



DAIRY FARM INJURY IN VICTORIA

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DAIRY FARM INJURY IN VICTORIA

**by
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August, 1996

Report No. 96

MONASH UNIVERSITY ACCIDENT RESEARCH CENTRE
REPORT DOCUMENTATION PAGE

Report No.	Date	ISBN	Pages
96	August, 1996	0 7326 0676 4	xi+27

Title and sub-title:

Dairy Farm Injury in Victoria

Author(s)

Day, L.

Type of Report & Period Covered:

General, 1987-1995

Funding Organisation(s):

United Dairyfarmers of Victoria
Dairy Research and Development Corporation
Public Health Research and Development Committee

Abstract:

Injury is a major occupational health and safety issue for agricultural industries. Over the past 10 years in Victoria more work related deaths have occurred in agriculture than in any other industry group (Health and Safety Organisation, 1995). This report profiles injuries in the dairy industry based on the best available data from Victorian and national health and workers' compensation databases. *The findings should be regarded as preliminary because of the limitations of these databases.*

The leading agents of fatal injury on dairy farms were shown to be the same as those on all types of farms - vehicles, dams and tractors. The leading agents of non fatal injury on dairy farms were cattle, hot water, gates/fences and dairy plant. The major injuries were burns, fractures, cuts and sprains. The body parts most frequently injured were eyes, fingers, hands, forearms and the back.

Back injuries mainly featured in retrospective surveys reported in the literature and in the WorkCover data. The hazards for the dairying industry to address include **dams, vehicles and tractors** for fatal injury and **cattle, hot water and motorcycles** for non fatal injury. Back injury would also seem to be a chronic dairy farm injury issue, although the hazards are a little more difficult to define from the available data.

Recommendations to prevent dairy farm injuries include: reducing opportunities for cattle contact by improving either the design of the dairy or cattle handling practices; developing safe practices and improving the design of the dairy for the safer handling of hot water; developing boots designed to protect from hot water splashes and spills; investigating the circumstances in which frequent injuries, such as hand injuries, occur to determine whether a generic countermeasure such as some form of hand protection might be applicable; and reducing injuries to children as they are over-represented in deaths and serious injuries in the available data

A number of recommendations to improve the availability and quality of data on dairy farm injury are also made

Key Words:

(IRRDR except when marked*)

farm injury

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ACKNOWLEDGMENTS

The Monash University Accident Research Centre gratefully acknowledge the financial support provided to this project by the United Dairyfarmers of Victoria and the Dairy Research and Development Corporation. At the time of this research, the author was supported by a Public Health Research Fellowship from the Public Health Research and Development Committee of the National Health and Medical Research Council.

The author is grateful to the Victorian Coroner's Office, National Injury Surveillance Unit (John Dolinis), Victorian Injury Surveillance System (Karen Ashby), Health and Safety Organisation Victoria (Eric Young), and the Australian Agricultural Health Unit (Richard Coleman) for the provision of data. Phillip Capicchiano (United Dairyfarmers of Victoria) advised on the dairying industry.

Centre staff Barbara Fox, Christina Leong and Julie Valuri assisted with data coding and analysis and Erin Cassell conducted the final editing of this report.

Tony Lower (Australian Agricultural Health Unit) and Joan Ozanne-Smith (Monash University Accident Research Centre) provided useful comments on this report.

EXECUTIVE SUMMARY

Introduction

Injury is a major occupational health and safety issue for agricultural industries. Over the past 10 years in Victoria more work related deaths have occurred in agriculture than in any other industry group (Health and Safety Organisation, 1995). Both Farmsafe Australia and Worksafe Australia have identified the need to work with key agricultural commodity groups to develop industry specific safety strategies and are currently actively pursuing this objective. Therefore, the commitment by the United Dairyfarmers of Victoria (UDV) to develop a health and safety strategy for dairying is timely.

Data sources

This report profiles injuries in the dairy industry based on the best available data. Data from Victorian and national health and workers' compensation databases were analysed, to the extent possible, for cases of dairy farm specific injuries. A Medline search of the international and national literature was conducted to gather information specific to dairy farm injury. Contact was also made with key researchers in Australia to gather information which may not have reached the published literature.

