Occupational Health and Safety Risk Associated with Sheep and Wool Production in Australia

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Occupational Health and Safety Risk Associated with Sheep and Wool Production in Australia.

National Farm Injury Data Collection Project

2001

Rural Industries Research and Development Corporation

and

The Woolmark Company

for the

National Health and Safety in the Sheep Industries Reference Group

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Foreword

While the different agricultural and horticultural industries share many occupational health and safety risks, their differing production processes are also associated with a range of risks that differ from each other.

This report is one of a series of profiles specific to a particular primary production industry that describe the OHS risks specific to that industry across Australia. It has been produced under the supervision of an industry Reference Group, convened by Farmsafe Australia to work with the National Farm Injury Data Centre to ensure that the profile addresses all known hazards associated with each phase of the production process, and that all relevant data is used.

These profiles are proving to be invaluable for the development of commodity specific guidance material for on-farm OHS risk management; for development of relevant guidance resources to control risks; for defining OHS training competencies and for defining information gaps that require further research.

The profile is a product of the National Farm Injury Data Collection project, funded by the Research and Development Corporations contributing to the Farm Health and Safety Joint Venture - Rural Industries Research and Development Corporation, Grains Research and Development Corporation, Australian Wool Innovation Limited, Cotton Research and Development Corporation, Sugar Research and Development Corporation and Meat and Livestock Australia. The Joint Venture is committed to improving well-being and productivity of the agricultural industries through careful investment in research and development programs that assist industry to manage OHS risk in a cost effective way. This Profile is a key document that brings together all available information in the interests of the sheep and wool production industries.

Peter Core
Managing Director
Rural Industries Research and Development Corporation

Acknowledgements

This report was jointly produced by the National Farm Injury Data Centre (funded by the Research and Development Corporations contributing to the Farm Health and Safety Joint Research Venture – Rural Industries Research and Development Corporation, Grains Research and Development Corporation, Australian Wool Innovation Limited, Cotton Research and Development Corporation, Sugar Research and Development Corporation and Meat and Livestock Australia), the Health and Safety in the Sheep Industry Project (funded the Woolmark Company) and the Australian Centre for Agricultural Health and Safety (funded by NSW Health).

The Report was produced to inform the Health and Safety in the Sheep Industries Project Reference Group in its program of work aimed at developing a strategy and resources to improve safety in that industry.

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EXECUTIVE SUMMARY

Title: Occupational health and safety risk associated with sheep and wool production in Australia.

Authors: LJ Fragar, R Franklin, A Lower

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The costs of work related injury and illness in the Agricultural sector is estimated by Worksafe Australia to be between $0.52 and $1.29 billion annually for Australia as a whole. Almost 1.7 million working days are lost over a twelve month period as a result of occupational injury or illness in the agriculture sector.

To these costs must be added the costs of injury/illness of other workers, costs of replacement labour, costs associated with reduced productivity, and for litigation at common law.

The sheep and wool industries, along with other agricultural industries, experience high rates of work related deaths, injury and illness. Injury/illness is occurring in the context of sheep handling on farms, wool harvesting and in addition, children in the agricultural work-place are at risk.

The sheep shearing workers compensation data indicates high rates of compensable injury, while the actual injury and illness rates of other workers, including farmers, farm managers, and other workers are not able to be estimated as precisely.

The best estimates of Worksafe Australia indicate that sheep shearer injury alone made up 14.8% of agricultural sector workers compensation claims – or between $7 to $19 million per annum – 0.5% of the gross value of wool production in Australia in 1992-92, or an estimated 5% of the net value of wool production in Australia.

Almost half the workers compensation claims for shearers involve body stressing, with another 40 percent being associated with the body hitting or being hit by another object – sheep or the shearing equipment. Body parts injured are more commonly the back (20%), and the hand (22%).

Those working in the sheep industry (non-shearers) are most commonly injured from farm machinery and vehicles, including motorcycles, and by sheep during sheep handling and slaughtering.

Other hazards associated with the industry include those associated with noise, farm chemicals and zoonotic disease.

Table 1. Sheep Industries Annual Injury/ Disease Incidence - Wage & Salary Earners 1992-93

ASIC Industry Class	Incidence Rate per 1000 Wage and Salary Earners per Annum
Sheep-Cereal Grains	55.4
Sheep-Meat Cattle	34.1
Sheep	59.0
Sheep Shearing Services	89.6
All Agriculture	49.1
All Australian Industries	25.5

Source: Worksafe Australia (1995)

Table 2. Injury/disease rates selected occupations - agriculture and services to agriculture 1992-93

Occupation	Incidence Rate per 1000 Wage and Salary Earners per Annum	Average number of working days lost per injury
Farmers and farm managers	26.8	49.6
Sheep shearers	151.5	68.6
Agricultural plant operators	48.1	
Farm hands and assistants	581.0	43.6
All occupations	26.2	49.9

Source: Worksafe Australia (1995)

INTRODUCTION

This health and safety profile has been developed as part of a Farmsafe Australia and sheep industry initiative to improve the health and safety performance of commodity groups through the development of industry specific health and safety plans. This profile sits within the overall *'Managing Farm Safety'* Program of Farmsafe Australia.

Managing Farm Safety is a program which has been developed by integrating data and research findings, with:

- farmer responsibilities under occupational health and safety (OHS) legislation,
- best practice in OHS on farms
- farm management practicalities including issues of farm cash flow and individual aspirations.

The program development process involves four steps:

1. Production of data derived commodity specific profiles of health and safety
2. Production of data and industry experience derived commodity specific hazard profiles
3. Production of a farm safety audit checklist derived from 1 and 2 above
4. Generic and commodity specific guidance notes for employers and workers

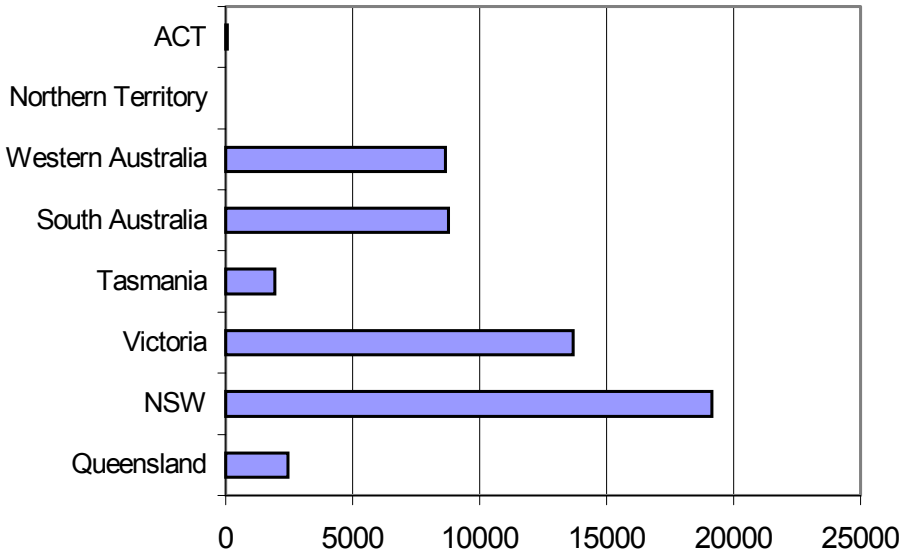
This profile provides a summary of available data for the sheep and wool industries. Although the quality and coverage of the data is poor, it does provide important direction for the industry.

INDUSTRY STRUCTURE

Wool remains is a major component of Australian agricultural production. A total of 54718 sheep and wool producers responded to the 1997/98 agricultural census - between them they produced approximately 696,000 Tonnes of wool. The sheep meat and wool industry in Australia extends across all states and territories except the Northern Territory. New South Wales, Victoria and Western Australia dominate sheep production together holding approximately 76% of total sheep numbers.

The state distribution of sheep properties is presented in Figure 1.

Figure 1. Number of agricultural establishments reporting sheep 1997-98



Source: Australian bureau of Statistics

In addition the sheep enterprises are significant rural employers, both in terms of farm family labour, permanent employees and casual and contract labour. Hours of work are long, averaging 60 hours per week for farm owner/operators and 40 hours per week for employees (Ferguson KH, 1996). Both the Australian and international literature suggests wool production as a high injury risk agricultural industry.

FATAL INJURY

A major study of work-related fatalities in Australia for the years 1982-84 indicated that the annual agricultural work-related death rate was 22.1 per 100,000 persons and followed only mining and transportation in significance (Erlich SM et al. 1993). The occupational group that includes station hands, drovers, shearing hands and general hands within grazing industries comprised 11% of farm deaths and had an annual incidence of 32 deaths per 100,000 persons.

