



**Australian Government**  

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**Rural Industries Research and  
Development Corporation**

A National Strategy for  
**Improving  
ATV Safety**  
on Australian Farms

*A Farmsafe Australia program*

A report for the Rural Industries  
Research and Development Corporation

by  
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# Foreword

All-terrain vehicles have emerged over the past decade as a useful machine or small vehicle on Australian farms. However, their use is associated with a growing number of fatalities on farms, and Farmsafe Australia has recognised this as a key occupational health and safety issue for the farm sector. The Rural Industries Research and Development Corporation, with other partners in the Farm Health and Safety Joint Research Venture, has recognised the importance of supporting Farmsafe Australia in developing a nationally agreed approach to reducing risk of death and serious injury due to ATV operation on farms, and to ensuring that such an approach is built on a strong evidence base to ensure that programs will be effective.

This report documents the process of development of the *Safe Operation of All-terrain Vehicles and All-terrain Utilities on Australian Farms - An Industry Strategy 2004 – 2009*, and plans for its implementation. The RIRDC and the Joint Venture partners are encouraged by advice of funding by the Australian Government Department of Health and Ageing for implementation of the Strategy. Without the investment in development of the evidence base for the strategic approach such funding would not have been possible.

This project was funded by R&D Corporations that comprise the Farm Health and Safety Joint Research Venture – the Rural Industries Research and Development Corporation, Australian Wool Innovation, The Cotton Research and Development Corporation, the Sugar Research and Development Corporation, the Grains Research and Development Corporation and Meat and Livestock Australia. These Corporations are generally funded principally by industry revenue matched by funds provided by the Australian Government.

This report, an addition to RIRDC's diverse range of over 1200 research publications, forms part of our Human Capital, Communications and Information Systems Program that aims to enhance human capital and facilitate innovation in rural industries and communities.

Most of our publications are available for viewing, downloading or purchasing online through our website:

- downloads at [www.rirdc.gov.au/fullreports/index.html](http://www.rirdc.gov.au/fullreports/index.html)
- purchases at [www.rirdc.gov.au/eshop](http://www.rirdc.gov.au/eshop)

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# Acknowledgments

Farmsafe Australia and the author gratefully acknowledge the input of each of the members of the national ATV Safety Reference Group. These people were drawn from agricultural industries, farmer organisations, Farmsafe organisations, government authorities and academic institutions, and freely gave their time and input into the development of a nationally agreed approach to improving safety associated with ATV use on Australian farms.

# Abbreviations

ACAHS	Australian Centre for Agricultural Health and Safety
ATV	All-terrain vehicle
ATU	All-terrain utility
OHS	Occupational health and safety
RIRDC	Rural Industries Research and Development Corporation
ROPS	Roll-over protective structure

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# Executive Summary

This document reports on the information and processes used in development of a multifaceted approach to reducing risk of death and serious injury associated with ATVs on farms across the major sectors. Around 10 deaths occur each year associated with ATV operation.

Farmsafe Australia Incorporated is an association whose member agencies have formed a partnership between agriculture industries and other agencies that share a commitment to improving the health and safety of those whose life and work is in agriculture. Member agencies of Farmsafe Australia work to pursue a strategic approach to reducing injury and illness associated with specific hazards that are common to all agricultural sectors.

In 2003 a Reference group was established by Farmsafe Australia to develop a national strategy to guide programs aiming to reduce serious injury and deaths associated with ATV operation on Australian farms.

The Reference Group found the following:

- that improved information and support should be available to farmers and workers to effectively manage ATV associated risk on farms and to meet their OHS regulatory obligations;
- that ATVs in their current design, and under certain circumstances, have a tendency to rollover and crush the operator;
- that ATV accidents in some circumstances will result in the rider being flung from the machine;
- that more specific information is needed to specify the safety limits of slope, terrain and loading of ATVs, including liquid loads, and suitability and safety of attachments;
- that manufacturers of ATVs do not currently support fitment of a rollover protective structure (ROPS), and that there is conflicting evidence as to the effectiveness of fitment of ROPS and rider restraint. This places suppliers and employers in a position of being solely reliant on lower order (non-engineering) risk control measures solutions to prevent death and injury;
- that a range of small vehicles (ATUs) are available that can reduce the need to use ATVs in some production systems, and offer a suitable substitution option in these circumstances. These appear to be more stable and can be fitted with ROPS and rider restraint as required;
- that guidelines need to be developed for farmers, employers and farm managers that provide information relating to the risk and recommended risk management solutions for safe operation of ATVs and ATUs on Australian farms;
- that more attention is needed to safety induction of riders into use of ATVs and ATUs in each specific farm workplace, with rigorous supervision of rules to ensure safety;
- that operation of ATVs with passengers reduces stability and adds to risk of roll-over;
- that children are at increased risk of serious injury and death and should be discouraged from riding ATVs;
- that farm manager and rider training should be widely promoted, although the evidence that supports rider training as the key risk management option is equivocal; and
- that increased use of helmets would reduce head-injury related deaths and serious head injury.

On the basis of these findings, a multifaceted national strategy - *Safe operation of All-terrain Vehicles and Utilities on Australian Farms - An Industry Strategy, 2004 – 2009*, was finalised and has been adopted by Farmsafe Australia. The Strategy will provide guidance to the range of stakeholders who will be actively engaged in working with farmers to reduce risk of serious injury and death associated with ATV operation on farms.

As a result of the groundwork undertaken by this project, the Department of Health and Ageing has funded a project that will ensure that the Strategy is implemented across Australia.

# 1. Introduction

In the late 1990's the National Occupational Health and Safety funded the Australian Centre for Agricultural Health and Safety to investigate injury associated with operation of 2-, 3- and 4-wheeled motorcycles on Australian farms. The concern that initiated that project was based primarily on the problem of serious injury associated with 2-wheeled motorcycles that had been noted in previous reports of farm injury in Australia.

However, the research undertaken by the Australian Centre for Agricultural Health and Safety brought the issue of injury associated with 4-wheeled motorcycle (ATV) operation to attention, as the 1990's was associated with a marked increase in uptake of these machines into the agriculture and horticulture industries in Australia. The report was published in 2000 (Schalk and Fragar, 2000).

Over the next few years, the Farmsafe network became aware of a growing number of deaths associated with ATVs on farms. Deaths were being reported from coroners and from states' work safety authorities. At the same time, the international injury prevention literature was reporting on the problems of deaths associated with ATVs.

This document reports on the information and processes used in development of a multifaceted approach to reducing risk of death and serious injury associated with ATVs on farms across the major sectors.

Farmsafe Australia Incorporated is an association whose member agencies have formed a partnership between agriculture industries and other agencies that share a commitment to improving the health and safety of those whose life and work is in agriculture. Member agencies of Farmsafe Australia work to pursue a strategic approach to reducing injury and illness associated with specific hazards that are common to all agricultural sectors.

Farmsafe Australia sees reduction of deaths and serious injury associated with ATVs as a major issue for the agriculture and horticulture industries. This strategy has been developed under the direction of a Reference Group that will continue to oversee implementation of an Action Plan to see adoption of key recommendations.

## 2. Objectives

The aim of this project was:

To establish a national framework for development and oversight of a national strategy aimed at reducing risk of death and serious injury associated with operation of ATVs on Australian farms.

It was expected that development of the Strategy would involve:

- Review of the data and research findings relating to the nature and scale of the injury problem
- Review of the key uses of ATVs in agriculture and horticulture in Australia
- Review of currently available ATV operator training and its relevance to reducing injury risk
- Review of helmet standards for use on farm motorcycles
- Review of design options for improved safety, including ROPS design research that is, or has been undertaken.
- Development of evidence based strategic approaches to reduce death and severe injury

# 3. Methodology

## 3.1 Definitions

### *What is an ATV?*

For the purpose of the program, All-terrain Vehicles (ATVs) are specifically designed motorized machines that operate on four low pressure, high flotation tyres. They have a saddle-type seat that is designed for a single operator, handlebars for steering control and may be either 2- or 4-wheeled drive.

ATVs are in widespread use on Australian farms. Their use includes:

- Personal travel around the farm
- Mustering of livestock
- Supervision of working field crews
- Inspection of crops, pastures, fences, water and livestock
- Towing and carrying of goods
- Spraying of small areas of weeds
- Shifting irrigation pipes



### *What is an ATU?*

All-terrain Utilities (ATUs), are other small vehicles designed for off-road use. They often have a bench-type seat, have a steering wheel and are designed to transport more than one person.



While ATUs are not in as common use on Australian farms as ATVs, some farms have moved over to using ATUs as a safer option, particularly for transporting horticultural produce.

## 3.2 Establishment of the ATV Safety Reference Group

At its meeting in April 2003 Farmsafe Australia noted that Farmsafe Australia had previously resolved that a nationally agreed approach was necessary to prevent serious injury and deaths associated with ATV use on farms. This was to be considered in the context of the use of ATVs in various commodity groups, and of the evidence supporting prevention action. A submission had been made to the Rural Industries Research and Development Corporation (RIRDC) to fund the development of an industry supported strategy to reduce injury and death due to ATV operation on farms in Australia. The meeting was advised that RIRDC had advised that funding support will be made available to assist in the development by the agriculture/horticulture industries in an agreed strategy to reduce risk of injury and death associated with ATVs on farms.

To this end a Reference Group was to be established to consider the industry use of ATV's and to consider moves being made by ATV manufacturers, suppliers and others in reducing injury risk associated with their use on farms.

1.

Members of the ATV Safety Reference Group included the Chair and Deputy Chair of Farmsafe Australia, the National Farmers Federation, practicing farmers nominated by AgForce (Queensland), Northern territory Cattle Council, Cotton Australia, Victorian Dairy industry, NSW Farmers Association, Worksafe Victoria, NSW State Farm Training Centre, Australian Centre for Agricultural Health and Safety. (The Tractor and Machinery Association and Farmsafe Queensland were later invited to membership.)