The literature on dairy farm injury is sparse. In the international literature owner -operators were reported to be more at risk in two studies and cattle and machinery were found to be the prominent causes of injury. Australian studies reported that dairy farm injuries were associated with animal handling, heavy lifting, trips and stumbles and motorbikes. Hand and back injuries predominated.

Victorian injury databases cover different levels of severity or capture particular sub-groups of farm injury. Definite dairy farm injury fatalities can be identified in the Victorian Coroner's database. Non-fatal cases can be identified in the Latrobe Valley Hospital emergency department collection (part of the Victorian Injury Surveillance System) and the general practice collection (Extended Latrobe Valley Injury Surveillance). Case identification is also possible in data collected by WorkCover and the Health and Safety Organisation, Victoria. In future, dairy farm injury cases will also be identifiable in the Victorian Hospital Emergency Minimum Database when that data becomes available, to the extent that hospitals from dairying areas participate in this collection.

The identification of dairy farm injuries generally relies on the recording of the specific location of the injury (farm and type of farm) from patients at some point of contact. Currently, in some of the data collections mentioned above, this information is not collected systematically.

Although there is sufficient data available to establish a broad picture of dairy farm injury, the extent of coverage is less than ideal, particularly for non fatal injury. Monitoring of trends in dairy farm injury over time is only possible in the Latrobe Valley Emergency Department collection.

Results

- The leading agents of fatal injury on dairy farms identified from the data analysis were vehicles, dams and tractors. These are also the most common hazards associated with unintentional deaths on all farms. The management of these hazards should receive priority on dairy farms as on other farms.
- The leading agents of non fatal injury on dairy farms were cattle, hot water, gates/fences and dairy plant.
- The major injuries were burns, fractures, cuts and sprains. The body parts most frequently injured were eyes, fingers, hands, forearms and the back.

There were some differences in the pattern of injury on dairy farms compared to the pattern for farms in general. Cattle and hot water were more prominent causes of hospital admission for dairy farm injuries, while animals being ridden, motorcycles, and machinery were less prominent causes. For emergency department presentations, cattle, dairy plant and hot water appear more important causes of injury on dairy farms and motorcycles and machinery appear to be less important. It was interesting to note that back injuries mainly featured in retrospective surveys reported in the literature and in the WorkCover data. *These findings should be regarded as preliminary because of the limitations of the databases outlined above.*

Recommendations

It would appear from this initial study that the hazards for the dairying industry to address include **dams, vehicles and tractors** for fatal injury and **cattle, hot water and motorcycles** for non fatal injury. Back injury would also seem to be a chronic dairy farm injury issue, although the hazards are a little more difficult to define from the available data.

Prevention of injuries from these hazards could focus on:

- reducing opportunities for cattle contact by improving either the design of the dairy or cattle handling practices
- developing safe practices and improving the design of the dairy for the safer handling of hot water
- design boots to protect from hot water splashes and spills
- investigating the circumstances in which frequent injuries, such as hand injuries, occur to determine whether a generic countermeasure such as some form of hand protection might be applicable.
- reducing injuries to children as they are over-represented in deaths and serious injuries in the available data

This study only dealt with injury and was not extended to include other occupational health issues relevant to dairy farmers such as zoonoses, chronic exposure to chemicals and sun exposure. Such issues should also be considered when devising an occupational health and safety strategy for the industry.

Recommendations to improve the availability and quality of data on dairy farm injury (and farm injury in general, in some cases) for the purposes of informing prevention programs and subsequent evaluation of the impact of such programs include:

- Liaise with the State Coroner to ensure identification of farm type in the Coroner's database.
- Explore the potential for identification of farm type in the Health and Safety Organisation's fatality and serious injury database.
- Incorporate the National Minimum Dataset (Injury Surveillance) Level 1, plus an extended location code for farms into the Victorian Inpatient Minimum Database, which must be completed in all injury cases. This would require systematically collecting this information from the patient before discharge. For hospitals participating in the Victorian Emergency Minimum Database, this could be achieved by linking that database with the Victorian Inpatient Minimum Database.
- Ensure that the coding framework for the National Minimum Dataset (Injury Surveillance) Level 2 includes the Farm Injury Optimal Dataset developed by the Australian Agricultural Health Unit.
- Encourage regional hospitals in Victoria to participate in Victorian Emergency Minimum Dataset and use the National Minimum Dataset (Injury Surveillance) Level 2, including the Farm Injury Optimal dataset.
- Ensure that injury surveillance methods allow the identification of all farm injuries and the relevant commodity group.
- Explore the feasibility of compulsory notification of farm injury, including farm type, by all treating doctors in a similar fashion to infectious diseases.
- Incorporate a farm injury register sheet into the Managing Farm Safety Kit to facilitate self recording of farm injuries, including dairy farm injuries.
- Institute some incentives for farmers to collect injury data on their farms.
- Establish a system for the collection, validation and integration of injury data collected by farmers.
- Given the patchy nature of current databases for dairy farm injury identification, a comprehensive survey of members of the United Dairyfarmers of Victoria should be seriously considered. The purpose would be to determine the pattern of injuries experienced on dairy farms, to establish a baseline of injury occurrence against which the success of the health and safety strategy could be measured and to investigate the current safety practices used and equipment available on dairy farms. The survey would facilitate targeting of the farm safety strategy and provide a baseline to measure the impact of the actions taken. It is recommended that the survey method chosen should generate a high response rate from the members.



1.0 INTRODUCTION

Injury is a major occupational health and safety issue for agricultural industries. Over the past 10 years in Victoria more work related deaths have occurred in agriculture than in any other industry group (Health and Safety Organisation, 1995). Both Farmsafe Australia and Worksafe Australia have identified the need to work with key agricultural commodity groups to develop industry specific safety strategies and are currently actively pursuing this objective. Therefore, the commitment by the United Dairyfarmers of Victoria (UDV) to develop a health and safety strategy for dairying is timely.

It is appropriate that a prototype strategy be developed in Victoria, where 61% of Australia's milk is produced. There is considerable potential for the adoption of the Victorian strategy by other states. It is intended that profiles of the dairy industry and of dairy health and safety issues will be used to underpin the proposed strategy.

The profile of dairy farm injury in this report is based on the best available data. Victorian and national health and workers' compensation databases were analysed, to the extent possible, for cases of dairy farm injuries. A Medline search of the international and national literature was conducted to gather information specific to dairy farm injury. Contact was also made with key researchers in Australia to gather information which may not have reached the published literature.

Monash University Accident Research Centre (MUARC) holds a number of the databases and datasets relevant to this study, including the Victorian Coroner's database, an injury dataset from the Victorian Inpatient Minimum Database (VIMD), the Victorian Injury Surveillance System (VISS) and a collection of general practice injury data from the Latrobe Valley. MUARC is a multi-disciplinary centre with a broad mandate to conduct research in road safety and occupational, recreational and domestic injury prevention in both urban and rural areas.

These and other Victorian health based data systems are identified in this report and their utility for the identification of dairy farm injury is summarised. A number of recommendations have been made for modifications which would improve the utility of data systems for the purposes of identification and monitoring of dairy farm injury.

This research was supported by funding from the UDV, the Dairy Research and Development Corporation, and the Public Research and Development Committee.

2.0 INJURY DATABASES IN VICTORIA

2.1 DESCRIPTION OF DATABASES

Victoria is well served with health system databases which can be used for injury research and prevention. There are four main databases currently available, covering four levels of injury severity: deaths, hospitalisations, emergency department presentations and general practice presentations (Table 2.1).

Table 2.1: Injury databases in Victoria

Database	Time frame	Injury category	Variables
Victorian Coroner's Database	1989/90-1991/92	deaths	minimum dataset, plus additional items
Victorian Inpatient Minimum Database(VIMD)	1987/88-1993/94	public hospital injury admissions	minimum dataset, minus activity & narrative; plus additional items
Victorian Injury Surveillance System (VISS)	Various-first hospital commenced 1988	emergency department injury presentations at participating hospitals; one regional hospital, Latrobe, 1991-	minimum dataset, minus E code, plus additional items
Extended Latrobe Valley Injury Surveillance(ELVIS)	Nov 1994-Nov 1995	general practice injury presentations to almost all practices in Latrobe Valley	minimum dataset, plus additional items

Note: The minimum dataset includes: basic demographics (age, sex, post code residence), location, activity, external cause of injury (including intent), nature and body part of injury and a narrative relating to the injury event

2.1.1 Victorian Coroners' Database

The database of the State Coroner's Office is a major source of detailed information on fatal injury in Victoria. Under a pilot scheme, the first of its kind in Australia, three years of data (1989/90-1991/92) on injury deaths investigated by the state Coroners have been computerised and the data published by the Department of Justice (State Coroner's Office 1989-1992). The data is also available for approved purposes in electronic form. This database includes all acute injury deaths which occur in Victoria for which the Coroners' findings are complete.