During 1995 and 1996 the following deaths reported by the Victorian Health and Safety Organisation included:

- A 59 year old self-employed man electrocuted when he touched the metal frame of a shearing shed.
- A self-employed man died from spinal injuries when he fell from his truck being loaded with wool bales
- A man aged 22 was electrocuted when he came into contact with overhead power lines while moving sheep from a 4-tier sheep truck

Most of the other 27 deaths occurred on farms where the enterprise type was not specified, and a number could have occurred on sheep farms.

Since 1987, with data quality, scope and coverage consistently improving, the NSW WorkCover Authority has maintained a fatalities surveillance system. This surveillance system is not dedicated to agriculture and is somewhat limited in the depth of information held, however it is extremely useful for describing the causes of on-farm deaths as a result of work-related injury. In this period the system has recorded 12 deaths on properties producing sheep. *Tractor related runovers* comprised 3 (25%) of cases, while only farm motorcycles appeared in more than one other case.

Worksafe Australia (1995) reported that the Australian Standard Industrial Classification (ASIC), industry class 'sheep" had 6 of the 31 compensated fatalities for agriculture during the period 1992-1993, with an additional 4 in 'sheep-cereal grains'.

The Australian Standards Association is also currently developing a National Standard for the design, manufacture and operation of hydraulic wool presses following 3 deaths across three states, that have occurred where persons have had their head crushed by the moving platen of the press.

WORKERS COMPENSATION INJURY DATA

Worksafe Australia has calculated injury and disease incidence rates for the employed workforce by ASIC class for the period 1992-93. The results are presented below in Table 1. It is notable that sheep industries display higher incidence rates than All Australian Industries" and the ASIC classes "Sheep" and "Sheep Shearing Services" have higher incidence rates than all other agriculture classes.

Table 1. Sheep Industries Annual Injury/ Disease Incidence - Wage & Salary Earners 1992-93

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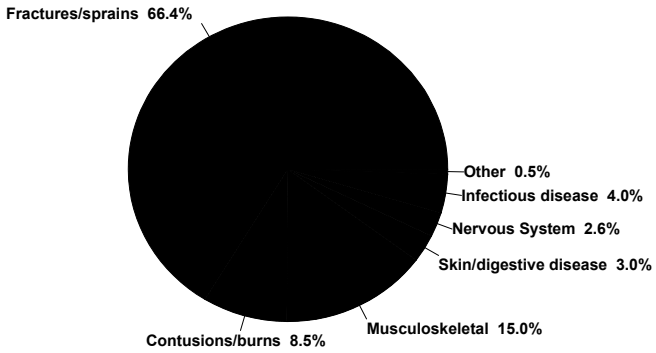
Farm hands and assistants	581.	43.6
All occupations	26.2	49.9

Source: Worksafe Australia (1995)

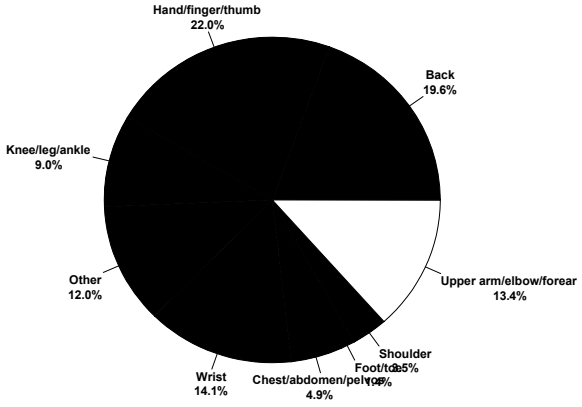
The following figures indicate the nature of injury/disease, the body location of injury/disease and the mechanism of injury/disease claims by sheep shearers:

Figure 2. Nature of injury/disease – sheep shearers 1992-93



Source: Worksafe Australia (1995)

Figure 3. Bodily location of injury/disease – sheep shearers 1992-93



Source: Worksafe Australia (1995)

Figure 4. Mechanism of injury/disease – sheep shearers 1992-93

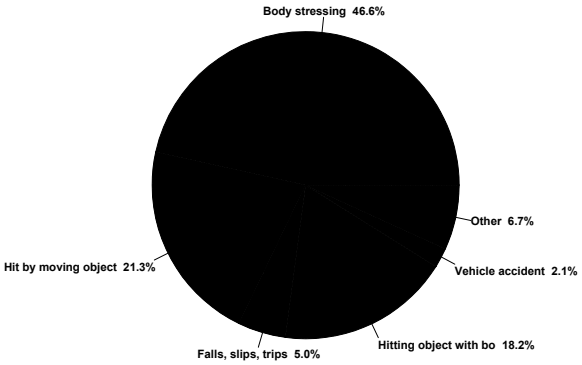
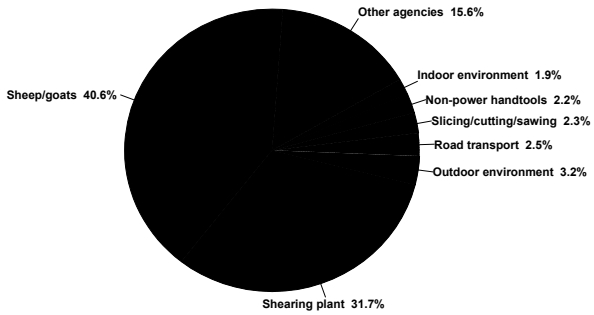


Figure 4a. Agent of shearer injury 1992-1993



Source: Worksafe Australia (1995)

The average cost per new worker's compensation claim for sheep shearers was $9545. Claims by sheep shearers made up 14.8% of all claims in agriculture and services to agriculture for 1992-93.

It is important to note that this Worksafe data is the closest approximation we have to national data but it excludes Victoria. This is somewhat problematic for analysis of sheep related health and safety, given the size of the sheep industries in Victoria.

The Queensland Workers Compensation jurisdiction has published information regarding the number and cost of claims in the sheep industries. Data for 1990/91 - 1992/93 are presented in Table3.

Table 3. The Number and Cost of Workers Compensation Claims Queensland Jurisdiction 1990 / 91 - 1992 / 93. Pastoralists and Wool Contractors.

Occupational Group	**1990 / 91**		**1991 / 92**		**1992 / 3**	
	Number	Cost $	Number	Cost $	Number	Cost $
Pastoralists (Sheep & Goats)	85	592,811	60	642,782	55	359,457
Shearing, crutching & wool classing contractors	181	984,884	99	661,112	90	517,521
Total	**266**	**1,577,695**	**159**	**1,303,894**	**145**	**876,978**

Worksafe Western Australia has provided an analysis of workers compensation claims in that state by agricultural industry for the years 1993/94 to 1995/96. The following tables display the data relating to the sheep industries:

Table 4. Number of workers compensation injury/disease claims Western Australia 1993/94 – 1995/96

Industry by ANZIC code	Number of injury/illness claims			
	1993/94	1994/95	1995/96	Total
Grain-sheep and Grain-beef farming	318	375	342	1035
Sheep-beef farming	68	30	41	139
Sheep farming	97	54	81	232
Sheep shearing	313	197	264	774

Within the NSW jurisdiction during 92/93 shearers made 203 workers compensation claims with a median claims cost of $4000.

Table 5. Agent of injury/illness workers compensation claims Western Australia 1993/94 - 1995/96

Agent of injury/illness	Sheep farming		Sheep shearing	
	Number	Percent	Number	Percent
Machinery	43	18.5	308	39.8
Mobile plant and transport	38	16.4	9	1.2
Powered equipment/ tools	7	3.0	5	.6
Non-powered handtools	28	12.1	50	6.5
Chemicals	2	.9	3	.4
Materials/ substances	10	4.3	20	2.6
Environment	28	12.1	40	5.2
Animal/ human & biological	66	28.4	320	41.3
Other and nec	10	4.3	19	2.5
Total	**232**	**100.0**	**774**	**100.0**

Table 6. Body location injured - workers compensation claims Western Australia 1993/94 - 1995/96

Body location of injury/ illness	Sheep farming		Sheep shearing	
	Number	Percent	Number	Percent
Head	25	10.8	24	3.1
Neck	3	1.3	5	.6
Trunk	33	14.2	173	22.4
Upper limbs	117	50.4	438	56.6
Lower limbs	43	18.5	118	15.2
Multiple	11	4.7	14	1.8
Systemic			2	.3
Total	**232**	**100.0**	**774**	**100.0**

Table 7. Cost of workers compensation injury/illness claims Western Australia 1993/94 - 1995/96

Industry by ANZIC code	Number injuries/illness claims	Mean cost $	Mean days lost	Annual Cost (= cost/3) $
Grain-sheep and Grain-beef farming	1035	8649.21	30.22	2983977
Sheep-beef farming	139	6898.00	23.54	319607
Sheep farming	232	7826.93	33.19	605282
Sheep shearing	774	6366.80	27.12	1642634

OTHER NON-FATAL INJURY

Ferguson (1996) reported that the annual work related injury/illness rate for the sheep industry was 24.0 per 100 farms. This study was undertaken by survey of farms reporting injury over a 12 month period 1995. The average cost of an injury in the sheep industry in this study was $7231 and required 17 days off work.