2. The meeting was further advised that the Coroner of Victoria has announced a coronial inquest and review of deaths associated with ATVs in that state and in Tasmania.
3. It was planned to convene the ATV Farm Reference Group to begin review of available information, and to initiate consultation with users in the key commodity groups re the use of ATVs in each industry. Results from the Coronial review will be considered by the Reference Group and incorporated into its outputs.

Terms of Reference for the reference Group were noted and accepted

### **3.1.1 Terms of Reference**

Farmsafe Australia provided the following Terms of Reference for the work of the Reference Group :

*To oversee the development of a Farmsafe Australia National Strategy for Prevention of Serious Injury associated with use of ATVs on farms.*

*Development of the strategy will involve:*

- *Review of the data and research findings relating to the nature and scale of the injury problem*
- *Review of the key uses of ATVs in agriculture and horticulture in Australia*
- *Review of currently available ATV operator training and its relevance to reducing injury risk*
- *Review of helmet standards for use on farm motorcycles.*
- *Consultation with ATV manufacturers and suppliers regarding recommendations for reducing injury risk*
- *Review of design options for improved safety, including ROPS design research that is or has been undertaken.*
- *Development of evidence based strategic approaches to reduce death and severe injury.*

The Terms of Reference were considered at the first meeting of the Reference Group and adopted.

### **3.1.2 Review of available information and data**

The Reference Group considered information prepared to provide it with relevant information upon which to base an effective strategic approach These included:

#### ***ATV briefing paper***

A Briefing Paper was prepared for the first meeting of the Reference Group (Australian Centre for Agricultural Health and Safety, 2003). That paper summarised the available Australian data, with a view to defining the known risk factors of importance for prevention of injury and death. Risk factors were considered in relation to:

- Human and behavioural risk factors
- Machine risk factors

- Environmental risk factors, and
- Mechanisms of injury.

Possible approaches to prevention being considered by the Reference Group were using the “Hierarchy of Control” framework that underpins states’ occupational health and safety (OHS) legislation, viz:

1. Elimination of the hazard
2. Substitution for hazards of lesser risk
3. Design for safety
4. Administrative/ practice, including skills assessment, training and supervision
5. Personal protective equipment
6. First aid

As the work of the Reference Group progressed, information regarding further deaths became available and the National Farm Injury Data Centre provided updated information to the reference Group.

### ***Victorian State Coronial Enquiry into ATV deaths***

In addition to the information that was available in collated form , the Reference Group had available more detailed information relating to 8 deaths being considered by the Victorian Coroner as having been associated with operation of ATVs. This information included descriptions of the settings and circumstances of those deaths, and transcripts of proceedings of the enquiry.

This material was an important source of information that the Reference Group used to consider whether any of the interventions being considered as important to prevent serious injury and death would have been effective in preventing those deaths.

### ***Review of current uses of ATVs in differing farm production systems***

At the first meeting, the Reference Group agreed that further information should be gathered in relation to current uses of ATVs in different production systems. The Reference Group identified a number of regional centres that would be the focus for meetings with producers, aimed at describing the range of uses that ATVs are put to for production of key commodities.

The Australian Centre for Agricultural Health and Safety undertook this work and provided a report to the Reference Group.

### ***Review of head injury and helmet options to prevent head injury***

As head injury was identified as contributing to a number of deaths associated with ATV use, further information regarding the nature and mechanism of head injuries, and of helmet options was gathered and reported to the Reference Group.

### ***Peer reviewed literature and other reports***

In the course of development of the information base and potential options for reducing ATV injury, access to the peer-reviewed literature and other reports was made by the Australian Centre for Agricultural Health and Safety. A list of key references is attached to this report.

### **3.3 Development of a framework for a National Strategy**

The Reference Group worked through the available information to determine what on-farm action would be necessary and effective in reducing risk of serious injury and death associated with ATV use.

On the basis of these considerations, and taking into account current gaps in knowledge, a national strategy was developed, with the aim of achieving those changes on farm enterprises.

# 4. An overview of the safety problem of ATVs on Australian farms

## 4.1 Aim

This report was prepared to provide background information to members of the Farmsafe Australia Reference Group being convened develop a national approach to reducing death and serious injury associated with ATV operation on Australian farms.

The briefing paper summarises available information as at May 2005. It is noted that the Victorian Coroner is undertaking a coronial investigation into 6 deaths associated with ATVs in Victoria and 2 in Tasmania, and that further information may be available following that investigation.

## 4.2 The problem

### 4.2.1 Deaths and serious injury

*There are around 10 deaths associated with ATVs occurring each year in Australia, most associated with ATVs used in agriculture and horticulture.*

There is a growing concern world-wide over the number of deaths and serious injury occurring in association with ATV operation in the context of agricultural use, as well as in the context of leisure use of the machine (CDC, 1999; Moroney et al, 2003).

ATVs are in widespread use on Australian farms. They are used for:

- Personal travel around the farm
- Mustering of livestock
- Supervision of working field crews
- Inspection of crops, pastures, fences, water and livestock
- Towing and carrying of goods
- Spraying of small areas of weeds
- Shifting irrigation pipes
- Markers for aerial operations
- Recreation

The actual number of deaths associated with ATV operation in Australia is not immediately available to the Australian Centre for Agricultural Health and Safety. A *Register of ATV Deaths* has been established, that has identified 59 cases from July 2000 (as at May 2005). The level of detail pertaining to these cases is very variable. Cases have been derived from:

- The National Coronial Information System - 57 deaths associated with ATVs in that database between 2000 and 2005.
- Five cases reported in the press as a farm death, not yet in the National Coronial Information System (NCIS).

It is estimated that there may be around 10 deaths associated with ATV use on farms annually, bearing in mind that Queensland, Tasmanian, South Australian, Western Australian and Northern Territory cases are underrepresented in this limited register of ATV deaths.

This represents an increase in annual death rates since the national enumeration of such deaths on farms for 1989-1992, when 4 deaths occurred during the 4 years – i.e. 1 per annum (Franklin et al, 2000).

The increase is assumed to be related to the increase in numbers of ATVs in use on

Australian farms.

Of ATV riders surveyed by Schalk and Fragar (2000), 8.2 percent had suffered injury associated with riding the ATV in the previous 2 years. Of 612 motorcycle riders reported by the women on 182 farms, 8.4 percent were injured while riding an ATV in the previous 2 years.

Injury events occur through a complex interaction between the person, the agent of injury and the operating environment. We have attempted to identify risk factors for ATV associated death and serious injury from the information that is available. The following information has been distilled from analysis of the information relating to all ATV-related deaths and from the study of motorcycle riders and injury associated with motorcycles undertaken by Schalk and Fragar.

#### 4.2.2 Human and behavioural risk factors

The following provides information relating to human risk factors.

##### 1. Age and use

*Riders of all ages are at risk of death, and risk most likely reflects exposure i.e. the age range of those who have died broadly reflects the age distribution of farmers.*

*The majority of those who have died were ATV riders; however passengers (and bystanders) are also at risk.*

The following table indicates the age of those who died as a result of ATV-related activity, where age is known.

<b>Age of victim - deaths</b>						
<b>Age (years)</b>	<b>Operator</b>	<b>Passenger</b>	<b>Bystander</b>	<b>Other</b>	<b>Unknown</b>	<b>Total</b>
0-5	2	4			1	7
6-15	5	2			2	9
16-25	7	1		1*		9
26-45	7					7
46-65	17					17
+ 66	10		1		1	12
Unknown	1					1
<b>Total</b>	<b>47</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>62</b>

Source: ACAHS ATV Deaths Register

The rate of injury associated with ATV riding was shown to decline with rider age in the Schalk and Fragar study.

##### 2. Gender

*Most of those who died were males, but females are also at risk*

Eight of the 62 victims were female; 2 were child passengers, 2 were riders in their fifties, 1 was a rider aged more than 65 years; 1 was a bystander and in 2 cases were unknown.

### 3. Competency and training

*Information regarding training and rider skills of riders associated with ATV-related deaths is only available for 8 deaths before the Victorian Coroner, where no rider had undertaken formal training.*

There was limited information relating to rider training or skills deaths database, although several narratives indicated that farmers had purchased their ATV in the last 12-24 months.

Over 97% of motorcycle riders (2 and 4 wheeled cycles) reported in the rider survey (Schalk and Fragar) that they had never participated in a formal motorcycle rider training course.

### 4. Activity being undertaken

*ATV-related deaths are associated with a wide range of work activities in agriculture and horticulture, including mustering, spraying pesticides, transporting and travelling on the property.*

*There are significant numbers of deaths associated with leisure operation of ATVs.*

Agricultural and other activity being undertaken by the deceased is indicated in the following table.

<b>Work context of activity of victim</b>				
<b>Industry and Activity</b>	<b>Work Context</b>	<b>Leisure Context</b>	<b>Unspecified Context</b>	<b>Total</b>
<b>Agriculture</b>	<b>34</b>	<b>2</b>	<b>5</b>	<b>41</b>
Weed Control	9			
Mustering/herding/drafting	7			
Inspecting property	2			
Structure maintenance	1			
Transporting materials	1			
Hunting	3			
<b>Non agricultural</b>	<b>1</b>	<b>7</b>	<b>2</b>	<b>10</b>
Transport	1			
<b>Unknown industry</b>		<b>1</b>	<b>10</b>	<b>11</b>
<b>Total</b>	<b>35</b>	<b>10</b>	<b>17</b>	<b>62</b>

Source: ACAHS ATV Deaths Register

### 5. Speed

*More information relating to speed of ATV at time of injury event is needed.*

Only eight of the 62 cases had information on speed of the ATV at the time of incident;

- 1 case was estimated to be travelling at 15 kph
- 1 case was estimated to be travelling at 40 kph
- 1 case was estimated to be travelling at 40-50 kph
- 1 case had the throttle jammed on 'full'
- 3 cases were reported to be travelling at 'speed' or 'high speed'

Schalk and Fragar surveyed riders regarding the average and maximum speeds in relation to their agricultural industry. There was wide variation, with 80% of riders operating their cycles at average speeds of less than 50 kph, except in cane and cotton where speeds are reportedly higher. Animal handling industries tended to use lower speeds compared to cropping industries, with dairy industry reports the lowest.