2.1.2 Victorian Inpatient Minimum Database

The Victorian Inpatient Minimum Database (VIMD) holds information relating to all Victorian public, and more recently private, hospital admissions. Data are provided regularly by the hospitals to the Victorian Department of Health and Community Services. Monash

University Accident Research Centre holds a subset of VIMD records, selected by External cause of injury codes (E codes) from the International Classification of Diseases Ninth Revision Clinical Modification (ICD-9-CM) (US Department of Health, 1986). This subset encompasses a range of variables relating to each injury hospitalisation for the period July 1986 to June 1993 (Langlois et al. 1992; Watt, 1992, 1995). Update tapes are received for each financial year.

The VIMD is close to a complete collection of public hospital admissions in Victoria. As private hospitals increasingly supply information to the Department of Health and Community Services, the representation of private hospital injury admissions will improve. There are several quality control measures programmed in the data coding and entry software. However, there are currently no regular validation procedures. As the data are coded by hospital medical records clerks around the state, there is some potential for different interpretation of coding schedules. Furthermore, the inclusion of information regarding the circumstances of the injury event, such as the location, must be recorded in the medical history in order to be included in the database. Currently, the information does not appear to be recorded systematically in the medical history (and therefore the database).

2.1.3 Victorian Injury Surveillance System

The Victorian Injury Surveillance System (VISS) began as a paediatric injury data collection and expanded to include data on adult injury presentation to the emergency departments of participating hospitals from January 1991, commencing with the Western Hospital (Footscray campus). The data also include admissions arising from these presentations. There are now an additional four hospital campuses that have contributed adult injury data to the database: Latrobe Regional Hospital (Moe and Traralgon campuses), Preston and Northcote Community Hospital, and Royal Melbourne Hospital. As of June 1995, there were approximately 163,000 cases on the database which is located at Monash University Accident Research Centre.

Throughout Australia a standard instrument for injury surveillance has been used by emergency departments to collect injury data. The instrument collects demographic data and information relating to the injury event such as the mechanism of injury and associated factors. The forms are filled in by the patient, carer or doctor on a voluntary basis. The completion rate of data collection forms for the VISS hospitals ranges from a minimum of 85% (frequently more than 90%) for presentations to 100% for admissions. A more detailed description of the data collection process used by VISS has been published elsewhere (Watt 1992; Nolan & Penny 1992).

Although unique in Victoria, the VISS database is not a complete statewide collection of self reported injury presentations to emergency departments, since information is supplied only from those hospitals that participate in the system. Injury patterns reported from the analysis of VISS data could be influenced by the geographical location and nature of VISS hospitals. Therefore, VISS data may not be representative of the whole of Victoria or other regions in the state.

Most of the VISS hospitals phased out this type of injury data collection in the emergency departments, after collecting for time periods ranging from 12 months to 5 years. The exception is the Latrobe Regional Hospital (Moe and Traralgon) which began collecting all

age all injury data in 1991 and which still has a functioning system. This first generation injury surveillance is currently being replaced by routine electronic surveillance in a number of Victorian hospital emergency departments (see Section 2.5).

2.1.4 Extended Latrobe Valley Injury Surveillance

The Extended Latrobe Valley Injury Surveillance (ELVIS) database holds 12 months data on injury presentations to general practitioners in the Latrobe Valley. The collection commenced in November 1994. The data collection method is similar to that used for VISS, as is the range of information collected. The completion rate was approximately 77% of cases and more than 95% of general practitioners in the Latrobe Valley participated.

2.2 METHODS FOR THE IDENTIFICATION AND EXTRACTION OF DAIRY FARM INJURY

Identification of definite dairy farm injury cases is possible in three of these databases, the exception is VIMD. Identification is generally a two step process, using a combination of two variables to define a dairy farm injury subset (Table 2.2).

