coronial file. This varied between all the states and the Northern Territory. As a consequence the states where the coronial files tended to be briefer were more likely to have enterprises assigned to the broad industry categories, and were therefore more likely to have underestimates for the numbers and rates of death for specific agricultural industry groups. The same problem occurred within states for particular types of incidents. For example, it was often difficult to determine the farm enterprise type for incidents where children drowned in dams, because the coronial files commonly didn't contain the relevant information. Therefore, comparisons of agricultural industry groups between states, or between incident types, should be made with caution.

Intent

Most of the results presented in this report describe unintentional deaths. Suicides were excluded from the overall fatalities study due to the difficulty of deciding if they were work-related. Homicides were excluded from much of the analysis because many of the approaches to prevention would be different for unintentional deaths (which were the primary focus of this report) than for homicides.

Working Alone

There were problems with defining what exactly was meant by 'working alone'. For the purpose of this study, if a worker was out of sight and earshot then they were considered to be working alone. A typical example was when a farmer went out for the day by himself and was not expected to return until dusk.

Disease Deaths

This report does not include any deaths due primarily to disease. This approach was required because the fatalities study conducted by NOHSC (1998) only included external cause deaths.

Denominator Information

Fatality rates were calculated, where possible, to provide an understanding of the absolute and relative risks of fatal injury for particular population groups. In some instances, difficulties arose in identifying the most appropriate denominator to use. For working deaths (e.g. occupation and industry groups), the three-monthly Labour Force Survey (LFS) data were

used. The LFS provided 16 denominator data estimates for the four year study period, including four for each year of the study and four for each season of the year. It therefore can be expected to provide reasonable coverage of occupations and industries with a large proportion of seasonal or itinerant workers.

Since the LFS data are obtained using a sample survey, they are imprecise for small groups. The main alternative was to use the 1991 Census data. However, the Census was less appropriate for most of the rates because it didn't take into account variations in non-Census years. Also, it only provides information for a single time of the year (August), and so doesn't allow for seasonal variations.

Another difficulty with the denominator (and with the case classification) concerned the uncertain employment status of some people, especially elderly "farmers". The main difficulty arose from considering whether farmers can ever be determined to be fully retired. There were a number of elderly people (mostly males) who were described on the police notification form as "retired", but who were clearly (or probably) performing some sort of work-related farming activity when they were fatally injured. This sometimes presented difficulty in determining whether the person should be classed as worker, bystander or other farm person. More commonly, it was clear that the person was properly considered to have been working, but less clear whether they would have been classified as a worker if they had been part of the LFS sample.

Some rates were calculated on the basis of establishments, using the 1991 Agricultural Census as the source of the denominator data (ABS, 1999). The inclusion criteria for the Agricultural Census changed from 1990 to 1991, with the threshold for inclusion dropping from $20,000 to $5,000 per year. This provided a better indication of the true number of farm enterprises, but still did not include all farms. Therefore, the rates calculated using this denominator should be considered overestimates. A single denominator had to be used for each of the four years because of the change in inclusion criteria in 1991. The 1991 Agricultural Census was used, because the lower threshold provided a better estimate of the true number of farms. Also, 1991 was closer to the middle of the study period than 1992, and so provided a better estimate of the number of farms during the early study years. Since it is known that the number of farms decreased over the study period (and beyond), the calculated rates for 1989 and 1990 are probably slightly higher, and the 1992 rates slightly lower, than the true rates.

A more significant problem relates to the interpretation of rates based on various denominators. The rates are used to identify particular groups that are at increased risk of injury, but the way they should be interpreted, and their usefulness, depends on the denominator used. Rates based on LFS data use information on the number of workers employed. They provide information on the overall risk of fatal injury for particular groups of workers who are exposed to farm activities in general. These rates are heavily influenced by the activities required in the occupation and industries of interest, but do NOT take into account the amount of time a particular group spends on a particular activity or using particular equipment. So, these rates can indicate that a particular worker group based on occupation, industry or state has a higher risk of fatal injury overall. It can also indicate a higher risk of fatal injury involving a certain type of equipment (e.g. a tractor). However, this result may be due to many reasons, such as the group using the equipment more often than other groups, or in different terrain, or for different tasks, or in a less safe manner, or to the use of intrinsically less safe equipment. Ideally, information would be available regarding the time of exposure for each particular activity and equipment type, allowing true person-time

risk to be calculated for specific situations. This would allow specific high-risk activity-groups to be identified and targeted for intervention. Unfortunately, such information is very rarely available. The rates can therefore be used to help set broad priorities for prevention activities, but not to identify the prevention activity itself.