The majority of motorcycle accidents reported by riders occurred at speeds of less than 30kph.

## **6. Alcohol and other drugs**

*More information is needed relating to the role that alcohol and other drugs may play in ATV-related deaths and serious injury*

There were eight cases where alcohol and/or drugs were detected. Of these cases, 7 of the deceased were the operators of the vehicle and 1 was a passenger. In the case of the passenger, the operator of the vehicle also tested positive to alcohol. Further information relating to alcohol use should be available to the coroner.

### **4.2.3 Machine risk factors**

#### **1. Size and make/model of machine**

*More information is needed relating to injury risk associated with size and design features of ATVs*

Information relating to the engine capacity of only 13 ATVs associated with death was available:

- Suzuki 500 – Two rollover deaths
- Polaris Sportsman 500 (6x6) – One rollover death
- Honda 450 – One rollover death
- Yamaha Kodiak 400 – One rollover death
- Yamaha 400 – One collision with vehicle death
- Honda TRX 350 – One death thrown from ATV
- Yamaha YFZ 350 – One death thrown from vehicle after collision
- Polaris Magnum 330 – One rollover death after collision with fence
- Suzuki 330 – One death from collision with fence
- Suzuki 250 – One rollover death
- Yamaha 250 – One death thrown from ATV
- Suzuki 160 – One rollover death

#### **2. Rollover and rollover protection of operator**

*There is a propensity for ATVs to rollover and cause serious injury to riders.*

There are 26 cases within the ATV Deaths Register that relate to the ‘rollover’ of the ATV. Of these; 5 were side rollovers, 4 were rear rollovers and the remaining 17 are unspecified. No information was available relating to whether there was fitment of any form of roll-over protective structure, which are not commonly used in Australia.

#### **3. Loading of machines**

*Loading of the ATV has been associated with rollover deaths. More information is needed to understand the role that loading plays in ATV rollover.*

One of the deaths associated with ATV rollover had used the machine for carrying steel posts. Six deaths associated with rollover referred to spraying weeds or having a spray tank, but limited detail was available. One of these spray tanks was noted to be 200L in capacity, with an estimated 80L of chemical. Another 50L spray tank was reported to be full.

There were nine deaths involving a passenger being carried on the ATV and one involving two passengers being carried on the ATV.

#### 4. Maintenance of machine

In one death, where the victim was flung over the ATV and crushed between the machine and a wall, it was noted that the brakes had needed attention, and that the throttle was jammed on full. Another case reported wear to front and rear suspension and a broken exhaust system

The Schalk and Fragar study reported that poorer ATV maintenance regimes were associated with higher injury rates than those whose maintenance were more timely.

#### 5. Other

In one death, it was noted that a tree branch had pierced the rear tyre causing the ATV to veer and crash.

#### 4.2.4 Environmental risk factors

*Terrain, slope and surface appear to play a key role in ATV-related deaths, and it appears that there are terrain limits for operation of so-called “all-terrain vehicles”.*

##### **Slope of terrain at site of ATV fatal incident (Jul 2000 to May 2005)**

<b>Slope of ground at accident site</b>	<b>No. of Cases</b>
Steep	18
Undulating	1
Slight (less than 30 degrees)	3
Level	4
Unknown/Not recorded	36
<b>Total</b>	<b>62</b>

Source: ACAHS ATV Deaths Register

##### **Ground Surface at site of ATV fatal incident (Jul 2000 to May 2005)**

<b>Ground surface at accident site</b>	<b>No. of Cases</b>
Unsealed roadway or lane	11
Paddock	18
Embankment	8
Shed/garage	3
Urban road	4
4WD Track	1
Beach/sandy track	2
Airstrip	1
House yard	1
Cattle yard	1
Driveway	1
Unknown	11
<b>Total</b>	<b>62</b>

Source: ACAHS ATV Deaths Register

## 4.2.5 Mechanisms of injury and body part injured

*The mechanism of injury in the majority of cases was noted to be blunt force with the body part crushed between ATV and the ground or other surface, or contact of the body with a rock or tree or other surface, having been flung from the ATV.*

*The body part injured and associated with death was mostly the head and cervical spine, crush injuries and asphyxia.*

### Cause of Death (1a)

Category	Injury	ICD 10 Code	No. of Cases
<b>Circulatory System</b>	Acute myocardial infarction	I21	1
	Chronic ischaemic heart disease	I25	1
	Cardiac Arrest	I46	1
<b>Head Injury</b>	Fracture of skull and facial bones	S02	3
	Intracranial injury	S06	6
	Other and unspecified injuries of the head	S09	7
<b>Neck Injury</b>	Fracture of Neck	S12	4
	Injury of nerves and spinal cord at neck level	S14	1
	Injury of blood vessels at neck level	S15	1
	Crushing injury of neck	S17	1
	Other and unspecified injuries of neck	S19	1
<b>Thorax Injury</b>	Injury of other and unspecified intrathoracic organs	S27	3
	Crushing injury of thorax	S28	7
	Injury of blood vessels at hip and thigh level	S75	1
<b>Hip/thigh Injury</b>	Injury of blood vessels at hip and thigh level	S75	1
<b>Multiple Injuries</b>	Unspecified multiple injuries	T07	8
<b>Unspecified</b>	Injuries of spine and trunk, level unspecified	T09	1
<b>Other</b>	Asphyxiation	T71	9
	Unknown		6
<b>Total</b>			<b>62</b>

Source: ACAHS ATV Deaths Register

In the Schalk and Fragar study of injury, riders injured on ATVs reported sprains (25.6%) and fractures (23.4%), whereas riders injured on 2-wheel motorcycles commonly sustained cuts/lacerations (23.5%). Bruising was an injury common to both machines with 23.4% and 22.3% of injured riders sustaining bruising on ATVs and 2-wheel motorcycles respectively. Lower leg injuries appear to be common for both ATV and 2-wheel motorcycle riders, although the percentage of injuries received varies considerably, 14.9% for ATVs and 21.6% for 2-wheel motorcycles. It was also observed that ATV riders commonly sustained injuries to the upper body, shoulder (12.8%) and wrist (8.5%), and trunk, ribs (10.6%), whereas 2-wheel motorcycle riders sustained injuries to the lower body, upper leg (11.0%) and ankle (10.0%).

Injury from ATVs occurred mainly due to rolling the machine (22.8%), hitting a stationary object (18.2%) or human error (11.4%). Human error has been defined for the survey as an incorrect action performed by the rider which has resulted in a detrimental effect, for example jamming the brakes on resulting in a skid.

## 4.2.6 General

These findings relating to Australian agriculture are consistent with the findings of a report by Rechnitzer et al (2003) that described findings for 24 ATV deaths in the NCIS system, as well as data from the United States and New Zealand.

## 4.3 Options for reducing risk of serious injury and death

OHS legislation and good injury prevention practice indicate that where possible, hazards of high risk should be controlled by “higher order” controls i.e. controls that do not depend on the day to day behaviour of operators or bystanders to ensure their safety.

This report has therefore used the Hierarchy of Control of workplace injury to consider the options for reducing risk of death and serious injury associated with ATV operation in Australia.

### 1. Eliminate the hazard

and

### 2. Substitute for a hazard of lesser risk

The use of ATVs has been well established in Australian agriculture and horticulture. However, current uses in these industries need to be reviewed to determine whether these uses are sustainable in light of the real risk of death and serious injury.

Use of ATV's in all terrains for such activities as mustering, spraying and transporting loads should be reviewed by the specific agricultural industries to determine the most appropriate vehicles and machines for these activities.

### 3. Improved design/ engineered solution

ATVs have undergone changes in the past, with the move away from manufacturing of 3-wheeled machines, improved foot and leg protection.

#### ***Reducing risk associated with rollover***

However, the propensity of the ATV to rollover needs to be addressed with either the design of an effective rollover protective structure for the ATV as it is currently designed, or, design of a vehicle that can be used for the key operations defined by the agricultural industries without risk of rollover injury.

#### ***Reducing risk of rider being flung from the ATV***

Similarly, the number of deaths associated with being flung from the ATV need to be addressed in future design of the vehicle.

### 4. Administrative controls/ safe practice

Administrative controls that should be put in place have been defined by an interagency task force in New Zealand (OHSS, 2002). These should be reviewed in the light of Australian experience and the evidence for effectiveness. Key controls include:

#### ***Age of operators***

Manufacturers of ATVs advise against young people less than 16 years riding ATVs, and this is supported by data on injury found by Schalk and Fragar (2000).

Effective ways of ensuring that children are not put at risk in the farm setting need to be identified and implemented.

### ***Competencies for safe operation***

Competency standards for operation of ATVs have been produced by the Rural Training Council of Australia, and are in use in rural vocational training programs. These need to be reviewed in light of the defined risk factors for ATV-related injury and death, and competency requirements for safe operation established.

Practical and effective ways of delivery of training and assessment of competencies need to be identified and implemented.

### ***No passengers***

ATVs are not designed for passengers, and carrying passengers increases risk to both operator and the passenger.

Practical and effective ways of ensuring that passengers are not carried on ATVs in the farm workplace need to be identified and implemented.

### ***Loads***

The specifications for safe loads to be carried or towed need to be established for the uses and conditions of operation.

Practical and effective ways of ensuring that load limits are not exceeded need to be identified and implemented.