The injured party required professional medical attention in 82% of cases. Ferguson identified mustering by motorcycles and yard work as the two most common causes of acute injury. Chronic back pain was reported by 18.7 persons per 100 farms.

Table 8. Breakdown of injury/illness by role of worker on sheep properties – Queensland 1995. n=224

Role on property	Number
Owner, manager, family member	29
Permanent employee	1
Casual employee/ contractor	7
Total	**41**

Source: Ferguson, 1995

Table 9. Injury/illness incidence over 12 months in the sheep industry in relation to selected activity n=224

Production phase		Number of injuries
Animal handling	Work in yards and races	10
	Mustering	19
	Other	2
General maintenance	Equipment	n.a.
	Fencing	n.a.
	Other	1
Cropping	Irrigating	1
Other		8
Total		**41**

Source: Ferguson, 1995

Table 10. Injury and illness incidence over a 12 month period in the sheep industry in relation to agent of injury n = 224

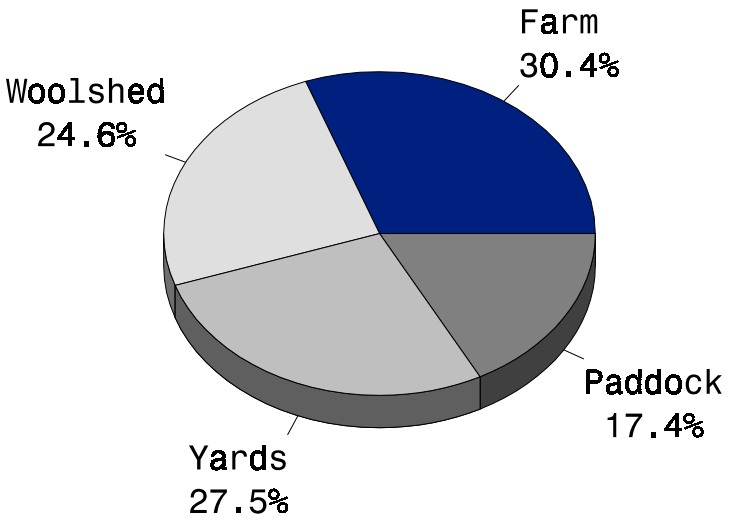
Agent	Number
Motorcycle	15
Other plant	4
Horse	3
Cattle	1
Other animal	4
Pesticide	1
Ground covers	3
Acts of a person	8
Total	**41**

Source: Ferguson, 1995

The Rural Injury Prevention Program (RIPP) in New South Wales, and the Victorian Injury Surveillance System (VISS) have collected information from people who have presented at rural hospital emergency departments. Both the RIPP and limited VISS information is held by the Australian Agricultural Health Unit, which currently holds detailed information regarding 69 cases of sheep related injury. The RIPP & VISS data provides information regarding the activity being undertaken at the time of the injury, the time of day, age and sex of the victim, details about the specific agents of injury, the on-farm location and details about the injury.

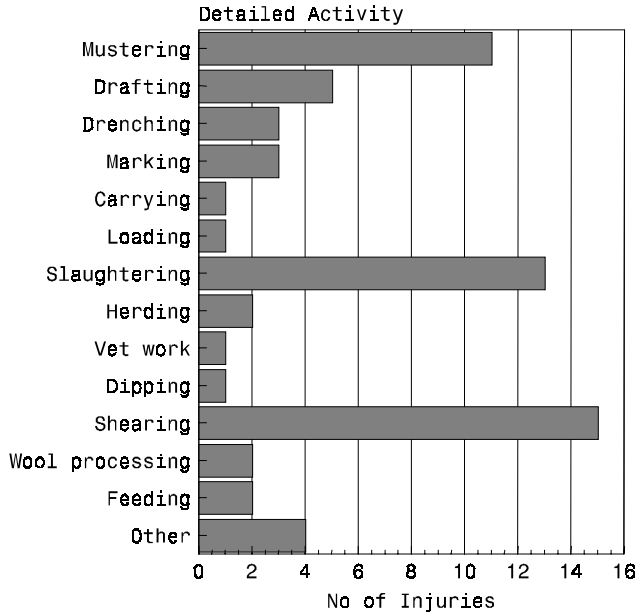
Injuries within the sheep industries are often thought to occur primarily in the woolshed. In fact the distribution of the emergency department attendances reveals that other on-farm locations are also important sources of injury. Figure 5 indicates that the woolshed is the location for about 1/4 of the sheep industry injuries that require emergency department treatment. It should be noted that the emergency department presentations do not reflect the true injury burden associated with sheep and wool production being virtually free of sprains / strain type injuries. However, what this data does reveal is the existence of other injury types in locations other than the shearing shed.

Figure 5. On-Farm Location of Sheep Industries Injury.
NSW RIPP & VISS data. (n=69)



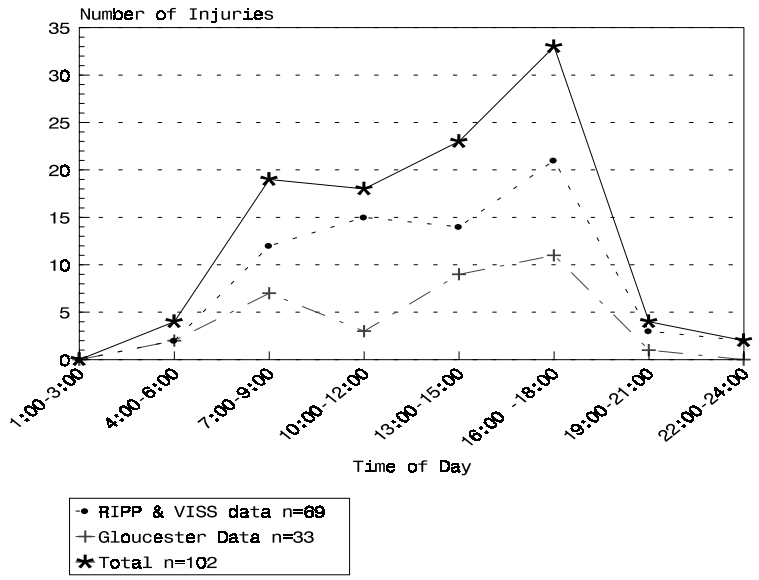
The activities associated with the emergency department presentations are displayed in Figure 6. The activities that appear in significant groups are shearing, slaughtering and animal handling tasks such as, drafting, mustering and drenching. Sheep industry preventative programs need to consider a range of work activities not simply shearing. The large slaughtering group appears to be an area in which preventative work would reap significant benefits. Slaughtering is not a task undertaken everyday, much of the required preventative development has been undertaken in the meat processing sector and the solutions, such as chain mesh gloves are relatively cheap. Further analysis of the animal handling injuries is necessary to consider the range of potential controls. The RIPP & VISS data confirms the results obtained by Ferguson that mustering and yard work are commonly associated with injury.

Figure 6. Detailed Breakdown of Animal Handling Related Injury - Sheep Industries NSW RIPP & VISS data. (n=69)



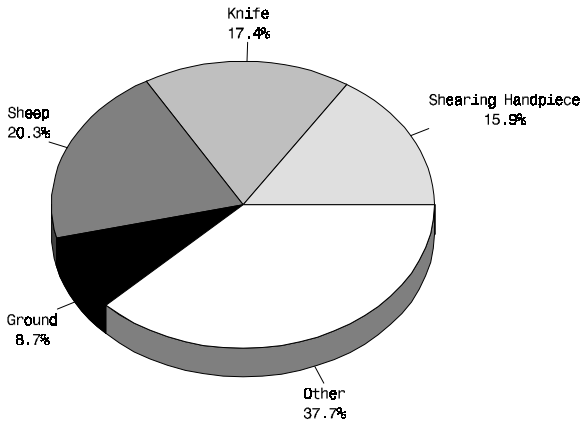
The injuries occurred across the traditional work day span with some injuries occurring in the early morning and the night. The peak period appears to be the mid afternoon. Issues of adequate rest breaks and water intake need to be considered in preventative programs, a tendency to attempt to get work finished and forget rest breaks in the afternoon may contribute to the afternoon peak. The distribution across the 24 hr clock is presented in Figure 7.