Rates based on occupation or industry groups do not provide an understanding of the risk of injury for non-workers. Unfortunately, there are no relevant, reliable population estimates for this non-working group. The number of persons living on farms provides a reasonable proxy, but there are no good estimates of this group. Even if there were, they wouldn't allow for persons who did not live on a farm but who were fatally injured while visiting the farm. Since there are no good farm population estimates, rates based on the number of establishments have been used, with the number of establishments providing an index of the level of agricultural activity. Rates based on establishment numbers therefore provide a rough guide to the overall risk resulting from agricultural activity, and can be used to monitor changes in risk over time. However, since the at-risk group is not the establishment but the persons on it, a much better guide would be provided by rates based on population estimates.

One of the future solutions to some of these problems may be to measure the amount of crop/s harvested each year and, knowing the yield per acre and the average time, it would be possible to establish a measure for farm machinery fatalities per 1,000 hours worked or area farmed.

Bystander and Other Farm Deaths

The primary focus of this report was the fatal hazards resulting from farming activities. These were considered equally important, whether the fatally injured person was a worker or not (and therefore a bystander). In addition, fatal injuries which occurred on a farm, but which were apparently not related to farm activity, were of interest. The distinction between workers and bystanders was usually clear, but the distinction between bystanders and other farm persons was sometimes less apparent. This was made more difficult by the fact that the farm also usually serves as a home, making the separation of farm work from home duties and recreation, and farm equipment from home or recreational equipment, difficult.

The study team dealt with this problem primarily through the use of strict definitions as to what constituted work equipment and work activity and what did not. These definitions, which applied to equipment and agents such as motor bikes, guns, horses, fences, motor vehicles and dams, are clearly set out in Chapter 2. However, at times a somewhat arbitrary decision was required as to whether an incident was best classified as involving a worker, a bystander or an other farm person.

Prevention

Currently in Australia, there are many different types of professionals who are working to reduce the number of injuries and deaths on Australian farms. These professionals include doctors, health promotion officers, OHS authority workers and farm injury prevention specialists. One of the purposes of this report is to inform stakeholders about the circumstances surrounding fatal farm injury and to assist in identifying where work needs to be conducted in this area. Preliminary information from this report has already been used by

people developing injury prevention strategies for areas such as child injuries, injuries involving motorcycles, machinery injuries and injuries in the cattle industry. It was also used for the Farmsafe Australia mid term review of goals, targets and strategies 1996-2001 (Fragar and Franklin, 1999). On-going surveillance of fatal farm injuries allows for the identification of patterns of injury that can be addressed through prevention programs (Brison and Pickett, 1995). It also allows for the broad monitoring of programs to see how effective and successful they have been.

Lexau et al (1993) noted that farmers who are owner operators bear all the cost for safety. They therefore may not see the benefit in adopting prevention activities and may have a poor performance regarding OHS. Information from this report should also be useful for education and training programs such as "The Managing Farm Safety Program", which is designed for farm managers and owners, to inform them about health and safety on the farm.

Having detailed information concerning the number and type of injury on Australian farms will allow for an accurate assessment of cost and the allocation of resources to be made. This information will be useful for the National Farm Injury Data Centre (NFIDC) in Australia to determine the cost of farm injuries to agricultural industries and the community as a whole.

Future Surveillance of Farm-related Fatalities

A National Coronial Information System (NCIS) is currently being developed by the Australian Coroners' Society and the State and Territory governments. The NCIS is a computerised data storage, coding and retrieval system that is designed to allow prompt access to coronial data. Surveillance of OHS is one of many reasons why the NCIS is being developed. The information available from the system will be very important to the monitoring and prevention of work-related traumatic death at both State and Territory and National levels.