## **5. Personal protective equipment**

Head injury is associated with a significant number of ATV-related deaths.

Helmet standard specifications need to be established for safe use and conditions of different operations, including speed and risks associated with oncoming traffic.

Practical and effective ways of ensuring that helmets conforming to specified standards are worn during ATV operations need to be identified and implemented.

## **6. First aid training**

Systems for effective emergency response, including access to people with first aid skills is a requirement for farm workplaces and practical ways to assist access to first aid training by farmers and farm workers need to be identified and implemented.

## **4.4 Data issues**

### **1. Improved data collection relating to ATV deaths and serious injury**

The National Farm Injury Data Centre has established a Register of ATV Deaths and serious injury and has defined the data items needed to define key risk factors which, if addressed, could reduce risk. Data items are listed in Attachment 1.

Persons investigating ATV deaths should be requested to provide this information to the National Farm Injury Data Centre

# 5. Current uses of ATVs on Australian farms

## 5.1 Background

In 2003, the ATV Safety Reference Group had acknowledged the growing problem of ATV-related deaths on Australian farms, had considered data reported earlier in this report as a briefing paper (Australian Centre for Agricultural Health and Safety, 2003) had been provided to the Reference Group with a summary of information about ATV risk on Australian farms in relation to:

- Human and behavioural risk factors
- Machine risk factors
- Environmental risk factors, and
- Mechanisms of injury.

Possible approaches to prevention being considered by the Reference Group were using the “Hierarchy of Control” framework that underpins states’ occupational health and safety (OHS) legislation, viz:

7. Elimination of the hazard
8. Substitution for hazards of lesser risk
9. Design for safety
10. Administrative/ practice
11. Personal protective equipment
12. First aid

Further information was required by the Reference Group for further development of specific recommendations for a multifaceted approach to ATV injury risk reduction. Information requirements included a review of the *key uses* of ATVs in agriculture and horticulture in Australia. This section reports findings from farm ATV operators’ perspectives on the role that ATVs currently play in the various agricultural production systems, mode of operation that has bearing on injury risk and prevention, and on potential options being considered for ATV injury risk reduction.

## 5.2 Aim

The aim of a small study was to define the uses of All Terrain Vehicles (ATVs) in the agricultural production systems in Australia, and to describe key modes of operation of importance to reducing risk of serious injury and death associated use of ATVs on Australian farms.

## 5.3 Method

Information that was collated to form this report was derived from a small number of publications and data sources, and from records of recent cases where farm employers have been prosecuted in relation to serious injury and deaths of workers operating ATVs on farms.

In addition, a series of meetings were held with Industry Advisory Groups in the following areas:

Griffith (NSW)	Rice, horticulture, sheep/cattle producers
Young (NSW)	Stone fruit, sheep/cattle producers
Goondiwindi Queensland)	Sheep/cattle, cotton producers
Roma (Queensland)	Sheep/cattle, grains producers
Benalla (Victoria)	Dairy producers

The aim of these meetings was receive information from practicing farmers in key agriculture and horticulture industries to better define the uses to which ATVs are put, options available to undertake these activities, and design requirements for machines to undertake these operations.

## 5.4 Findings

### 5.4.1 ATV role in agricultural production

#### ***Number of ATVs on Australian farms***

The number of ATVs on Australian farms has grown over the past decade. In 1994 attendees at major field days in NSW reported between 10 and 13.3 ATVs per 100 farms with increasing numbers with increasing size of farm (Schalk and Fragar, 2000). In 1997/1998, 2816 of 17494 respondents in the NSW Health Survey reported that their home was on a farm, farmlet or rural property (NSW Department of Health, 2004). Of these, 20 percent reported at least one ATV in use on the farm, with the number of ATVs ranging from 1 to 10 per farm.

Farmers in western Queensland and western NSW reported that typically there are 2-3 ATVs on each sheep/cattle property. Dairy farmers in Victoria reported that 1-2 per dairy farm would be typical, but could range from 1-4.

Rice growers reported that farms would typically have 1 ATV with bigger enterprises having more. Horticulturalists in the Young district of NSW reported 3-4 ATVs in use on blocks up to 40 ha, and horticulturalists in south western NSW reported 1 per block as being typical.

Cotton enterprises may operate 1-4 or more ATVs.

#### ***Production tasks undertaken using ATVs***

ATVs are used for a range of tasks in different agricultural industries in Australia.

##### *Livestock industries*

Beef cattle and sheep producers report that ATVs are routinely used for checking water, fences and stock, starting bores, carrying dogs and other materials such as fly strike treatments and fencing materials and ATVs may be used for boom and spot spraying of weeds. These jobs were previously undertaken using 2-wheelers, utilities and tractors.

ATVs are in widespread use for sheep mustering although some properties still use horses for cattle work, 2-wheel motorcycles (*“more flexible in Mitchell Grass country”*) and *“utes and dogs”*.

The most critical job reported for these industries, and where ATVs come into their own, is in flood mustering and work in wet and muddy conditions.

In the dairy industry ATVs are used for bringing in cows on a twice daily basis, for carrying calves and hay and for boom and spot spraying of weeds. These tasks were previously undertaken using 2-wheelers, utilities and tractors.

##### *Cropping industries*

In the horticulture industries ATVs are typically used for carting fruit and vegetables (often by pulling trailers carrying lugs [30lb boxes]), spot spraying of weeds, carrying pruning gear, moving irrigation gear and supervision of workers. These jobs were previously undertaken using tractors and utilities.

ATVs are used on cotton farms for spot and boom spraying of irrigation channel banks, transporting materials around the farm – towing some equipment. The most important job is *“getting to a breakdown or blow-out when it has rained”* as the ATV is good in wet and muddy conditions.

Similarly in the rice industry, ATVs, often fitted with narrow tyres, are used for spraying banks for weeds and also for spraying rice paddies for weeds and eg for blood worm, and carrying equipment.

Spraying was undertaken manually before the ATV, and is sometimes still done using a “Herbigator” manual pack.

In the grains industries ATVs are used for checking and carrying items.

### **Leisure use**

All participants in the industry Advisory Groups reported that leisure use of ATVs was minimal and represented a small proportion of use, and then mostly by children, often visitors. The ATV is “*mainly a workhorse*”.

Dairy farmers reported that if farm child family members are using the ATV it is more likely to be in the work context - “ATVs are dirty machines in the dairy industry”.

### **Machines and maintenance**

The whole range of size and makes and models of ATVs are in use on Australian farms.

Cattle properties and cotton and rice farmers reported tendency to larger machines, while the fruit growers and dairy farmers reported mid-range sizes.

ATVs may be kept “*until they die*” with farmers reporting their life as typically 2-4 years, although they may be operated for up to 10 years.

Routine basic maintenance such as oil change is undertaken on the farm, with off-farm maintenance being undertaken when needed. A few farmers reported “*Once a year go over by the mechanic in town*”.

Most groups reported that maintenance is not undertaken as well or as often as for larger machinery, and that often maintenance on eg brakes is neglected.

Farmers in most groups reported that pillion passengers are sometimes transported on the ATV, “*but is the exception rather than the rule*” and “*despite the manufacturers don’t allow it*”. Passengers may be transported “*to take another worker out to the job*”. One cotton farmer reported “no passengers except possibly during a flood”.

Design features that participants would like attended to for ATVs included:

“*Improved racks*”

“*Better balance so that the ATV won’t roll so readily*”

“*Better positioning of the tow-ball – too low for the trailer*”

“*Puncture resistant tyres for tree cropping – spikes from plum trees*”

“*Believe thumb-controlled throttle potentially poses RSI risk*”.

### **Loads and towing**

The majority of farmers in the industry Advisory Groups did not know the load limit for their ATV, and some did not know where to look for the load limit advice of manufacturers.

Spray tanks were reportedly mounted on the back of the ATV and most of the participating farmers reported fitted tanks of either 60L or 100L capacity. One reported 100L on the back and 50L on the front. One reported having a 120L baffled tank – fitted out by the local engineering firm.

Some farmers in the horticulture industries reported towing misters behind the ATV for pesticide application in vineyards.

Other loads that are commonly carried on ATVs include dogs in the livestock industries, and sheep and calves that need attention in the sheep, cattle and dairy industries. One dairy farmer recounted his story of a newborn calf kicking the throttle and getting the ATV moving and out of control.

Dairy farmers reported towing round hay bales. One farmer recounted losing control, going too fast, too sharp a corner on loose surface. He was not aware of the towed load limit of the machine.

Farmers in the cropping industries reported carrying fencing gear, steel pickets, irrigation pipes and other gear.

The horticulture industries typically use ATVs to tow small trailers with fruit and vegetables in lugs or crates.

### ***Speed of operation***

The survey of motorcycle riders (both 2- and 4-wheeled machines) of Schalk and Fragar (op cit) provided reported average and maximum speeds of operation of motorcycles, but did not separate the two types of machines.

That report indicated that reported average speeds were lower in the dairy and horticulture, with only 1.7 percent of rider in the dairy industry exceeding 40kph average speeds, while 23.6 percent of riders in cereal grains, 13 percent of riders in sheep/cereal grains and 4 percent of riders in sheep/beef cattle reporting riding at average speeds over 40 kph.

Maximum speeds exceeded 60 kph for 70 percent of riders in the sheep/grains industry, and for 45.5 percent of riders in the sheep/beef cattle industry but for only 12.7 percent of riders in the dairy industry and 13.7 of riders in the horticulture industries.

Advisory Group participants in the livestock industries, including dairy, reported that ATV are ridden at high speeds (up to 60 kph) to the work site, then at lower speeds when working with livestock.

For the cropping industries, the rice industry participants reported speeds of up to 70-80 kph to the job, then 20-30 for the job, while the horticulture participants reported much lower speeds 20-30 kph to the job and 10 kph for the job. One cotton farm reported a speed limit for riders of 60 kph, and one horticulture enterprise a limit of 28-10 kph.