Figure 7. Time of Day of Injury - Sheep Industries NSW RIPP, Gloucester District & VISS data



The primary agents of injury are associated with the activities being undertaken as revealed in Figure 7a.

Figure 7a. Agent of Injury. NSW RIPP & VISS data



Data relating to both the nature of the injury, and the bodily location of injury are useful for the development of prevention programs. Figures 8 and 9.

Figure 8. Nature of the Injury NSW RIPP & VISS data

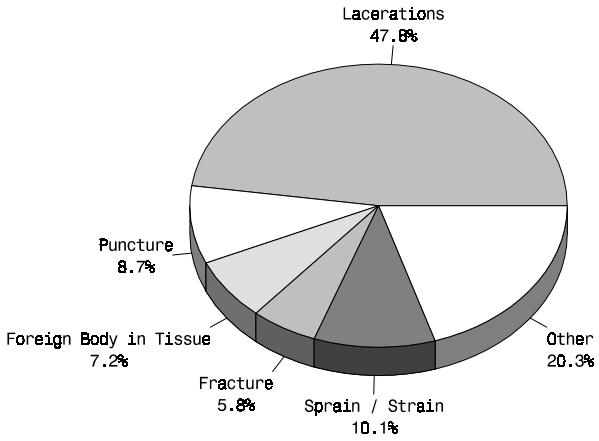
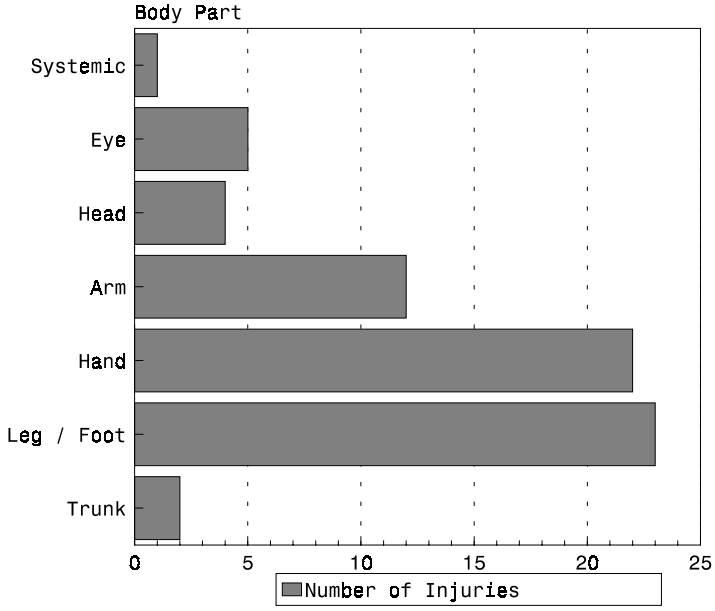


Figure 9. Body location of injury, NSW RIPP & VISS data



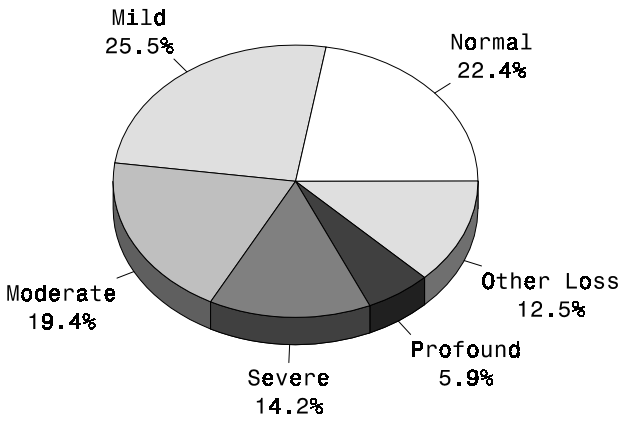
NOISE INDUCED HEARING LOSS.

The NSW Rural Hearing Conservation Program holds data regarding free hearing screening results obtained from farmers and farm workers at NSW Farm Field days. At the end of 1997, there were a total of 1890 individuals for whom full details were recorded. Of these persons 65% were males who identified themselves as full time farmers, 19.6% males who were part time or hobby farmers, 9.6% were full time female farmers and 6% were female part time farmers.

While there is no specific information regarding frequency and duration of exposure of individuals it is known that at peak periods in agriculture shifts can be 12-16 hours in length and that a working week for full time sheep farmers is often in excess of 55 hours per week (Ferguson KH, 1996).

Whereas others (Eddington I et al, 1995) have suggested that there may be a difference in incidence of hearing loss among the various commodity groups, analysis of the NSW sample data has failed to show any consistent pattern in relation to particular farming industries being more at risk of incurring a hearing loss as a result of farm noise exposure. What is clearly evident is the gradual deterioration in hearing thresholds of farmers as the years involved in the industry increases. The distribution of hearing loss types for the sheep industry is presented in Figure 10 below.

Figure 10. Proportion of Hearing Loss Types - Sheep Industries.



ZOONOSES

Hydatid tapes worms cause cysts in the liver, kidney and other organs of sheep and other animals, and humans can also become infected in the same way. The disease is transmitted in Australia through the dog/sheep life cycle, with humans becoming a host following ingestion of eggs from the dog. More recently a sylvatic cycle has been described involving kangaroo hosts.

Hydatid infection occurs predominantly in the eastern half of New South Wales, along the great dividing range. There is an increasing trend for cases to arise on the north eastern and south eastern tablelands. The mean annual prevalence of hydatidosis in rural NSW = 2.6 cases per 100 000 population. Between 1987 - 1992 there were 195 new cases of hydatidosis in NSW and the ACT (Jenkins DJ & Power K, 1996).

The following table shows the national incidence of hydatid disease in humans by state according to the Communicable Diseases Intelligence report of the Commonwealth Department of Health and Aged Care.

Table 11 Reported cases of Hydatid disease

YEAR	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total
1991	0	7	0	31	0	1	3	2	**44**
1992	0	5	0	13	1	2	13	4	**38**
1993	0	3	0	17	0	2	8	2	**32**
1994	2	20	1	8	3	1	19	2	**56**
1995	0	18	0	11	0	3	14	0	**46**
1996	4	14	0	10	0	2	14	1	**45**
1997	0	6	0	12	1	2	31	9	**61**
1998	0	0	0	12	3	1	28	2	**46**

Q Fever is the other zoonotic disease of concern to people involved in animal production in Australia. It is caused by a small organism, *Coxiella burnetii*, and while most people who contract the disease suffer headaches, fever and debility for a few weeks only, a small number can go on to more serious complications. The disease is spread by inhalation of the organisms in dusts from premises contaminated by animal birth fluids, products of

conception and excreta of infected animals. The degree of risk for sheep handlers in Australia is currently being investigated (Fragar et al. 1999). Evidence of Q fever has been identified in workers in sheep abattoirs (Dubbo Plains Division of General Practice. 1999)

Orf is a viral disease of the skin transmitted to humans by contact with infected sheep and goats. In sheep it causes scabby mouth with ulcers and sore around the muzzle and nostril. In humans it typically causes blister like lesions on the hands, and wrist, and sometimes the face. Shearers are at high risk of contracting the disease.

PESTICIDES AND HUMAN HEALTH

Pesticides are defined as substances used to destroy, prevent, control, attract or repel pests or to regulate plant growth. They include insecticides, herbicides, fungicides, bactericides, plant growth regulators, defoliants, rodenticides and biological control agents.
The body routes of human exposure include:

1. the skin (dermal)
2. the lungs (inhalation)
3. the mouth (ingestion)
4. the eyes.

The skin is the most common route of entry into the body, and different body surfaces will have various absorption rates for different chemicals. Serious damage to the eyes can also occur with contact with many pesticides.

Inhalation of pesticides can result in rapid transfer across lung surface to blood supply, and can occur from dusts, vapours, or very small spray droplets.

Oral ingestion may result from splashes, keeping chemicals in unlabelled bottles, poor hygiene, intentional or unintentional swallowing.