The NCIS will allow most farm-related fatalities to be identified quickly, and will provide some basic information regarding each fatal incident. This will allow major outcomes of interest such as the number, rate, mechanism, agencies involved, place, age, gender, role of alcohol and state and territory to be known on a regular basis. However, more in-depth research may still require access to the relevant coronial files.

The NCIS will form the basis of information on farm-related fatalities in the future. However, information from other sources should still be used to supplement it. For example, additional information regarding farm-related deaths could be found through cross-checking with information from State and Territory OHS and workers' compensation agencies, or inspectors' reports on incidents could be matched to the information in the coronial system.

Additional future surveillance systems are being developed by the National Farm Injury Data Centre (NFIDC) in Australia to collect information on both child deaths and tractor deaths on farms in two separate registers. Information regarding these deaths will be collected through OHS authorities, child deaths review teams, newspaper clippings and coronial records. The objective of the registers is to collect information on all children and tractor deaths on farm, including as much information surrounding the circumstances of each death as possible. The aims are to:

- determine the nature and scale of the problem;
- identify the key causes;
- inform the farming community, government, health workers and others; and
- monitor the progress of programs.

The NFIDC has developed a coding guide, called the Farm Injury Optimal Dataset (Fragar et al, 2000). The dataset provides guidance for persons designing farm injury surveys and databases. A standardised system of classifying farm injuries allows disparate work to be brought together and compared, and in some cases to be analysed as a whole. It is hoped that by aggregating the different data collections regarding farm-related injury that there will be sufficient, accurate and reliable data to assist agricultural industries in determining injury priorities and causal factors.

Summary

In summary, farm-related fatalities in Australia continue to contribute significantly to the number of people fatally injured while working. Agriculture, with its unique environment where people are living and working at the same location, increases the risk to those not working, of being involved in a farm accident. This study of 607 farm-related fatalities that occurred between 1989 and 1992 provides a comprehensive collection of farm-related fatalities for those years, allowing detailed examination of the injury event. Of these, 587 were unintentional and 20 were intentional (homicides). There were 387 people working at the time of the fatal incident. The rate of fatal injury was 20.6 per 100,000 workers per year.

The information collected examined the injury event by age, gender, location on farm, commodity group, states and the Northern Territory, agent, mechanism, activity at time of injury, pathophysiological cause of death, blood alcohol content, drugs, resident of the farm, intent, and by workers' compensation and OHS coverage. This study compared the information found to that of similar studies from Australia and internationally. Many similarities were found including rates of injury, types of injuries, agents and mechanism involved, and location on farms. This study, unlike many other studies, collected detailed information on those who were not working but were bystanders to work activity. Drowning especially was unique to Australia and a particular concern for farms where children are present.

There were some difficulties in this study in terms of the definitions, although any study of farm-related deaths faces difficulties in this area. Despite great care being taken, of particular concern to this study were definitions of what constitutes a farm and farm activity; whether an injured person should be classified as a worker, a bystander or neither; selecting the most appropriate agricultural industry group; and in identifying the most appropriate denominator to be used for calculating rates. The same areas are also likely to have been issues in other studies and interpretation of the current study's results, and comparison with results from other studies, should therefore be made with these issues in mind.

This study also demonstrated that the traditional providers of the information of work-related fatalities underestimate the true number of farm-related deaths up to a factor of five. However, by the continued good work of the many organisations throughout Australia and farmers, the number of deaths on Australian farms will hopefully decline in the ensuing years.

REFERENCES

ABARE. (1996) *Australian Commodity Statistics*. ABARE: Canberra.

ABARE. (1998) *Australian Commodity Statistics.* ABARE: Canberra.

ABS. (1985) *Australian Standard Industry Classification* (Catalogue no. 1201.0). ABS: Canberra.

ABS. (1986) *Australian Standard Classification of Occupations* (Catalogue no. 1222.0). ABS: Canberra.

ABS. (1992) *Census of Population and Housing*. ABS: Canberra.

ABS. (1993) *Labour Statistics Australia, 1992* (Catalogue no. 6101.0). ABS: Canberra.

ABS. (1999) *Agriculture Australia,* 1997-1998 (Catalogue no. 7113.0). ABS: Canberra.

Adekoya, N. & Myers, J. (1999) Fatal harmful substances or environmental exposures in agriculture, 1992 to 1996. *Journal of Environmental Medicine*, 41, (8), 699-705.