### ***Operating environments***

ATVs are operated in a wide range of terrain and slopes.

All the livestock industries report operation in flat and hilly country, including the dairy industry. Riders in the sheep/cattle industry reported hazardous conditions where there has been rain with high grass – one participating farmer had hit a stump while mustering through high grass.

Riders in the dairy industry reported use of the ATV in all weather and often in the darkness during winter mustering and at calving, using a torch as a spotlight.

While participants in the horticulture industries reported using ATVs generally in flat or mildly undulating country, riders in the rice industry reported use on rice banks that can have steep and soft edges and riders in the cotton industry use ATVs along irrigation channels and on head ditches that can have sloppy and crumbly surfaces. Participants noted that banks can be “slimy” when wet.

### ***Rider characteristics, induction and training***

Farmers and family member workers are reportedly key riders in the livestock industries with variable numbers of employees and contract musterers and milker contractors depending on the size and structure of the of the enterprise.

Similarly owners and variable numbers of workers are riders in the cropping industries.

The age range of working riders ranges from late teens to more than 70 years.

No formal training in ATV operation was reported by any participant in Advisory Groups with the exception of a training program undertaken by riders of any ATV and/or All Terrain Utility (ATU) on a larger corporate horticulture and sheep enterprise, and a cotton enterprise where the *“farmer had no training. Workers are trained before operating ATV, including where they can be ridden and PPE expectations. Knowing what terrain can be safely ridden is an essential skill to be developed”*.

A common experience was that *“I got on and rode”*. *“Balance of the ATV is much easier than the 2-wheeled motorcycle”*.

Knowledge of how to access an ATV training course was almost non-existent for most Advisory Group participants.

Advisory Group participants generally (with some exceptions) found it difficult to articulate the key skills requirements for ATV riders.

A common position was that rider skills can only developed by trial and error.

- *“Develop skills by trial and error – the hard way.”*
- *“Comes down to common sense of operator”*.
- *“Most people are experienced riders”*
- *“Mustering operators bring their own gear”*
- *“Less experienced workers receive grater degree of supervision”*

Specific suggestions as to the critical skills required for safe ATV operation included:

For new workers:

- Assess terrain
- Give them a workout
- Stress difference between 2 and 4 wheelers
- Don't put foot down if rolling.
- Handling
- Placement of loads
- Turns at what speed
- Maintenance - brakes

*“See a demonstration, how easy to topple”*

*“Take your time, Don't rush into job.”*

*“Don't operate in uneven, steep terrain”*

*“Communicate information about serious incidents more widely”*

*“If feels unsafe don't do it”*

*“Use the machine as a work vehicle for job described, and eg don't hoon around coming back from the job”*

How do you teach the kids? – *“no passengers, load limits, know how to ride”*.

While there was general agreement that *“knowing what terrain can be safely ridden is an essential skill to be developed”*, participants generally could not describe in practical terms how a rider should judge when the terrain is too steep, when the load is unsafe and when there is high risk of rollover.

The larger corporate enterprises were more orientated to provision of formal safety induction for new workers than smaller family farm participants.

The importance of induction and training of workers has been highlighted by a number of recent successful prosecutions of employers under relevant state Occupational Health and Safety Acts relating to ATV deaths and serious injury, where lack of induction and training of the injured or deceased employee to safe operation of the ATV in the particular farm workplace, even though the employee in each case had previous experience in ATV operation. Heavy emphasis in these cases has been placed on induction to the use of the ATV in all areas of the farm, and the importance of a thorough knowledge of paths and roads and areas of the farm that are considered safe for use of the ATV.

### **Helmet use**

Use of helmets was reportedly rare across all industries.

Typically the reasons offered were:

- Too hot
- Too heavy
- Can't hear
- Can't see
- Uncomfortable
- Need a wide hat
- Believes employees will just not wear them.
- Would need greater shade and ventilation

*"Not used on this farm. Had used helmets on other farms – reason for non-use was the heat."*

When questioned on whether a more suitable helmet, that allowed for ventilation would be used, eg the current equestrian helmet, it was generally accepted that this would *"be OK – camp drafters use helmet"*

### **5.4.2 Substitution options**

Participants in the Industry Advisory Groups were asked to consider what practical alternatives they would consider in situations where it is judged that ATVs pose too great an injury risk to the operator. Substitution options differ between the production systems.

Beef cattle and sheep producers indicated that return to horses and 2-wheeled motorcycles for mustering would be considered. However, for mustering of sheep, the horse option is not as good as the ATV, and it was noted that the pool of horses has been reduced significantly and it would almost impossible for wholesale return to that option.

Utilities were considered practical for carrying and spraying (the Suzuki utility was highly regarded as an option for a number of participants), it was noted that *"utes are better for carrying dogs and where cold exposure is a problem"*. *"Hilux or Suzuki ute for cattle work – good for mustering cattle, are roadworthy can carry larger loads, light enough to move from bogs"*. *"Seriously considered helicopter"*.

In the cropping industries the most likely substitution option would be the farm utility and/or tractor for carrying and for spraying.

For horticulture industries there was interest in some of the ATUs as potentially safer options if ROPS and seat restraints can be installed. One company has replaced most ATVs with John Deere Gators for transporting produce (See Case Study below).

A cotton grower indicated that *"After looking at Polaris Ranger and Kawasaki Mule think they may be able to perform similar role"*

ATUs were considered “*costly*”.

### 5.4.3 Modification of the ATV with ROPS and seat belt restraint

Participants were asked to consider whether jobs would be difficult if ATVs (or ATUs) were fitted with a properly designed ROPS and restraint system.

For the beef cattle and sheep industries it was considered that mustering in timbered areas would hinder work, depending on the height of the ROPS, but “*would be an inconvenience, not a restriction*”.

A restraint system would be an annoyance for opening gates, manoeuvring and mustering, but “*would prefer legislation requiring seatbelts rather than legislation prohibiting use of ATVs on farms*”.

For the rice producers, ROPS would not be a problem. It was considered that restraint systems could pose a risk of drowning if the machine rolls into water.

Of the horticulture producers some considered that a ROPS would be “*OK if trees are pruned properly*” while others felt it would be “*difficult for spraying in light of branches*”. As for restraint systems - “*Probably OK - Rigid form would be best*”.

Cotton growers considered that “*if ATVs had different seat a ROPS may work, bucket seat with high back and a belt*”. “*A seat belt could pin operator between bike and stationary object. Would need a caged area to protect rider from objects*”

## 5.5 Summary

The findings of this study have relevance for the risk control approaches that are currently available to farmers, and to the Australia-wide strategic approaches being considered by the ATV Safety Reference Group to be put to Farmsafe Australia.

Farmers as employers are required under states’ OHS regulations relating to use of Plant in the workplace as follows (National Standard for Plant (NOHSC:1010(1994))

- (1) Where an assessment under identifies a requirement to control a *risk* to health or safety, that *risk* must be eliminated or, where it cannot be eliminated, *minimised*.
- (2) To *minimise* the *risk* to health and safety, one or a combination of the following approaches must be used:
  - (a) substitution of the *plant* by less hazardous *plant*;
  - (b) modification of the design of the *plant*;
  - (c) isolation of the *plant*; and/or
  - (d) engineering controls such as *guarding*.
- (3) Where through the application of the above clause the *risk* is not *minimised*, appropriate administrative controls and personal protective equipment must be *used*.

Specific requirements relate to *Powered Mobile Plant*, into which category ATVs fit

- (1) An employer must ensure that the *plant* is used so as to *minimise* the *risk* of overturning or of a falling object coming into contact with the operator.
- (2) Where a *risk assessment* identifies a *risk* of -
  - (i) a powered mobile *plant* overturning
  - (ii) objects falling on the operator, or

(iii) an operator being ejected from the seat, and the *risk* needs to be controlled, an employer must ensure that, as far as practicable, an appropriate combination of *operator protective devices* are provided, maintained and as appropriate used.

Taking the risk control approaches one by one, this study adds information as follows:

### ***1. Elimination of the risk***

Options for elimination of the risk associated with current work with ATVs are not immediately obvious as the work being undertaken is important work in each of the major production systems. However, ATVs that are integral to farm production can be removed from use by visitors to the workplace and children under 16 years for leisure type purposes.

### ***2. Substitution of the plant for less hazardous plant***

Discussions with practising farmers in the key agricultural sectors have identified a number of substitution options that should be further explored by the ATV Safety Reference Group and by individual farmers. Substitution options may be more practical for different sectors – for example some horticulture enterprises have already made substitution changes (See Case Study)

### ***3. Design for improved safety***

While there is considerable debate regarding the technical feasibility of fitment of ROPS and operator restraint to existing ATVs, early findings from this study has found that operators will overcome any problems associated with their fitment, in preference to losing access to ATVs or ATUs.

### ***4. Administrative controls***

This study has identified a clear need for improved training of ATV operators, and improved attention to safety induction of ATV operators, particularly in relation to the safe operation of the ATV in the particular farm environment.

(It is apparent that a review of the ATV operation competency standards needs review in light of the findings of this study and of recent cases of prosecution of farm employers in relation to ATV deaths and serious injury)

## ***5. Personal protective equipment***

Use of a suitable helmet should be promoted. This will involve the Reference Group reviewing the Standards of currently available helmets including the Equestrian Helmet, and the New Zealand ATV Helmet and possibly working with Standards Australia to provide clear guidance as to head protection for operators of ATVs and ATUs on Australian farms.

Information regarding speed of operation of ATVs/ATUs can assist in determining the suitability of the Equestrian Helmet.

### **A Case study**

A “corporate” enterprise has farms producing cherry and stone fruit, a vineyard and 2 broadacre farms in central NSW was represented in one of the Industry Advisory Groups This business has undertaken significant changes in response to difficulties associated with use of ATVs.