The hazard level of any pesticide will depend on the pesticide's toxicity, the concentration of the chemical, the duration of exposure and the route of entry or absorption into the body. The human toxicity of a chemical is generally extrapolated from test animal experiments and can be expressed dermally or orally. Toxicity tests evaluate the following health effects:

1. Acute effects - the immediate effects of single, short term exposure
2. Chronic effects - multiple or long-term exposure effects
3. Reproductive effects - potential impairment of reproductive function
4. Teratogenic effects - effects on foetal development
5. Mutagenic effects - structural or functional impairment to genetic material
6. Carcinogenic effects - potential to cause tumours and cancer

The data to describe the full extent of human health effects from exposure to pesticides is not available. There are a number of reasons for this including the potential long latency periods for chronic illness, the difficulty in diagnosing acute health effects, the non-specific nature of pesticide health effects and the lack of an effective monitoring system.

Following an initial survey in the UK of 34 cases of suspected exposure to sheep dip pesticides, a study was conducted by the Birmingham University which has recently demonstrated that long term exposure by sheep farmers to organophosphate pesticides probably causes subtle changes to the nervous system, affecting cognitive function (Stephens et al). Sheep farmers routinely use OP pesticides in control of ectoparasites in sheep, and the processes of dipping, jetting or back-lining for ectoparasite control often result in skin contamination of sheep handlers.

Research is being conducted in Australia to examine the potential problem of pesticide residues in wool - which has the potential to result in unacceptable exposure to pesticides by shearers and others handling treated sheep and wool.

While pesticide users are at greatest risk of exposure, families of farmers and farm workers may be exposed to pesticide residues on equipment, garments, containers and in their homes. Children may be at risk because of their body size and eating and dressing habits, and are at particular risk of accidental poisoning caused by pesticides.

ESTIMATES OF CURRENT COST TO INDUSTRY

The costs of work related injury and illness in the Agricultural sector is estimated by Worksafe Australia to be between $0.52 and $1.29 billion annually for Australia as a whole.

It has been estimated by Farmsafe Australia that OHS costs to industry could be cut by at least 30% within the next 5 year period, with greater reductions in the longer term as improved work processes are designed and capital equipment is replaced.

Sheep shearer injury alone accounted for 14.8% of agricultural sector workers compensation claims reported to Worksafe Australia –representing a cost of between $7 to $19 million per annum – 0.5% of the gross value of wool production in Australia in 1992-92, or an estimated 5% of the net value of wool production in Australia. (Based on ABS estimates of the net value of farm production = 88% of gross value across all agricultural commodities 1992-92).

Workers compensation premiums vary between states. In NSW it is currently 10.36% of wages for the agricultural sectors, where across all industries it is less than 3%.

To this must be added the costs associated with injury, illness and death of farmers, farm managers and other farm workers, costs of replacement labour, costs associated with litigation under common law, and costs of prosecution by work health authorities. The potential for increased claims for alleged exposure to pesticides and to noise is likely to increase in the future.

Further work is needed to fully identify the cost of injury and illness in the sheep industries.

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This document has been prepared for the sheep and wool industries in Australia to assist in development of a Sheep and Wool Industries Health and Safety Strategy and Plan.

It aims to list the full range of potential hazards to human health and safety on sheep properties, and to provide information to assist producers, workers and the industry in ***assessing the degree of risk*** associated with identified hazards. Such information will be useful in the development of a range of "tools" for sheep and wool producers to use in the process of managing health and safety issues for workers on sheep properties, family members and visitors to the property. Such tools include:

- Farm safety environmental audits
- Guidance notes for the implementation of a safety program
- Induction and training of workers
- Health and safety records

The information has taken account of:

- Identified hazards to health and safety in the sheep and wool production processes
- The severity of injury or illness as indicated by risk of death and permanent disability
- The frequency of injury or illness or exposure risk
- The costs associated with injury and illness
- The requirement to meet relevant occupational health and regulations in relation to control of risk

The information has been derived from:

- Direct observation of sheep handling and shearing activity
- Observations and input of members of the Health and Safety in the Sheep Industries Reference Group
- Coleman R. *"Health and Safety Profile of the Australian Sheep Industries".* 1996. Australian Agricultural Health Unit. This document draws on a number of sources, including hospital data, workers compensation data collated by Worksafe Australia and Keith Ferguson of the Queensland Division of Workplace Health and Safety.
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The **Severity Rating** is derived from consideration of the severity, duration and cost of the most severe injury or illness caused by the hazard.

The **Frequency Rating** is a composite rating, taking into account both the typical frequency of exposure of workers and others to the hazard and the frequency of reported injury or illness. Specific references used in determining the Frequency Rating are as listed:

1. Worksafe Australia. Occupational health and safety performance overviews - Issue No 9: Agriculture and Services to Agriculture Industries. 1995

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I Industry knowledge

The **Risk Rating** is derived from both the above ratings.

Hazards and Risk Associated with Sheep and Wool Production

A. SHEEP HUSBANDRY

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
Mustering/ Yarding/ Drafting/ Handling	Butts by animals in races/ pens	Workers involved in sheep handling	Injury to knees, legs, torso, feet, hands, head	■■■□□	■■■■■ (2)	☠☠☠	Rams and certain breeds raise risk Heavier sheep increase injury risk
	Agbike injury - falls, collisions with objects/ fences	Drovers	Death (ATV) Crush injury Fracture/ dislocation lower limb Lacerations/ contusions upper limb, head injury	■■■■■	■■■■■ 2,3)	☠☠☠☠☠	Young men at high risk
	Horse injury	Drovers	Death Serious injury limbs, head injury, crush injury	■■■■■	■■■□□ (2)	☠☠☠☠	All ages at risk Greater risk of fracture in older people
	Lifting sheep	Workers involved in sheep handling	Back injury Musculoskeletal injury	■■■□□	?	☠☠☠	Heavier sheep increase injury risk Heavier sheep increase injury risk
	Bending/ stooping	Workers involved in sheep handling	Back injury Musculoskeletal injury	■■■□□	?	☠☠☠	
	Slips, trips, falls	Workers involved in sheep handling	Sprains, strains, fractures ankles wrists, back, feet	■■□□□	■■■□□ (2)	☠☠	Greater risk of fracture in older people
	Orf in humans (= scabby mouth in sheep)	Workers involved in sheep handling	Rash on hands	■□□□□	?	☠	
	Dog bite	Workers involved in sheep handling, family members and visitors	Laceration Infected bite	■■□□□	■□□□□ (10)	☠☠	
	Hydatid disease from sheep dogs	Workers and family members handling infected dogs	Serious illness	■■■■□	■□□□□ (5)	☠☠☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
Mating/ Artificial Insemination	Butting by rams	Workers handling sheep	Injury to knees, legs, torso, head	■■■□□	■■■□□ (2)	☠☠☠	Heavier sheep increase injury risk
	Lifting sheep	Workers handling sheep	Back & musculoskeletal injury	■■■□□	?	☠☠☠	Heavier sheep increase injury risk
Pregnancy testing	Bending/ lifting/ twisting	Veterinarian/operator	Back injury Musculoskeletal injury	■■■□□	?	☠☠☠	
Lambing	Bending/ lifting/ twisting	Workers managing lambing	Back injury Musculosketal injury	■■■□□	?	☠☠☠	
	Zoonotic infection	Workers managing lambing	Blood, body fluid borne diseases Q Fever	■■■□□	■■□□□ (12)	☠☠☠	
Castrating/ tailing/ ear marking	Lifting lambs Bending/stooping/twisting	Workers handling lambs	Back injury Musculosketal injury	■■■□□	■■■■□ (I)	☠☠☠	Heavier sheep increase injury risk
	Knife	Operator	Laceration to hands	■■■□□	?	☠☠☠	
	Pesticides	Operator	Exposure to hazardous substances	■■■□□	?	☠☠	Subject to Hazardous Substances legislation
Mulesing	Lifting lambs Bending/stooping/twisting	Workers handling lambs	Back injury Musculosketal injury	■■■□□	■■■■□ (I)	☠☠☠	Heavier sheep increase injury risk
	Knife	Workers	Laceration to hand	■■■□□			
Feeding lambs	Lifting lambs Bending/stooping	Workers and often farm family members	Back injury Musculoskeletal injury	■■■□□	?	☠☠☠	
Weaning	Butts by animals in races/ pens	Workers involved in sheep handling	Injury to knees, legs, torso, feet, hands, head	■■■□□	■■■□□ (2)	☠☠☠	Heavier sheep increase injury risk
	Lifting sheep	Workers involved in sheep handling	Back injury Musculoskeletal injury	■■■□□	?	☠☠☠	Heavier sheep increase injury risk