Australian Centre for Agricultural Health and Safety (May 1998). *Guidance Note, Number 17. Firearm Safety on Farms*

Australian Water Safety Council. (1998) *National Water Safety Plan*. Australian Water Safety Council: Sydney.

Bond, N. (1996) The case for agrarian reform. *The Safety and Health Practitioner*, March, 25-27.

Boyle, D., Gerberich, S., Gibson, R., Maldonado, G., Robinson, R., Martin, F., Renier, C., Amandus, H. (1997) Injury from dairy cattle activities. *Epidemiology*, 8, (1), 37-41.

Brison, R. & Pickett, C. (1991) Non-fatal farm injuries in Eastern Ontario: a retrospective survey. *Accident Analysis and Prevention*, 23, (6), 585-594.

Brison, R. & Pickett, C. (1992) Non-fatal farm injuries in 117 Eastern Ontario beef and dairy farms: a one-year study. *Accident Analysis and Prevention*, 23, (6), 585-594.

Brison, R. & Pickett, C. (1995) Fatal farm injuries in Ontario, 1984 through 1992. *Canadian Journal of Public Health*, 86, (4), 246-148.

Browning, S., Trusczynska, H., Reed, D., McKnight, R. (1998) Agricultural injuries among older Kentucky farmers: the farm family health and hazard surveillance study. *American Journal of Industrial Medicine*, 33, 341-353.

Burke, P. (1998) Personal correspondence about occupation classification from the ABS.

CAISP. (1997) *Fatal Farm Injuries in Canada, 1991-1995. Canadian Agricultural Injury Surveillance Program*. CAISP: Canada.

Cameron, D., Bishop, C., Sibert, JR (1992). Farm accidents in adults. *British Medical Journal*, 305, 25-26.

Cameron, D., Bishop, C. (1992). Farm accidents in adults. *British Medical Journal*, 305, 25-26.

Casey, G., Grant, A., Roerig, D., Boyd, J., Hill, M., London, M., Gelberg, K., Hallman, E., Pollock, J. (1997a). Farm workers injuries associated with cows. New York State 1991-1996. *American Association of Occupational Health Nurses*, 45, (9), 446-450

Casey, G., Grant, A., Roerig, D., Boyd, J., Hill, M., London, M., Gelberg, K., Hallman, E., Pollock, J. (1997b). Farm workers injuries associated with bulls. New York State 1991-1996. *American Association of Occupational Health Nurses*, 45, (8), 393-396.

Castillo, D. & Rodriguez, R. (1997) Follow-back study of oldest workers with emergency department-treatment injuries. *American Journal of Industrial Medicine*, 31, 609-618.

Chapman, P. & Spinks, D. (1994) Recognition of farm hazards by children engaged in farming activities. *Journal of Occupational Health and Safety – Australia and New Zealand*, 10, (4), 331-337.

Clarke, L. & Wolfenden, K. (1991) Community organisation to reduce injury on Australian farms. *Health Promotion Journal of Australia*, 1, (2), 17-22.

Cole, B. & Foley, G. (1995) *Occupational health and safety performance overviews, selected industries. Issue No. 9. Agriculture and services to agriculture industries*. NOHSC: Sydney.

Coleman. R. (1995) *Farm Injury Optimal Data Set*. Australian Agricultural Health Unit: Moree.

Commonwealth Department of Human Services and Health. (1994) *Better Health Outcomes for Australians: National Goals, Targets and Strategies for Better Health Outcomes into the Next Century*. Commonwealth of Australia: Canberra.

Coury, H., Kumar, S., Jones, E. (1999) Farm related injuries and fatalities in Alberta. *International Journal of Industrial Ergonomics*, 23, 539-547.

Crandall, C., Fullerton, L., Olson, L., Sklar, D., Zumwalt, R. (1997) Farm-related injury mortality in new Mexico, 1980-91. *Accident Analysis and Prevention*, 29, (2), 257-261.

Cryer, P. & Fleming, C. (1987) A review of work-related fatal injuries in New Zealand 1975-84 – numbers, rates and trends. *The New Zealand Medical Journal*, 100, (816), 1-6.