The company had documented 24 ATVs flip-overs on its farms before making the changes. When ATVs were being used for towing fruit the trailer load tended to become “pushy”. The Safety Officer had experienced one roll-over on a big ATV where the towed trailer pushed it. It wasn’t over the tow weight limit. The terrain is mildly sloping in the orchards and vineyards.

The company now has one ATV on its horticulture property used for supervision and checking, and one on a sheep property. It has replaced its other ATVs with John Deere Gators for most of the work previously done by ATVs and now has 6 Gators and two 2-wheeled motorcycles that are being phased out.

Regular maintenance is undertaken by the on-farm mechanic, who does all the routine maintenance.

Worker induction and training of workers to operate the Gators is undertaken by the Safety Officer. The induction includes having the worker read the operator’s manual, undertaking basic checks, noting the farm speed limit which is 8-10 kph on roads. Gators are governed to 25 kph. Each worker has 8 hours training with the Gator, in which time they are taken all over the property, and are made familiar with the tracks to be taken and areas off limits for ATU operation.

(It was felt that the basic Gator Manual is not technical enough, and that the Technical Manual is too technical.)

Full road helmets are used by riders, except where work involves talking to people.

It was noted that Gator is currently retaining a good resale value

# 6. Training for safe operation of ATVs on farms

## 6.1 Information available to the ATV Safety Reference Group

### 6.1.1 Rider training

Information regarding training and rider skills of riders associated with ATV-related deaths was only available for 8 deaths before the Victorian Coroner, where no deceased rider had undertaken formal training. There was limited information relating to rider training or skills deaths database, although several narratives indicated that farmers had purchased their ATV in the last 12-24 months.

Over 97% of motorcycle riders (2 and 4 wheeled cycles) reported in the rider survey (Schalk and Fragar, 2000) that they had never participated in a formal motorcycle rider training course.

The Reference Group recognized that workers who are required to operate any machine on the farm must have the necessary skills to operate the machine in the specific work environment. The employer therefore is required to assess skills, provide induction, specific training as necessary and safety induction. All operators should have read the Operators Manual provided with the machine.

A study conducted in Western Australia by Lower et al (2005) was unable to demonstrate a marked improvement in injury rate for young people who received rider training. The study unfortunately suffered from a poor response rate to follow-up survey.

The Reference Group acknowledged the need for riders to be able to access sound rider training, but also recognized the limitation of training alone as the solution to reducing the risk of serious injury and death. Clearly, road traffic safety requires driver training as a minimum condition for motorists, but there has been major progress through improved vehicle design, improved road design and enforcement of rules relating to speed, alcohols, and distraction such as use of mobile phone usage while driving.

Competency standards have been developed for operators of vehicles including ATVs on farms. Any Registered Training Organisation providing vocational training for rural workers will be delivering and assessing competency against this standard ( RTC2306A – Operate vehicles, National Training Information Service).

Specialists ATV training is provided by a number of agencies, a number associated with individual Manufactures of ATVs). In addition, an ATV Safety video, or DVD is made available to buyers of new ATVs through many supply outlets.

However, information that emerged from the meetings with industry groups indicated that none of the farmers who attended the meetings in the regional centres knew where they could get access to an ATV rider training.

### 6.1.2 ATV risk management training

The Reference Group considered all the available information relating to ATV deaths to determine the role of training in prevention of serious injury and death. The more detailed information available relating to the eight cases of death being considered by the Victorian Coroner was particularly useful.

The Reference Group determined that, in addition to the need for rider training, there is an immediate requirement for farmers to become better informed about ATV risks and effective methods to manage

those risks. Those methods will include options relating to elimination of the hazard, substitution of the hazard by, for example use of other safer vehicles or machines, safe loading, rider induction, rider training and supervision, helmet use, risk for passengers and risks for children.

## **6.2 Recommendations**

Training should be a key component of the on-farm strategies to reduce risk of ATV serious injury and death.

Attention should be made to make ATV rider training more accessible to ATV operators on Australian farms.

It was agreed that a guideline be prepared for farmers that provides advice on ATV risk management.

# 7. Head protection and helmets for ATV use on farms

## 7.1 The injury problem

The ATV Safety Reference Group recognised early that prevention of head injury is an important issue to be addressed in any strategy to reduce risk of serious injury and death associated with ATV use on Australian farms. The Australian Centre for Agricultural Health and Safety provided the Reference Group with the following information.

ATV operation is associated with risk of head injury when the machine rolls over and the operator is crushed underneath the machine, or when the operator is flung from the machine when the machine hits an object such as tree, stump, rock or depression and comes to an abrupt halt. Fifteen of 59 ATV deaths between the period July 2000 to March 2005, where the death is recorded in the ATV Death Register of the National Farm Injury Data Centre had head injury recorded at autopsy.

### 7.1.1 Human and behavioural risk factors

The following provides information relating to human risk factors

#### *Age and use*

Riders of all ages are at risk of head injury death, and risk most likely reflects exposure – in that the age range of those who have died broadly reflects the age distribution of farmers. The majority of those who have died were ATV operators, however passengers (and bystanders) are also at risk. The following table indicates the age of those who died as a result of ATV-related activity.

**Age of victim – deaths (July 2000 to December 2004)**

<b>Age (years)</b>	<b>Operator</b>	<b>Passenger</b>	<b>Unknown</b>	<b>Total</b>
0-5	1			1
6-15	3	1		4
16-25	3	1		4
26-45	3			3
46-65	1			1
+ 66	1		1	2
<b>Total</b>	<b>12</b>	<b>2</b>	<b>1</b>	<b>15</b>

Source: NFIDC ATV Deaths Register (ACAHS)

#### *Gender*

Of the 15 head injury deaths reported in the Register, 13 were of males, 2 of females.

#### *Competency and training*

There is limited information relating to rider training or skills deaths database.

### *Activity being undertaken*

The following table indicates the activity being undertaken at time of injury event.

<b>Work context of activity of victim</b>	
<b>Activity</b>	<b>No. of Cases</b>
Unknown	7
Recreation/Travel	3
Mustering/Herding	2
Hunting	2
Inspecting property	1
<b>Total</b>	<b>15</b>

Source: ACAHS ATV Deaths Register

### *Speed*

The only mention of speed in the 15 head injury deaths is one case where the estimated speed was 40kmh

### *Alcohol and other drugs*

One operator tested positive to alcohol, and one tested positive to cannabis. In a case where the passenger was killed, but not the operator, the passenger tested positive to alcohol, cannabis and methamphetamines, whilst the operator admitted to consuming alcohol before the incident.

## **7.1.2 Machine risk factors**

### *Size and make/model of machine*

There are details on five of the 15 machines involved in the head injury deaths:

<b>ATV Make/Model associated with head injury death</b>	
<b>Activity</b>	<b>No. of Cases</b>
Unknown Polaris	1
Unknown Yamaha	1
250cc Yamaha	1
350cc Yamaha	1
400cc Yamaha	1
Unknown	10
<b>Total</b>	<b>15</b>

Source: ACAHS ATV Deaths Register

### *Rollover and rollover protection of operator*

There is no mention in any of the 15 cases of a form of roll over protection.

### *Loading of machines*

The only mentions of any loads in the Register were passengers; two cases were carrying one passenger, another case was carrying two passengers.

### *Maintenance of machine*

There is no mention of any of the ATVs being in an un-roadworthy state.

### *Other*

In one death, it was noted that a tree branch had pierced the rear tyre causing the ATV to veer and crash, another involved a collision with a vehicle towing a horse float.

## **7.1.3 Environmental risk factors**

### *Terrain and Slope*

Of the 15 head injury cases;

- Four were unknown
- Three were on unsealed lanes/tracks/roads
- Four were in a paddock (one involved steep incline)
- One was at the intersection of a driveway and road
- One was a contour bank in a paddock (Steep slope)
- One was down a water channel embankment
- One went up an embankment after losing control (Steep slope)

## **7.1.4 Mechanisms of injury and cause of death**

Of the 15 head injury cases;

- Three were unable to be determined due to a lack of available Coronial information.
- Five were thrown from the ATV.
- Three were crushed under the ATV.
- Two involved collision with a tree.
- One involved the Dec. impacting a rock.

The type of head injury that occurred is as follows:

### **Cause of Death (ICD 10 Code)**

<b>Activity</b>	<b>ICD Code</b>	<b>No. of Cases</b>
Fracture of base of skull	S02.1	1
Extensive fracture of skull	S02.7	3
Cerebral Oedema	S06.1	1
Brain Haemorrhage	S06.8	3
Brain Stem Injury	S06.9	2
Blunt Head Trauma	S09.9	1
Unspecified Head Injury	S09.9	4
<b>Total</b>		<b>15</b>

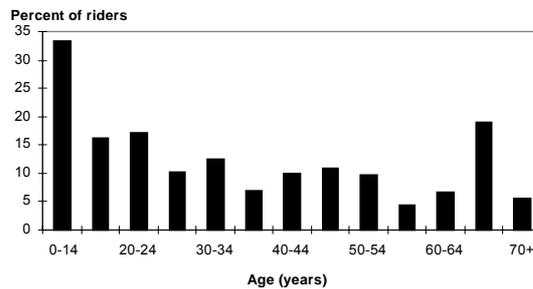
Source: ACAHS ATV Deaths Register

## 7.2 Helmet use on ATVs and motorcycles on farms

The only helmet standard in Australia that is applicable to ATV riding is *AS 1698 – 1988 Protective helmets for vehicle users*. This standard was developed for road users.

Protective helmets are not widely used by ATV riders on Australian farms. A report of a rider survey by Schalk and Fragar noted that there is an apparent relationship between farm motorcycle rider age and the wearing of a helmet (See figure below). The highest rate of helmet wearing appears in the age group 0-14 years where 33.3% of respondent/riders indicated that they always wore a helmet. The next largest group of helmet wearers is found in the 65-69 years (18.9%), 20-24 years (17.2%) and 15-19 years (16.3%).