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
	Bending/ stooping	Workers involved in sheep handling	Back injury Musculoskeletal injury	■■■□□	?	☠☠☠	
	Slips, trips, falls	Workers involved in sheep handling	Sprains, strains, fractures ankles wrists, back, feet	■■□□□	■■■□□ (2)	☠☠	Greater risk of fractures in older people
	Orf in humans (= scabby mouth in sheep)	Workers involved in sheep handling	Rash on hands	■□□□□	?	☠	
	Dog bite	Sheep handlers, family members and visitors	Infected bite	■■□□□	■□□□□ (10)	☠☠	
	Hydatid disease from sheep dogs	Workers and family members handling infected dogs	Serious illness	■■■■□	■□□□□ (5)	☠☠☠☠	
Selling sheep	Butts by animals in races/ pens	Workers involved in sheep handling	Injury to knees, legs, torso, feet, hands, head	■■■□□	?	☠☠☠	Rams and certain breeds raise risk Heavier sheep increase injury risk
	Lifting sheep	Workers involved in sheep handling	Back injury Musculoskeletal injury	■■■□□	?	☠☠☠	Heavier sheep increase injury risk Heavier sheep increase injury risk
	Bending/ stooping	Workers involved in sheep handling	Back injury Musculoskeletal injury	■■■□□	?	☠☠☠	
	Slips, trips, falls	Workers involved in sheep handling	Sprains, strains, fractures ankles wrists, back, feet	■■□□□	?	☠☠	Greater risk of fractures in older people
	Orf in humans (= scabby mouth in sheep)	Workers involved in sheep handling	Rash on hands	■□□□□	?	☠	
	Dog bite	Sheep handlers, family members and visitors	Infected bite	■■□□□	■□□□□ (10)	☠☠	
	Motor vehicle/trailer	Operators, bystanders	Death , injury by runover, crush injury	■■■■■	?	☠☠☠☠☠	
	Hydatid disease from sheep dogs	Workers and family members handling infected dogs	Illness	■■■■□	■□□□□ (5)	☠☠☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
Feeding/ grazing	Lifting feeds/ Bending/stooping	Workers/ helpers feeding sheep	Back injury Back injury Musculoskeletal injury	■■■■□	?	☠☠☠	
	Slips, trips, falls	Workers involved in handling feeds	Sprains, strains, fractures ankles wrists, back, feet	■■□□□	?	☠☠	Greater risk of fractures in older people
	Organic dusts from stored feeds	Workers/ helpers feeding sheep	Foreign body in eye Respiratory disease - asthma, Toxic Organic Dust Syndrome, hypersensitivity pneumonitis	■■■■□	?	☠☠☠☠	Greater risk for those with asthma and those who smoke
	Pesticides in stored grain/ feed	Workers/ helpers feeding sheep	Exposure to hazardous substances	■■■□□*	?	☠☠	Subject to Hazardous Substances regulation
Ectoparasite control Dipping sheep	Sheep dip tank - falls into	Workers, children and bystanders	Drowning Pesticide exposure	■■■■■	■□□□□ (11)	☠☠☠☠☠	
	Exposure to pesticides	Workers, helpers	Pesticide toxicity	■■■□□*	■■■■□ (8)	☠☠☠☠	Subject to Hazardous Substances regulation
	Exposure to pesticides residues in wool	Shearers, wool handlers	Pesticide toxicity	■■■□□*	?	☠☠☠☠	
	Bending/stooping/twisting	Workers who dip sheep	Back and Musculoskeletal injury	■■■□□	?	☠☠☠	
Sheep Jetting	Exposure to pesticides spray drift	Workers, helpers, bystanders	Pesticide toxicity	■■■□□*	■■■■□ (8)	☠☠☠☠	Subject to Hazardous Substances regulation
	Exposure to pesticides residues in wool	Shearers, wool handlers	Pesticide toxicity	■■■□□*	?	☠☠☠☠	
	Power drive of jetting equipment	Operator, bystanders	Crush injury to hands, lower limb	■■■□□	?	☠☠☠	
	Bending/stooping/twisting	Workers who jet sheep	Back and Musculoskeletal injury	■■■□□	?	☠☠☠	
Blowfly treatment	Exposure to pesticides	Workers, helpers	Pesticide toxicity	■■■□□*	■■■■□ (I)	☠☠☠☠	Subject to Hazardous Substances

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating (Reference)	Risk Rating	Associated risk factors
							regulation
	Exposure to pesticides residues in wool	Shearers, wool handlers	Pesticide toxicity	■■■□□*	?	☠☠☠☠	
	Bending/stooping/twisting	Workers who treat sheep	Back and Musculoskeletal injury	■■■□□	?	☠☠☠	
Backliner ectoparasite control	Exposure to pesticides - hands, back	Workers, helpers	Pesticide toxicity	■■■□□*	■■■□□ (I)	☠☠☠☠	
Internal parasite control	Exposure to anthelminthic	Workers who drench sheep	Anthelminthic toxicity	■■□□□	■■■■□ (I)	☠☠☠	
	Bending/stooping/twisting	Workers who drench sheep	Back and Musculoskeletal injury	■■■□□	?	☠☠☠	
Other disease management	Exposure to agvet chemicals	Veterinarians Workers handling sick sheep	Pesticide toxicity, needlestick, tetanus	■■■□□	?	☠☠	Subject to Hazardous Substances regulation
	Lifting sheep	Veterinarians Workers handling sick sheep	Back injury Musculosketal injury	■■■□□	?	☠☠☠	Heavier sheep increase injury risk
On-farm slaughter for meat	Kicks Cuts by knife	Farm workers	Injury to hands, legs Lacerations	■■■□□	■■■■□ (3)	☠☠☠☠	Heavier sheep increase injury risk
Slaughter of unwanted stock	Firearms	Shooters, bystanders	Gunshots wounds, death	■■■■■	■□□□□ (9)	☠☠☠☠☠	

*** Severity rating will be higher depending on the toxicity of pesticide in use**

B. WOOL HARVESTING AND CRUTCHING

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
Penning up	Butts by animals	Penner up		■■■□□	■■□□□ (2)	☠☠	Heavier sheep increase injury risk
	Slips, trips, falls	Penner up		■■■□□	?	☠☠	Greater risk of fractures in older people
Shearing	Catching, dragging, lifting	Shearer	Back injury Musculoskeletal injury	■■■□□	■■■■■ (4,6,7)	☠☠☠☠	High workers compensation cost Heavier sheep increase injury risk
	Shearing machine - belts/ pulleys/crankshaft	Shearer/shed hand	Crush injury to hands, arm,	■■■□□	?	☠☠	Higher risk if equipment within reach
	Shearing handpiece	Shearer	Lacerations to hands,arms, face, legs "Squeaky wrist" or repetitive strain syndromes Vibration injury	■■■□□	■■■■□ (4,6)	☠☠☠☠	
	Shearing process- lifting/ bending/ stooping/ twisting/ pulling/ pushing	Shearer	Back injury Musculoskeletal injury	■■■□□	■■■■■ (4,6,7)	☠☠☠☠☠	High workers compensation cost Heavier sheep increase injury risk
	Pesticide residues	Shearer	Pesticide toxicity	■■■□□*	?	☠☠☠☠	Subject to Hazardous Substances legislation
	Zoonotic infection	Shearer Shed hand	Blood, body fluid borne diseases Q Fever	■■■□□	■■□□□ (12)	☠☠☠	
	Orf	Shearers Shed hand	Orf rash on hands	■□□□□	■■■■■ (4, 6)	☠☠	
	Other skin infections/ yoke boils, pilonidal sinus	Shearer Shed hand	Skin infection on hands, arms, legs	■□□□□	■■■■■ (4,6)	☠☠	
	Kicks	Shearer	Injury knees,legs,hands	■■□□□	■■■■■ (4,6)	☠☠☠	Heavier sheep increase injury risk