Cryer, P. & Fleming, C. (1989) Work-related fatal injuries on New Zealand farms. *Journal of Occupational Health and Safety*, 5, (1), 21-25.

Day, L. (1999) Farm work related fatalities among adults in Victoria, Australia. The human cost of agriculture. *Accident Analysis and Prevention*, 31, 153-159.

Day, L., Ashby, K., Stathakis, V. (1997). Unintentional Farm Injury. *VISS, Hazard*, 33. Monash University Accident Research Centre: Victoria

Day, L. & Rechnitzer, G. (1999) *Evaluation of the Tractor Rollover Protective Structure Rebate Scheme 1997/98*. Monash University Accident Research Centre: Victoria.

DPIE (1991) *Farmsafe 88: Papers and Proceedings of the Farmsafe 88 Conference: Held at the University of New England on 26-29 June 1998*. Department of Primary Industries and Energy. Canberra.

Erlich, S. (1990) *Work-related Agricultural Fatalities in Australia, 1982-1984*. Master of Public Health Treatise: University of Sydney.

Erlich S, Driscoll T, Harrison J, Frommer M, Leigh J. (1993) Work-related agricultural fatalities in Australia, 1982-1984. *Scandinavian Journal Environmental Health*, 19, 162-167.

Farmsafe Australia (1999) *Child Safety on Farms: A Framework for a National Strategy*. Farmsafe Australia: Moree.

Ferguson, K. (1994) *Farm Survey of Workplace Injury/Illness Factors to Support Activity Planning of Six Queensland Farm Safety Action Groups*. Queensland Farmsafe Committee and the Australian Institute of Health: Queensland.

Ferguson, K. (1996) *Survey of Farm Work Injury and Operational Procedure on Farms in Queensland to Assist Intervention Planning by Farm Safety Action Groups and Industry*. Division of Workplace Health and Safety: Queensland.

Fragar, L. (1996). *Goals, Targets & Strategy 1996-2001*. Farmsafe Australia: Moree.

Fragar, L. & Franklin, R. (1999) *Farmsafe Australia Goals, Targets and Strategy 1996-2001: Mid-term review*. Rural Industries Research and Development Corporation and the Australian Centre for Agricultural Health and Safety: Moree.

Fragar L, Franklin R, Coleman R. (2000). *Farm Injury Optimal Dataset. Version 1.2*. Australian Centre for Agricultural Health and Safety: Moree

Franklin R, Fragar L, Page A. (1999) *The Health and Safety of South Australian Farmers, Farm Families and Farm Workers*. Australian Agricultural Health Unit: Moree.

Gerberich S, Robertson L, Gibson R, Renier C. (1996) An epidemiological study of roadway fatalities related to farm vehicles: United States, 1988 to 1993. *Journal of Environmental Medicine*, 38, (11), 1135-1140.

Gerberich, S., Gibson, R., French, L.,. Lee, T., Carr, W., Kochevar, L., Renier, C., Shutske, J. (1998) Machinery-related injuries: regional rural injury study – I (RRIS- I). *Accident Analysis and Prevention*, 30, (6), 793-804.

Harrison, J. (1992) Nature and dimensions of injury in Australia. In Ozanne-Smith, J. & Williams, F. (Eds) (1995). *Injury Research and Prevention: A Text.* Monash University Accident and Research Centre: Victoria.

Harrison, J., Frommer, M., Ruck, E., Blyth, F. (1989) Deaths as a result of work-related injury in Australia. *Medical Journal of Australia*, 150, 118-125.

Hawthorn, S. (1999) Why young workers are more likely to have accidents on the farm. *Farm Injury Prevention 99*. Cairns, 26-29 August 1999.

Hayden, G., Gerberich, S., Maldonado, G. (1995) Fatal farm injuries: a five-year study utilizing a unique surveillance approach to investigate the concordance of reporting between two data sources. *Journal of Environmental Medicine*, 37, (5), 571-577.

Hendrie, L. (2000). Personal Communication.

Hockey, R., Horth, A., Pitt, W. Miles, E. (1999) Farm-related injuries presented at hospital emergency departments in Queensland. *Farm Injury Prevention 99*. Cairns, 26-29 August 1999.