Figure 23b: Percent of riders reporting helmets use by age



The differences in reporting helmet use by these respondent /riders and those in the Farms Survey were noted. The 0-14 year age group in both surveys reported a high percentage of helmet use, as did the 50-54 year group. However, all other age groups in the Farm Survey reported less use of helmets than the respondents in the Farm Motorcycle Rider Survey

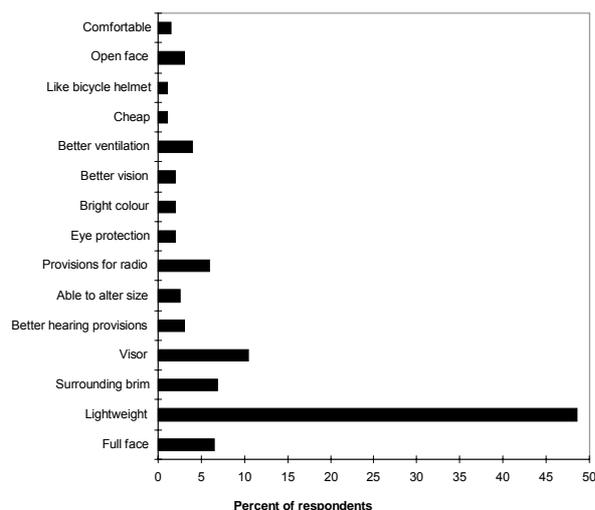
Reasons given for non-wearing of helmets include (Australian Centre for Agricultural Health and Safety, 2004):

- Too hot
- Too heavy
- Can't hear
- Can't see
- Uncomfortable
- Need a wide hat
- Believes employees will just not wear them.
- Would need greater shade and ventilation
- *"Not used on this farm. Had used helmets on other farms – reason for non-use was the heat."*

When questioned on whether a more suitable helmet, that allowed for ventilation would be used, eg the current equestrian helmet, it was generally accepted that this would *"be OK – camp drafters use helmet"*

Farm riders have reported the features they would like to see in a farm rider helmet (Schalk and Fragar, op cit). Of the respondents, 48.5 percent indicated that the helmets would need to be lighter before they would consider wearing one. A total of 202 suggestions were made for improving helmet design.

Figure 23c: Features respondents indicated they would like to see in a helmet (n=202)



### 7.3 Options for helmets for use on ATVs

A number of solutions were proposed to increase helmet use for riders of ATVs on farms.

1. Promote helmets that meet the Vehicle User Standard as providing most effective protection and encourage manufacture of the most comfortable helmet possibly with shade. This helmet standard does not provide for ventilation of the helmet.

A number of combination helmet/farm-hat helmets have been found to be available, mostly from the USA, and some may meet the road use Standard.

2. Adopt the New Zealand Standard *DZ 860 All Terrain Vehicle (ATV) Helmets*. This hat is designed for low speeds (less than 30kph)

Speed of riding was considered in the ATV use paper (Australian Centre for Agricultural Health and Safety, 2004)

*“The survey of motorcycle riders (both 2- and 4-wheeled machines) of Schalk and Fragar (op cit) provided reported average and maximum speeds of operation of motorcycles, but did not separate the two types of machines.*

*That report indicated that reported average speeds were lower in the dairy and horticulture, with only 1.7 percent of rider in the dairy industry exceeding 40kph average speeds, while 23.6 percent of riders in cereal grains, 13 percent of riders in sheep/cereal grains and 4 percent of riders in sheep/beef cattle reporting riding at average speeds over 40 kph.*

*Maximum speeds exceeded 60 kph for 70 percent of riders in the sheep/grains industry, and for 45.5 percent of riders in the sheep/beef cattle industry but for only 12.7 percent of riders in the dairy industry and 13.7 of riders in the horticulture industries.*

*Advisory Group participants in the livestock industries, including dairy, reported that ATV are ridden at high speeds (up to 60 kph) to the work site, then at lower speeds when working with livestock.*

*For the cropping industries, the rice industry participants reported speeds of up to 70-80 kph to the job, then 20-30 for the job, while the horticulture participants reported much lower speeds 20-30 kph to the job and 10 kph for the job. One cotton farm reported a speed limit for riders of 60 kph, and one horticulture enterprise a limit of 28-10 kph.”*

3. Support wearing of a helmet that meets the standard AS/NZS 3838:2003 *Helmets for horse riding and horse-related activities*. This standard meets requirements for falls from horses up to speeds of 55-60 kph, and allows in the testing for ventilation of the helmet. The helmet covers the parietal area of the side of the head that is impacted in a number of head injuries, but is open face and does not distort or reduce hearing.
4. Recommend to Standards Australia that it review the findings of the ATV Safety Reference Group, and develop a suitable standard for helmet use for operators of ATVs and motorcycles on Australian farms.

## **7.4 Recommended strategic action**

The Reference Group recommended to Farmsafe Australia that a submission be made to Standards Australia along the lines of Option 4 above.

Farmsafe Australia considered these options at its meeting in December 2004, and resolved to make submission to Standards Australia for consideration of a suitable helmet for use by ATV riders (and motorcycle riders) undertaking work on Australian farms.

At the same time, it was agreed that helmet use should be actively promoted for ATV operators on the basis of:

- Use of Road standard helmet, OR
- Farmers should use a risk-based approach and use an alternative standard helmet eg the equestrian helmet where speeds can be monitored, and there is no risk of collision with oncoming traffic.

# 8. A national strategy

## 8.1 Key findings upon which the national strategy has been based

Having considered all the information available, the Reference Group reached the conclusion that there is no one single solution available to reduce the number of deaths and serious injury associated with ATV use on Australian farms.

The strategy that has been developed acknowledges:

- that improved information and support should be available to farmers and workers to effectively manage ATV associated risk on farms and to meet their OHS regulatory obligations;
- that ATVs in their current design, and under certain circumstances, have a tendency to rollover and crush the operator;
- that ATV accidents in some circumstances will result in the rider being flung from the machine;
- that more specific information is needed to specify the safety limits of slope, terrain and loading of ATVs, including liquid loads, and suitability and safety of attachments;
- that manufacturers of ATVs do not currently support fitment of a rollover protective structure (ROPS), and that there is conflicting evidence as to the effectiveness of fitment of ROPS and rider restraint. This places suppliers and employers in a position of being solely reliant on lower order (non-engineering) risk control measures solutions to prevent death and injury;
- that a range of small vehicles (ATUs) are available that can reduce the need to use ATVs in some production systems, and offer a suitable substitution option in these circumstances. These appear to be more stable and can be fitted with ROPS and rider restraint as required;
- that guidelines need to be developed for farmers, employers and farm managers that provide information relating to the risk and recommended risk management solutions for safe operation of ATVs and ATUs on Australian farms;
- that more attention is needed to safety induction of riders into use of ATVs and ATUs in each specific farm workplace, with rigorous supervision of rules to ensure safety;
- that operation of ATVs with passengers reduces stability and adds to risk of roll-over;
- that children are at increased risk of serious injury and death and should be discouraged from riding ATVs;
- that farm manager and rider training should be widely promoted, although the evidence that supports rider training as the key risk management option is equivocal; and
- that increased use of helmets would reduce head-injury related deaths and serious head injury.

## 8.2 The national strategy

The Reference Group widened the ATV safety strategy to include provision for use of alternative small machines for some of the current ATV uses. The strategy *Safe operation of All-terrain Vehicles and Utilities on Australian Farms - An Industry Strategy, 2004 – 2009*, was finalised at the Reference Group meeting in November 2004 and the Strategy was adopted by Farmsafe Australia at its meeting in December 2004

The full Strategy document is published on the Farmsafe Australia website [www.farmsafe.org.au](http://www.farmsafe.org.au).

The Strategy has eight key components:

4. Establish a national framework for action
5. Define key farm uses of ATVs and ATUs, the injury problem and identify key risk factors
6. Identify effective management strategies for safe operation of ATVs and ATUs on farms
  - Elimination options
  - Substitution options
  - Engineering and design for safety
  - Induction, education and training and supervision
  - Helmets and other PPE
7. Develop and implement a communication plan
8. Define supportive legislation and standards
9. Define research needs
10. Resources
11. Evaluation

Each component has defined objectives and program indicators. These indicators are forming the basis of further planning of further the by which progress can be measured. The component programs are provided in the following box.

## **Safe Operation of All-terrain Vehicles and All-terrain Utilities on Australian Farms - an Industry Strategy 2004 – 2009**

### **Program 1: Establish a national framework for action**

#### **Objective**

To establish a nationally coordinated framework to reduce risk of serious injury and death associated with operation of ATVs and ATUs on Australian farms.

#### **Rationale**

The problem of deaths and serious injury associated with operation of All-terrain Vehicles on farms is a complex problem, with no universally effective solution. The problem crosses agricultural industry groups and occurs across Australia.

Experience from other Farmsafe Australia efforts and other industries indicate that the participation of all key industry stakeholders is critical for significant and lasting improvements to safety performance.

#### **Program Indicators**

1. Establishment of an ATV/ATU Safety Reference Group to oversee strategic safety initiatives with representatives drawn from key industry stakeholders – National Farmers Federation, workers, regulatory authorities, research interests, occupational health and safety expertise, consultants.
2. Effective communication with and involvement of ATV/ATU suppliers and manufacturers, and manufacturers and suppliers of ATV attachments.
3. Commitment of key industry stakeholders to the ATV/ATU Safety Strategy
4. A plan of action for *Safe Operation of All-terrain Vehicles and All-terrain Utilities on Australian Farms*, including as a high priority the effective communication of the need for attention to improved safety to producers..
5. The ATV/ATU Safety Reference Group acting as an agent of effective communication between member organisations within the industry.
6. Regular published reports of activity to the industry and to Farmsafe Australia

### **Program 2: Define key farm uses of ATVs and ATUs, the injury problem and identify key risk factors**

#### **Objective**

1. To gather information on the current and potential uses of ATVs/ATUs on Australian farms.
2. To gather all relevant data and examine in more depth the nature, scope, and cost of ATV/ATU related deaths and injuries, in order to establish the priorities for action, establish baselines and evaluate program effectiveness.
3. To assist Farmsafe Australia to establish its health and safety action program on a rigorous evidence base.