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
Shearing/ crutching in mobile systems	Stooping/ twisting	Shearer	Back injury/strain	■■■□□	?	☠☠☠☠	
Wool handling	Stooping, bending, twisting, lifting, throwing	Picker up	Back injury Musculoskeletal injury	■■■□□	■■■■■ (6)	☠☠☠☠	
	Zoonotic infection	Shearer Shed hand	Blood, body fluid borne diseases Q Fever	■■■□□	■■□□□ (12)	☠☠☠	
	Pesticide residues	Picker up	Pesticide toxicity	■■■□□*	?	☠☠☠☠	
Skirting, classing, binning	Lifting/bending/stooping/ twisting	Wool roller Wool classer	Back injury Musculoskeletal injury	■■■□□	■■■■■ (6)	☠☠☠☠	
	Pesticide residues	Wool roller Wool classer	Exposure to hazardous substance	■■□□□	?	☠☠☠☠	
	Zoonotic infection	Shearer Shed hand	Blood, body fluid borne diseases Q Fever	■■■□□	■■□□□ (12)	☠☠☠	
	Other skin infections/ yoke boils, pilonidal sinus	Wool roller Wool classer	Skin infection on hands, arms, legs	■□□□□	■■■■■ (4,6)	☠☠	
Wool pressing	Stooping, bending, twisting, lifting	Wool presser	Back injury Musculoskeletal injury	■■■■■	■■■■■ (6)	☠☠☠☠☠	
	Wool press	Wool presser	Crush injury to hands,arms, other body parts, death	■■■■□	■■□□□ (4,6, I)	☠☠☠☠	
	Pesticide residues	Wool presser	Exposure to hazardous substance	■■□□□*	?	☠☠☠☠☠☠☠	
Sharpening cutters, combs	Grinders used to sharpen - combs and cutters	Shearers Experts Bystanders	Foreign body injury to eyes, hands Laceration due to contact with grinding wheel	■■■□□	?	☠☠☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
	Electric leads	All workers Shearers Experts	Trips, falls Electric shock, death	■■■■■	?	☠☠☠☠☠	
Storing/ transporting/ selling product	Wool bales - manual handling	Shed hands, farm workers, carriers	Back injury Musculosketal injury	■■■■□	■■□□□ (6)	☠☠☠☠	
	Slips, trips, falls	Shed hands, farm workers, carriers	Sprains, strains, fractures wrists, legs, backs	■■□□□	?	☠☠☠	Risk of fractures greater in older people
General	Shearing shed noise (Shearing machinery, wool presses, grinders, sheep, dogs, radios, sound systems)	All workers in wool sheds	Noise induced hearing loss	■■□□□	■■■□□ (6)	☠☠☠☠	AAHU database will provide information
	Shearing shed heat	All workers in wool sheds Shearers at particular risk	Heat stress, dehydration	■■■□□	■■■□□ (6)	☠☠☠	
	Shearing shed ammonia fumes	All workers	Upper respiratory irritation	■□□□□	■■■□□ (6)	☠☠	Risk of respiratory effects greater in those with asthma

C. PASTURE MAINTENANCE AND HAY AND SILAGE PRODUCTION

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
Cultivating / Ground preparation	Tractor	Operator, passengers, bystanders	Death/crush injury from rollover, runover	■■■■■	■■■■■	☠☠☠☠☠	
	Noise	Operator	Noise induced, high frequency hearing loss	■■□□□	■■■■■	☠☠☠☠	
	PTO	Operator, bystander	Amputation limbs, crush injury, death	■■■■■	■■■■■	☠☠☠☠☠	
	Implements	Passengers Operator during operational interruption [*] & routine maintenance	Death Crush injury, lacerations, contusions	■■■■■	■■□□□	☠☠☠☠	
	Hitching	Operator	Crush injury fingers, hands Serious injury	■■■□□	?	☠☠☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, writs	■■□□□	■■■□□	☠☠☠	Fractures more likely in older people
	Herbicide exposure	Operator during mixing and spraying Bystanders	Acute toxicity depending on specific herbicide	■■□□□	?	☠☠☠	Subject to Hazardous Substances regulation
	UV/ solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■	☠☠☠☠	Middle of the day greater risk Children/adolescents special risk
Fertilising	Tractor	Operator, passengers, bystanders	Death/crush injury from rollover, runover	■■■■■	■■■■■	☠☠☠☠☠	
	Noise	Operator	Noise induced, high frequency hearing loss	■■□□□	■■■■■	☠☠☠☠	
	PTO	Operator, bystander	Amputation limbs, crush injury, death	■■■■■	■■■■■	☠☠☠☠☠	

[*] Includes clearing blockages, in-field repairs

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
			death				
	Implements	Operator during operational interruption * & routine maintenance	Crush injury, lacerations, contusions	■■■■□	■■□□□	☠☠☠	Single axle spreaders are unstable & can fall backwards
	Hitching	Operator	Crush injury fingers, hands	■■■□□	?	☠☠☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, writs	■■□□□	■■■□□	☠☠☠	Fractures more likely in older people
	Bending, lifting	Operator	Back injury, musculoskeletal strain/sprain	■■■□□	?	☠☠☠	
	Dusts / Particles	Operator, bystanders	Foreign body in eye Respiratory effects	■■□□□	?	☠☠☠	Respiratory problems greater for those with hypersensitivity
	Lime	Operator	Burns	■■■□□	?	☠☠☠	
	Fertiliser store/ silos/ fertiliser bins	Operator	Asthma in hypersensitive people Crush injury from falls of unstable structures	■■■■□	?	☠☠☠	
	Rupture of one tonne fertiliser bags sling	Operator	Crush injury	■■■■□	?	☠☠☠☠	Insufficient strength of supporting beams/structures
	UV/ solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■	☠☠☠☠	Middle of the day greater risk Children/adolescents special risk
Planting / seeding	Tractor	Operator, passengers, bystanders	Death/crush injury from rollover, runover	■■■■■	■■■■■	☠☠☠☠☠	
	Noise	Operator	Noise induced, high frequency hearing loss	■■□□□	■■■■■	☠☠☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
	PTO	Operator, bystander	Amputation limbs, cush injury, death	■■■■■	■■■■■	☠☠☠☠☠	
	Implements	Operator during operational interruption * and routine maintenance Passengers	Crush injury, lacerations, contusions	■■■□□	■■□□□	☠☠☠	
	Hitching	Operator	Crush injury fingers, hands	■■■□□	?	☠☠☠	
	Slips / trips / falls Falls from seeders	Operator	Sprains, strains, fractures to ankles, feet, backs, writs	■■□□□	■■■□□	☠☠☠	Fractures more likely in older people
	Bending, lifting	Operator	Back injury, musculoskeletal strain/sprain	■■■□□	?	☠☠☠	
	UV/ solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■	☠☠☠☠	Middle of the day greater risk Children at special risk
	Organic Dusts / Particles	Operator, bystanders	Respiratory effects- asthma, TODS	■■■■□	?	☠☠☠	People with respiratory hypersensitivity at greater risk. Risk greatly increased by tobacco smoking
Crop pest protection	Exposure to pesticides	Operator during mixing, spraying Bystanders during spraying	Acute toxicity, depending on chemical used Unknown long term effects	■■■□□*	?	☠☠☠☠	People with asthma

* Includes clearing blockages, in-field repairs

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
	ATVs	Operators	Death and crush injury	■■■■■	■■■■□	☠☠☠☠	
Irrigating	Tractor	Operator, passengers, bystanders	Death/crush injury from rollover, runover	■■■■■	■■■■■	☠☠☠☠☠	
	Noise	Operator	Noise induced, high frequency hearing loss	■■□□□	■■■■■	☠☠☠☠	
	ATVs	Operators	Death and crush injury	■■■■■	■■■■□	☠☠☠☠	
	Overhead Powerlines	Operators moving irrigation pipes Rescuers	Electrocution	■■■■■	■■■□□	☠☠☠☠☠	
	Lifting / carrying / moving pipes	Operator	Back injury, musculoskeletal strain/sprain	■■■□□	?	☠☠☠	
	Slips, trips, falls	Operator	Back strain, musculoskeletal strain/ sprain	■■□□□	■■■□□	☠☠☠	
	UV/ solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■	☠☠☠☠	Middle of the day greater risk Children/ adolescents special risk
	Pumps / belts / PTO & shafts/ moving parts	Operator during maintenance	Amputation fingers hands Crush laceration injury	■■■□□	?	☠☠☠	Automatic sensors may increase risk
	Wells - toxic gases, confined space	Operators doing pump maintenance Rescuers	Death	■■■■■	■■□□□	☠☠☠☠☠	
Hay/silage cutting,	Tractor	Operator, passengers,	Death/crush injury from			☠☠☠☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
raking/ windrowing, baling/wrapping		bystanders	rollover, runover	■■■■■	■■■■■		
	Noise	Operator	Noise induced, high frequency hearing loss	■■□□□	■■■■■	☠☠☠☠	
	PTO	Operator, bystander	Amputation limbs, crush injury, death	■■■■■	■■■■■	☠☠☠☠☠	
	Implements	Operator during operational interruption * and routine maintenance	Crush injury, lacerations, contusions	■■■■□	■■□□□	☠☠☠	
	Hitching	Operator	Crush injury fingers, hands	■■■□□	?	☠☠☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, writs	■■■□□	■■■□□	☠☠☠	Fractures more likely in older people
	Hay / silage cutting implements	Operator during operational interruption	Amputation feet, lacerations, contusions	■■■■□	■■□□□	☠☠☠	
	Forage harvesters	Operators Bystanders	Lacerations, amputations fractures Crush from run away machines	■■■■□	?	☠☠☠	
	Hay Raking Implements	Operator during operational interruption *	Laceration, contusions	■■□□□	■■□□□	☠☠☠	
	Hay Baling and Wrapping Implements/ Silage wrappers	Operator during operational interruption *	Crush injury hands, arms Crush injury/death from rolling bales	■■■■■	■■□□□	☠☠☠☠	Large round balers increase risk of injury from rolling bales
	UV/ solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■	☠☠☠☠	Middle of the day greater risk Children/adolescents special risk
	Organic Dusts	Operators, bystanders	Respiratory effects - asthma,		?	☠☠☠	Risk greatly