Horton-James, L., Coleridge, A. (1998) *Rural Injury Prevention Primary Education Resource (RIPPER)*. Rural industries research and development corporation and Victorian Farmers Federation: Victoria.

Irwin CE Jr, Igra V, Eyre S, Millstein S. (1997). Risk-taking behaviour in adolescents: the paradigm. *Annals of the New York Academy of Sciences* 817, 1-35.

Jenkins, E. (1996) Workplace Homicide: Industries and Occupations at High Risk. *Occupational Medicine: State of the Art Reviews*, Vol 11, no 2, 219-225.

Jones, S. (1993) Agricultural injury surveillance: occupational health nurse's role. *American Association of Occupational Health Nurses*, 41, (9), 434-436.

LaMar, W., Gerberich, S., Lohman, W., Zaidman, B. (1998) Work-related Physical Assault. *Journal of Occupational and Environmental Medicine*, Vol 40, no 4, 317-324.

Layne, L. & Landen, D. (1997) A descriptive analysis of nonfatal occupational injuries to older workers, using a national probability sample of hospital emergency departments. *Journal of Environmental Medicine*, 39, (9), 855-865.

Layde, P., Nordstrom, D., Stueland, D., Brand, L,. Olson, K. (1995) Machine-related occupational injuries in farm residents. *Annals of Epidemiology*, 5, (6), 419-426.

Lemen, R., Layne, L., Castillo, D., Lancashire, J. (1993) Children at work: prevention of occupational injury and disease. *American Journal of Industrial Medicine*, 24, 325-330.

Lexau, C., Kingsbury, L., Lenz, B., Nelson, C., Voehl, S. (1993) Building coalitions: a community wide approach for promoting farming health and safety. *American Association of Occupational Health Nurses*, 41, (9), 440-449.

Low, J. & Griffith, G. (1994) *The Incidence and Cost of Farm Injuries*. NSW Agriculture: Armidale.

Low, J., Griffith, G., Alston, C. (1996) Australian farm work injuries: incidence, diversity and personal risk factors. *Australian Journal of Rural Health*, 4, 179-189.

Lyman, S., McGwin, G., Enochs, R., Roseman, J. (1999) History of agricultural injury among farmers in Alabama and Mississippi: prevalence, characteristics, and associated factors. *American Journal of Industrial Medicine*, 35, 499-510.

Mandryk, J., Harrison, J. (1995). Work-related deaths of children and adolescents in Australia, 1982 to 1984. *Australian Journal of Public Health*, 19, (1), 46-49.

MMWR (1993) Effectiveness of Rollover Protective Structures for Preventing Injuries, Agricultural Tractors. *Morbidity and Mortality Weekly Report* 42, 57-59.

MMWR (1995) Agricultural Auger-Related Injuries and Fatalities - Minnesota, 1992-1994. *Morbidity and Mortality Weekly Report* 44 (36) 660-663.

MMWR (1999) Childhood Work-Related Agricultural Fatalities – Minnesota, 1994 -1997. *Morbidity and Mortality Weekly Report* 30 (April).

Myers, J. (1990) National surveillance of occupational fatalities in agriculture. *American Journal of Industrial Medicine*, 18, 163-168.

Myers, J. & Hard, D. (1995) Work-related fatalities in the agricultural production and services sectors, 1980-1989. *American Journal of Industrial Medicine*, 27, 51-63.

NIPAC. (1999) *Directions in Injury Prevention. Report 1: Research Needs.* NIPAC: Canberra.

NIPAC. (1999) *Directions in Injury Prevention. Report 2: Injury Prevention Interventions – Good Buys for the Next Decade*. NIPAC: Canberra.

NOHSC. (1995) *Compendium of Workers' Compensation Statistics, Australia, 1992-93*. NOHSC: Sydney.

NOHSC. (1998) *Work-related traumatic fatalities in Australia, 1989 to 1992.* NOHSC: Sydney.

NOHSC. (1999a) *Compendium of Workers' Compensation Statistics, Australia, 1997-98.* NOHSC: Sydney.

NOHSC. (1999b) *Work-related traumatic fatalities in New South Wales, 1989 to 1992.* NOHSC: Sydney.

NOHSC (1999c) *Work-related homicide in Australia, 1989 to 1992*. NOHSC: Sydney.