#### **Rationale**

The Farm Health and Safety Joint Research Venture has funded the National Farm Injury Data centre to produce reports of injury and deaths associated with Australian production agriculture/ horticulture, including production of reports for specific program of Farmsafe Australia.

A study by Schalk and Fragar (op cit) into motorcycle injury on Australian farms, along with a growing number of reports of ATV deaths, was the basis of the decision of Farmsafe Australia to address ATV safety.

Further work should be undertaken between the National Farm Injury Data Centre in conjunction with the ATV/ATU Safety Reference Group to improve data collection for the program. Ongoing analysis of data (including raw data) is likely to yield information sufficient to define ongoing priorities for action.

### **Program Indicators**

1. Collation of available data on ATV deaths and injury to produce a briefing paper for the ATV/ATU Safety Reference Group to define risk factors association operation of these machines on farms.
2. A report on the use of ATVs in Australian agriculture and horticulture industries and potential substitution options.
3. Publication of annual reports which highlight the scope, size and cost of injury associated with ATV/ATU operation on Australian farms

## **Program 3: Support for effective on-farm strategies for safe operation of ATVs and ATUs**

### **Objectives**

1. To provide relevant information regarding OHS best practice in operation of ATVs and ATUs to Australian farmers and employers.
2. To advocate for improved safety design of ATV/ATU machines supplied to Australian agriculture/horticulture workplaces.

### **Rationale**

Best practice in OHS risk control involves adoption of a “*Hierarchy of control*” approach by employers and farm managers. This approach is not only good injury prevention practice, it is also incorporated into Australian OHS regulations in relation to risk associated with plant and machinery in workplaces.

Furthermore, manufacturers and suppliers have similar obligations in relation to plant and machinery supplied for operation in work settings. An effective national strategy will engage manufacturers and suppliers of ATVs/ATUs and attachments in addressing improvements in safety design, in identifying OHS risks associated with operation of machines and in providing advice to employers and operators as to how to effectively manage risk.

### **Program Indicators**

1. Identification of ‘substitution’ options including ATUs for primary producers to consider in seeking safer systems of work for tasks that have been undertaken by ATVs. These to be based on relative stability and potential for fitment of rollover protection systems and operator restraint.
2. Annual report on progress with research and development and design of machines with improved safety features (ROPS and operator restraint) for ATVs and ATUs
3. Review report of farm ATV/ATU risk management training including:
  - Induction to operation of machines in the farm workplace
  - Supervision
  - Operator training
4. Review of helmet standard for ATV/ATU and motorcycle operators on Australian farms.
5. Production of a Guideline - *Safe use of All Terrain Vehicles and All Terrain Utilities on Australian Farms* for farmers and farm managers and supervisors. The Guideline will provide practical information and include:
  - Elimination options
  - Substitution options
  - Engineering and design guidelines
  - Administrative controls including guidelines for safety induction, training and supervision
  - Use of Personal Protective Equipment (PPE)

## **Program 4: Develop and implement a communication/ campaign plan**

### **Objective**

1. To raise the awareness of all farmers and farm managers that ATV safety is a priority OHS issue, associated with serious injury and death and that risk needs to be controlled.
2. To provide relevant information regarding ATV/ATU safety to all farmers and farm managers

### **Rationale**

There is need for a campaign to raise the awareness of ATV/ATU safety as an important risk management issue for the industry, and to promote current guidelines for safe operation through all agriculture and horticulture sectors.

### ***Program Indicators***

1. Identification of relevant key stakeholders who will be partners in the communication plan that promotes ATV/ATU safety on Australian farms.
2. Identification of effective means of communication of ATV/ATU safety to all agriculture/horticulture sectors
3. Communication strategy and plan being implemented targeted at the relevant sectors of the industry.
4. A feedback and evaluation component that informs the program for further action.

## **Program 5: Supportive legislation and standards**

### ***Objective***

1. To review the effectiveness of and potential for legislation and standards in improving ATV/ATU safety on Australian farms
2. To ensure that all sectors of the industry are familiar with relevant legislation and standards applying to ATV/ATU safety in the industry

### ***Rationale***

Cases of on-farm ATV injury and death have been the subject of prosecutions under states' OHS Acts. Existing national and state OHS requirements, as a general rule, are not well understood within agricultural industries. By adopting a pro-active role in this area, the industry will improve the knowledge of these requirements and enhance the level of safety for their members.

ATVs and ATUs meet the definition of "plant" under states' OHS regulations relating to safe operation of plant and machinery.

### ***Program Indicators***

1. A review report of states' plant regulations as they relate to ATVs/ATUs and attachments designed for them such as mounted spray tanks, spreaders and towed loads.
2. Inclusion of information about current legislation and standards in resource material and information packages in all programs

## **Program 6: Define research needs**

### ***Objective***

1. To identify the priority research and development requirements to improve ATV/ATU operator safety on Australian farms
2. To identify opportunities and funding sources that can be accessed to support a relevant research and development program

### ***Rationale***

ATVs remain a hazard of high risk for operators on Australian farms, while there is no solution to the rollover protection problem. Further research into design for safety and into the effectiveness of administrative controls is needed.

The Farm Health and Safety Joint Research venture has provided limited funding to develop a strategy based on current knowledge, however it is clear that further R&D work is required for ongoing safe use of these machines in production agriculture in Australia.

ATVs may be fitted with ROPS in New Zealand, and guidelines for retro-fitting of ROPS are available. It is desirable that Australia seek partnership with the Accident Compensation Commission (ACCC) of New Zealand to review the profile of ATV deaths including those that may have been fitted with ROPS.

### ***Program Indicators***

12. Research needs for improved ATV/ATU safety are defined for all sectors of the agriculture/horticulture industry. These should include research into how existing ATVs can be made safer.
13. Partnership with New Zealand ACC over ATV death monitoring
14. A program of research is funded and implemented.
15. Research findings are adopted and incorporated into all industry OHS programs and resources.

## **Program 7: Resources**

### ***Objective***

To identify resources for implementation of the ATV/ATU strategy and plan, and engage

### ***Rationale***

Farmsafe Australia will require project/program funding to implement the national ATV/ATU safety program and plan. Further, individuals and agencies will be required to provide time and attention if the strategy is to be effective.

Member agencies of Farmsafe Australia will be encouraged to commit resources and in-kind contribution to the program, and potential funding sponsors will be approached to provide support

### ***Program Indicators***

1. Potential funding partners are identified and recruited to support implementation of the plan.
2. Funded program of work

## **Program 8: Evaluation**

### ***Objective***

To evaluate and report on implementation of the ATV/ATU Safety Strategy and Plan.

### ***Rationale***

As a matter of principle, no program in OHS should be undertaken without evidence of it being cost effective. This involves subjecting all planned programs to a rigorous evaluation process that, where possible, includes analysis of effectiveness and cost.

### ***Program Indicators***

1. All programs implemented within this strategy to include evaluation of effectiveness and cost
2. Published reports that include an evaluation report
3. Evaluation report at mid-term and end of this strategy period

## 9. Implementing the national strategy

The ATV Safety Reference Group is continuing to oversee the implementation of the ATV/ATU safety strategy on behalf of Farmsafe Australia.

The Australian Government Department of Health and Ageing, through its Rural Health section, has funded a 3 year project – the Farm Injury prevention project, where ATV is one of the major components.

Action to date under this project has been:

- Agreement to an Implementation Plan for the ATV/ATU Safety Strategy
- Consultation with, and development of mechanisms for involvement of ATV manufacturers and suppliers
- Agreement to a Communication Plan to engage all stakeholders and achieve Australia-wide communication of agreed messages
- First draft of a Guideline for ATV/ATU Safety on Australian Farms

An Evaluation Plan is to be developed.

This Joint Venture-funded project has achieved its aims, and set in place a Strategy that has been adopted by the Farmsafe Australia network. By ensuring that the Strategy is based on the best evidence available, the implementation of the Strategy will be assured with assistance of Australian government funding.

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# Attachment : Data requirements relating to ATV deaths/serious injury on farms

The following is considered to be a minimum requirement for routine information collection for ATV/ATU death and serious injury:

## General

- Case ID
- Event ID
- Date of event
- Data source
- Address where event occurred
- Location of event
- Location of death
- Agricultural industry
- Agricultural enterprise
- Agricultural work phase
- Work related
- Description of event
- Cause of accident (ie. Rollover, thrown from ATV etc)

## Human risk factors:

- Information relating to victim
  - Age
  - Employment status
  - Occupation
  - Height
  - Weight
  - Other physical characteristics
  - Operator, pillion or bystander
  - Alcohol/ drugs/ mental state
  - Helmet
  - Other PPE
  - ATV Training
  - Medical cause of death
  - Additional autopsy details

- Information relating to operator
  - Age
  - Employment status
  - Occupation
  - Height
  - Weight
  - Other physical characteristics
  - Alcohol/ drugs/ mental state
  - Helmet
  - Other PPE
  - ATV Training
  - Medical cause of death
  - Additional autopsy details

**Machine risk factors:**

ATV make, model and size

Mechanical condition – brakes, tyres, etc

ROPS fitment – presence and description

Load – nature, weight, towed, where mounted etc

**Environment factors:**

Time of day of event

Weather

Light

Terrain

Slope

Speed