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
			TODS , hypersensitivity pneumonitis Foreign body in eye *	■■■■□			increased by tobacco smoking
Hay stack	Stack collapse Falls from stack	Worker, children	Crush injury Fractures/strains	■■■■□	?	☠☠☠	
Silage Pit Preparation / Filling	Tractor/ Front End Loader	Operator	Crush injury Death from rollover	■■■■■	■■■■■	☠☠☠☠☠	Boggy, unstable, wet conditions
	Silage stack - collapse	Operator	Crush injury	■■■■□	?	☠☠☠	
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, writs	■■□□□	■■■□□	☠☠☠	
	Pit wall collapse	Operator	Crush injury	■■■■□	?	☠☠☠	
Feeding Silage	Silage gases from harvest stores	Operator/ Rescuers	Inhalation toxicity, death	■■■■■	?	☠☠☠☠	Work in confined space
	Tractor/ front end loader	Operator	Crush injury, death from rollover/runover	■■■■■	■■■■■	☠☠☠☠☠	
	Injury from feed out cart	Operator at operational interruption * Bystanders	Crush, amputation, laceration	■■■□□	?	☠☠☠	
	UV/ solar radiation	Operator	Sunburn, skin cancer, dehydration	■■■□□	■■■■■	☠☠☠☠	Middle of the day greater risk Children at special risk
	Slips / trips / falls	Operator	Sprains, strains, fractures to ankles, feet, backs, wrist	■■□□□	■■■□□	☠☠☠	Fractures more likely in older people
Elevating / Loading	Falling / rolling bales	Operator, bystanders	Crush, internal injury, head injury	■■■■■	?	☠☠☠☠	
	Bale elevators/ loaders Belts / exposed moving parts	Operator	Crush, contusions, amputation fingers, hands	■■■□□	?	☠☠☠	
	Overhead Powerlines	Operator, Rescuers	Electrocution, death	■■■■■	■■■□□	☠☠☠☠☠	

D. FENCING

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
Cutting, transporting posts	Chainsaw kickback, slipping, falling	Worker	Lacerations, amputation, death	■■■■■	■■□□□	☠☠☠☠	
	Chainsaw noise	Operator, bystanders	Noise induced hearing loss	■■□□□	■■■■□	☠☠☠☠	
	Rolling logs	Worker, bystanders	Crush injury, fractures	■■■■□	?	☠☠☠	
	Falling trees, limbs	Worker, bystanders	Crush injury, fractures, death	■■■■■	■■□□□	☠☠☠☠	
	Slips, trips, falls	Worker	Sprains, strains, fractures ankles wrists, back, feet	■■□□□	?	☠☠	Fractures more likely in older people
	Trailer, tractor runover	Worker, bystanders	Crush injury, fractures, death	■■■■■	?	☠☠☠☠☠	
Post hole digging, post erection	Post hole digger entanglement	Worker/ bystander	Crush injury, lacerations, amputations, death	■■■■■	■■■■□	☠☠☠☠☠	
	Earth ramming	Worker	Shoulder strain/ musculoskeletal injury	■□□□□	■■■□□	☠	
	Slips, trips, falls,	Worker	Sprains, strains, fractures ankles, wrists, back, feet	■■□□□		☠☠	Fractures more likely n older people
Fence assembly	Wire runout, barbed wire	Worker	Lacerations	■■□□□	■■□□□	☠☠	
	Wire straining, breaking, recoil	Worker, bystanders	Lacerations, eye injury	■■■■□	?	☠☠☠	
	Pliers	Worker	Crush injury fingers Lacerations	■□□□□	?	☠	
	Electrical fence assembly	Worker	Electric shock	■■□□□	?	☠☠	

Production phase	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
	Stooping, pulling, twisting, lifting	Worker	Back injury, musculoskeletal injury	■■■□□	■■■□□	☠☠☠	
	Slips, trips, falls	Worker	Sprains, strains, fractures ankles, wrists, back, feet	■■□□□	?	☠☠	
Hanging gates	Lifting, pushing, pulling	Worker	Back injury, musculoskeletal injury	■■■□□	?	☠☠☠	
	Slips, trips, falls Falling gate	Worker	Sprains, strains, fractures ankles, wrists, backs, feet	■■□□□	?	☠☠	Fractures more likely in older people
Maintenance	Wire straining	Worker	Lacerations Eye injury	■■■■□	?	☠☠☠	
Travel/ Transport	ATV, motorcycle injury - falls, collisions with objects/ fences	Worker	Death (ATV) Crush injury Fracture/ dislocation lower limb Lacerations, contusions upper limb, head injury	■■■■■	■■■■□	☠☠☠☠☠	

E. MACHINERY, EQUIPMENT MAINTENANCE

Workshop activities	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
Power tools	Electricity	Workers, helpers	Electric shock, death	■■■■■	?	☠☠☠☠	
	Flying steel fragments from grinders	Workers, bystanders	Steel fragments in eye	■■□□□	■■■■■	☠☠☠☠	
	Saws - bench, portable	Workers	Lacerations, contusions	■■□□□	?	☠☠☠	
	Angle grinders - heat	Workers	Lacerations, contusions, burns	■■■□□	?	☠☠☠	
Hand tools	Contact with hands. fingers	Workers	Crush injury hands, fingers	■■□□□	■■■□□	☠☠☠	
Welding	Oxyacetylene explosion	Workers, bystanders	Burns, penetrating injury	■■■■□	?	☠☠☠☠	
	Welding arc	Workers, bystanders	Flash burns to eyes, skin	■■□□□	■■■■■	☠☠☠☠	
	Welding fumes	Workers, bystanders	Toxicity	■■■□□	?	☠☠☠	
Air compressors	Explosion	Workers, bystanders	Penetrating injury	■■■■□	?	☠☠☠☠	
Tyre repair	Explosion	Workers, bystanders	Penetrating injury	■■■■□	?	☠☠☠☠	
	Failure of chocks and jacks	Workers	Crush injury, death	■■■■■	■■■□□	☠☠☠☠☠	
Hoists	Failure	Workers	Crush injury, death	■■■■■	?	☠☠☠☠☠	
Chemicals	Solvents	Handlers	Skin conditions Toxicity	■■■□□	?	☠☠☠	
	Petroleum products	Handlers	Skin conditions Toxicity	■■■□□	?	☠☠☠	
Firearms	Accidental/ intentional discharge	Workers, others	Penetrating injury, death	■■■■■	■■■■□	☠☠☠☠☠	

Workshop activities	Associated physical hazards	Who is at risk	Nature of risk	Severity Rating	Frequency Rating	Risk Rating	Associated risk factors
General workshop hazards	Noise	Workers, bystanders	Noise induced hearing loss	■■□□□	■■■■■	☠☠☠☠	
	Storage areas	Workers	Back strain, musculoskeletal injury	■■□□□	?	☠☠☠☠	
	Slips, trips and falls	Workers	Sprains, strains, fractures of ankles, wrists, back, feet	■■■□□	?	☠☠☠	Fractures more likely in older people
	Bench, working areas	Workers	Back, musculoskeletal injury	■■□□□	?	☠☠☠	