In the case of VIMD, there is no selection strategy which will allow the identification of definite dairy farm injury cases. The location variable is missing or unspecified in more than 80% of cases, making selection by location an unreliable method. The best available strategy is to select all injury cases where the post code of residence falls in a local government area known to be dairy intensive. However, this will define a subset of injury cases which, in addition to including dairy farm injury, includes injury occurring on public roads, in schools, in homes, and other non farm locations.

Table 2.2: Identification of dairy farm specific injury cases in Victorian health system databases

Database	First step	Second step
Victorian Coroners' Database	<ul style="list-style-type: none"> extract farm injury cases using location variable 	<ul style="list-style-type: none"> search for dairy farm cases using narrative text search for "dairy", "cowshed", "milk"
Victorian Inpatient Minimum Dataset	<ul style="list-style-type: none"> identify dairy intensive local government areas in Victoria 	<ul style="list-style-type: none"> extract injury cases occurring to those living in the dairy intensive local government areas
Victorian Injury Surveillance System	<ul style="list-style-type: none"> extract farm injury cases using location variable 	<ul style="list-style-type: none"> search for dairy farm cases using narrative text search for "dairy", "cowshed", "milk"
Extended Latrobe Valley Injury Surveillance	<ul style="list-style-type: none"> extract farm injury cases using location variable 	<ul style="list-style-type: none"> search for dairy farm cases using narrative text search for "dairy", "cowshed", "milk"

2.3 MONITORING TRENDS IN CURRENT DATABASES

Trends in fatal dairy farm injury can be monitored satisfactorily in the Victorian Coroners' database. However, due to the relatively small numbers of deaths, trends are difficult to define. Trends in non fatal dairy farm injury can only be monitored satisfactorily in the Latrobe Regional Hospital collection from VISS.

2.4 OTHER SOURCES OF DATA

The Victorian WorkCover Authority and the Health and Safety Organisation (HSO), Victoria both hold databases relating to occupational injury. However, the WorkCover database only includes those cases for which a claim is made, thereby capturing only a specific sub-group of all dairy farm injury. This limits the usefulness of the data. The Health and Safety Organisation receives notification of all farm injury deaths, under legislation, and most serious farm injuries. The HSO database is, therefore, another source of information of all farm injury deaths. Dairy farm injury can be identified in the WorkCover data by an industry specific code. However, there appears to be no reliable or consistent means of readily identifying dairy farm specific cases in the HSO database.

2.5 FUTURE DEVELOPMENTS

Victorian injury databases cover different levels of severity or capture particular sub-groups of farm injury. Definite dairy farm injury fatalities can be identified in the Victorian Coroners database. Non-fatal cases can be identified in the Latrobe Valley Hospital emergency department collection (part of the Victorian Injury Surveillance System) and the general practice collection (Extended Latrobe Valley Injury Surveillance). Case identification is also possible in data collected by WorkCover and the Health and Safety Organisation, Victoria. In future, dairy farm injury cases will also be identifiable in the Victorian Hospital Emergency Minimum Database when that data becomes available (discussed below) to the extent that hospitals from dairying areas participate in this collection.

The identification of dairy farm injuries generally relies on the recording of the specific location of the injury (farm and type of farm) from patients at some point of contact. Currently, in some of the data collections mentioned above, this information is not collected systematically.

Although there is sufficient data available to establish a broad picture of dairy farm injury (see Chapter 3), the extent of coverage of this injury type is less than ideal, particularly for non fatal injury.

It is encouraging, therefore, that an important development in the routine collection of non fatal injury presenting to hospital emergency departments is currently taking place in Victoria. The Victorian Department of Health and Community Services is establishing an emergency department database (Victorian Emergency Minimum Database-VEMD), which will hold information on emergency department presentations to 25 public hospitals throughout Victoria. The primary purpose of the collection is to improve the treatment of illness and injury and to prevent its occurrence.

Under a contractual agreement with the Department, most major Victorian public hospitals are computerising the emergency department in order to provide data to VEMD. A component of this agreement is that the hospitals will collect data on all injury presentations to the emergency department. This injury data will be collated and made available for injury research and prevention purposes. There are a number of regional hospitals participating in this collection.

The minimum level of data required for VEMD will conform to the National Minimum Dataset (Injury Surveillance) Level 1, and thus will allow the identification of farm injury on the basis of the location code, which will be collected for all cases. Cases of dairy farm injury would then be selected in a similar way to that described for the Victorian Injury Surveillance System in Table 2.2.