NOHSC (1999d) *Work-related fatal injuries as a result of fishing and maritime activities in Australia, 1989 to 1992.* NOHSC: Sydney

NOHSC (1999e) *Work-related traumatic fatalities involving timber activities in Australia, 1989 to 1992.* NOHSC: Sydney

NOHSC (1999f) *Work-related traumatic fatalities involving construction activities in Australia, 1989 to 1992.* NOHSC: Sydney

Nordstrom, D., Layde, P., Olson, K., Stueland, D., Brand, L., Follen, M. (1995) Incidence of farm-work-related acute injury in a defined population. *American Journal of Industrial Medicine*, 28, 551-564.

Pickett, W., Brison, R., Niezgoda, H., Chipman, M. (1995) Nonfatal farm injuries in Ontario: a population-based survey. *Accident Analysis and Prevention*, 27, (4), 425-433.

Richardson, D., Loomis, D., Wolf, S., Gregory, E. (1997) Fatal agricultural injuries in North Carolina by race and occupation, 1977-1991. *American Journal of Industrial Medicine*, 31, (4), 452-458.

Rivara, F. (1997) Fatal and non-fatal farm injuries to children and adolescents in the United States, 1990-1993. *Injury Prevention*, 3, (3), 190-194.

Rossignol, M. & Pineault, M. (1993) Fatal occupational injury rates: Quebec, 1981 through 1988. *American Journal of Public Health*, 83, (11), 1563-1566.

RTCA (1998a). *Agricultural training package. Beef cattle production.* Rural Training Council of Australia. Canberra

RTCA (1998b). *National Competency Standards Horticulture.* Rural Training Council of Australia. Canberra

RTCA (1998c). *Agricultural training package. Sheep and Wool.* Rural Training Council of Australia. Canberra

RTCA (1998d). *Agricultural training package. Cotton Production.* Rural Training Council of Australia. Canberra

Sandall, J., Cooksey, R., Reeve, I., Kaine, G. (1999) Australian farmers' perceptions of farm health and safety hazards. *Journal of Occupational Health and Safety – Australia and New Zealand*, 15, (5), 449-464.

Schelp, L. (1992) The occurrence of farm-environmental injuries in a Swedish municipality. *Accident Analysis and Prevention*, 24, (2), 161-166.

SPSS Inc. (1999) *Statistical Package for the Social Sciences (SPSS)* ® Version 9.0 for Windows. SPSS Inc: US.

Stallones, L. (1990) Surveillance of fatal and non-fatal farm injuries in Kentucky. *American Journal of Industrial Medicine*, 18, 223-234.

Stone, P. (1993) Traumatic occupational fatalities in South Carolina, 1989-90. *Public Health Reports*, 108, (4), 483-488.

Stueland, D., Lee, B., Nordstrom, D., Layde, P., Wittman, L., Gunderson, P. (1997) Case-control study of agricultural injuries to women in Central Wisconsin. *Women & Health*, 25, (4), 91-103.

US Department of Health and Human Services (1993) *Fatal Injuries to Workers in the United States, 1980-1989: A Decade of Surveillance*. US Department of Health and Human Services. Public Health Service. Centres for Disease Control and Prevention NIOSH: US.

Valuri, J. & Routley, V. (1994) Injury surveillance and prevention in the Latrobe Valley. *VISS Hazard Special Edition February*. Monash University Accident Research Centre: Victoria.

Waller, J. (1992) Injuries to farmers and farm families in a dairy state. *Journal of Medicine*, 34, (4), 414-421.

WHO. (1977) *International Classification of Diseases. Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death. 9th Revision. Volume One*. WHO: Geneva.

Wilk, V. (1993) Health hazards to children in agriculture. *American Journal of Industrial Medicine*, 24, 283-290.

Zhou, C. & Roseman, J. (1994) Agricultural injuries among a population-based sample of farm operators in Alabama. *American Journal of Industrial Medicine*, 25, 385-402.

Zwerling, C., Burmeister, L., Jensen, C. (1995) Injury mortality among Iowa farmers, 1980-1988: comparison of PMR and SMR approaches. *American Journal of Epidemiology*, 141, (9), 878-882.