In some hospitals where there is a higher level of interest in injury data, the recommendations for Level 2 of the National Minimum Dataset may be followed. The specifications for Level 2 are currently being finalised and there is a possibility that an extended location code will be used to identify commodity group as well as more detailed codes for identifying the farming activity and agent of injury (National Injury Surveillance Unit, 1995).

However, given that the specifications for Level 2 will be designed to deal with injury surveillance across a range of settings, it is unlikely that it will provide the level of detail recommended in the Farm Injury Optimal Dataset developed by the Australian Agricultural Health Unit specifically for farm injury surveillance (Coleman, 1995).

The incorporation of the codes from this dataset into emergency department surveillance software, and their routine application, would greatly enhance the utility of VEMD for farm injury surveillance and prevention. Modification to the data collection method would also be required to ensure that all farm injury cases and the relevant commodity group are identified.

The VEMD has the potential to provide a good source of farm injury data for selected locations throughout Victoria. Most data will be to the minimum standard, providing some information on the circumstances of injury occurrence and causes of injury. Since a proportion of patients presenting to emergency departments are ultimately admitted to hospital, information on farm injury in VEMD will be more detailed and readily accessible than that currently in the Victorian Inpatient Minimum Database.

3.0 DAIRY FARM INJURY PROFILE

3.1 LITERATURE REVIEW

3.1.1 International literature

There were only a few studies in the international literature that reported specifically on dairy farm injuries. A one-year study of dairy and beef farms in Eastern Ontario, Canada, reported significantly higher rates of injury for farm owner-operators, males, and farm owners in the age groups less than 30 and greater than 70 years (Brison and Pickett, 1991).

A one-year study in Vermont, USA, where the primary agricultural industry is dairying, reported that at least one third of the dairy injuries involved contact with cattle. More than half of these (59%) occurred when cattle kicked, butted or stepped on the injured person (Waller, 1992). Injuries not associated with cows covered a broad range including those occurring as a result of contact with chemicals, during equipment repair or use, and those associated with tractor use.

A two-year study of dairy farms in New York state, USA, also found that owner operators had the highest injury rate, even when corrected for hours spent on the job. The dairy itself was the most common location of injury. Animals were the causative factor in 37% of cases, followed by machinery (35%). The level of individual workload, measured by the ratios of workers to milking cows and workers to acres under tillage, was found to be a significant risk factor for injury. It was calculated that a worker on a dairy farm has a 1 in 8 chance of being injured each year on the job. Four or more days of disability were found for 20% of the injuries. (Pratt et al., 1992)

3.1.2 Australian literature

Studies of farm-related injury are appearing more frequently in the Australian literature, and a general profile of farm injury in Australia is developing. Studies which provide specific information relating to dairy farms have been relatively small and conducted in confined areas.

A recent comprehensive survey conducted in Queensland reported health and safety profiles for six major commodity groups (Ferguson 1994). One of these was meat cattle and other animal, a category which included milk cattle. As most of the results presented for this category were aggregated, there was little information specific to dairying. The majority of injuries (78%) reported for this commodity group occurred in association with meat cattle only.

The annual acute injury and illness rate for the milk cattle industry in the Queensland survey was 21.6 per 100 farms, lower than that for meat cattle and pigs. The total annual cost of acute injury and illness for the milk cattle industry was \$34,707 per 100 farms. Levels of chronic back pain in milk cattle industry were reported at 27 people per 100 farms per year (Ferguson, 1994).

An earlier survey in New South Wales reported more specific information relating to injury among dairy farmers (Bath et al., 1985). This was a non-random survey in which 63 dairy farmers participated; the response rate was 90%. An annual injury rate of 17 injuries per 100

farmers was recorded. The most common causes of injury were animal handling (30%), heavy lifting (12%), trips and stumbles (8%), and motorbikes (6%). Injuries to the hand accounted for 25% of reported injuries, followed by the back (22%) and the lower limb (21%). The nature of injuries reported included strain (21%, all of the back), cuts (21%), bruising (17%), and fractures (13%). In a more recent New South Wales survey of dairy farmers (N=138, 31% response rate), 57% of respondents reported back problems related to dairying (Fuller and Lower, 1994).

A survey conducted in 1994 among all branches of the United Dairyfarmers of Victoria resulted in 64 completed questionnaires (United Dairyfarmers of Victoria, 1994). Back injuries were the most common type of injury reported (80% of responses), resulting mainly from lifting. However, this response may have been partly influenced by the questionnaire design which provided two specific choices of response, back injury and other injury, with a section to describe the cause.

The most common cause of the last serious accident on responding farms was motorbikes (36%), followed by farming implements (27%) and livestock (11%). Tractors were a relatively infrequent cause of injury in this survey, but they caused the most severe injuries, including one fatality. An interesting finding was that the answers to questions about potential causes of injury were not always consistent with the injury experience of the respondents. Motorcycles, which were the leading cause of the serious injuries reported, were listed infrequently by farmers as a potential cause of injury.

Workers' compensation data for the dairy industry from Queensland and New South Wales indicate that falls were the most common cause of reported injury (41.1%). The hands and fingers, followed by the back, were the most common body parts injured (20.4% and 12.6% respectively) (Coleman, 1995).

A recent profile of dairy farm injury reported to hospital emergency departments (Coleman, 1995) showed a predominance of males and that the peak age groups for injury were 10-19 and 50-59 years. The dairy was the most common location, milking the most common activity, and cattle the most common agent of injury. Lacerations were the most common injury and the eye and hand/finger were the body parts most frequently injured. Only limited conclusions can be drawn from this profile as the number of cases was small (18).

Despite the limitations of the Australian studies conducted to date (ie., small numbers, confined areas, and variable data reliability), some common findings emerge (Table 3.1). For acute injury in the dairy industry, animals and motorbikes are common agents of injury, while hands and backs are the most frequently injured body part. Lacerations are a common injury. Dairy farmers, through self-report, suffer both acute and chronic back pain, associated with lifting and straining.

Table 3.1: Summary of dairy farm injury studies

Reference	Study location	Injury causes	Body parts	Injury rates	At risk groups
Brison and Pickett, 1991	Eastern Ontario Canada				owner operators males owners <30 yrs, owners >70 yrs
Waller, 1992	Vermont USA	<ul style="list-style-type: none"> • cattle (33%) • chemicals • equipment • tractors 			
Pratt et al., 1992	New York USA	<ul style="list-style-type: none"> • animals (37%) • machinery (35%) 			owner operators risk increased as workload increased
Bath et al., 1985	New South Wales Australia	<ul style="list-style-type: none"> • animal handling (30%) • heavy lifting (12%) • trips (8%) • motorbikes (6%) 	<ul style="list-style-type: none"> • hand (25%) • back (22%) • lower limb (21%) 	<ul style="list-style-type: none"> • 17/100 farmers/year 	
Ferguson, 1994	Queensland Australia			<ul style="list-style-type: none"> • 22/100 farms/year • chronic back pain 27/100 farms/year 	
United Dairyfarmers Victoria, 1994	Victoria Australia	<ul style="list-style-type: none"> • motorbikes (36%) • implements (27%) • livestock (11%) 	<ul style="list-style-type: none"> • back (80%) 		
Coleman, 1995	New South Wales and Victoria, Australia	<ul style="list-style-type: none"> • cattle (39%) • dairy plant (22%) 	<ul style="list-style-type: none"> • hand (inc fingers) (3%) • eye (3%) 		
Coleman, 1995	New South Wales, Australia	<ul style="list-style-type: none"> • falls (41%) • hit by moving object (21%) 			
Coleman, 1995	Queensland, Australia		<ul style="list-style-type: none"> • hand (inc fingers) (20%) • back (13%) 		

3.2 DAIRY FARM INJURIES IN VICTORIA

3.2.1 Fatal injuries

The Victorian Coroners' Database holds information in electronic form on all injury deaths which occurred in Victoria during the three year period 1989/90-91/92. There were 45 cases where the death was recorded to have occurred on a farm, six of which occurred in dairying intensive areas of Victoria. One of these, a gyrocopter crash, is unlikely to have been associated with dairy farming, and is excluded from the following discussion. More details on this database and selection methods are found in Chapter 2. Cause of death was determined from the text description in each case.

Three of the deaths occurred in 1989/90, and one each subsequent years (a total of 5 deaths). Four of the deaths were males. Four of the deaths were of children aged six years and under and one death was of an adult 75 years of age.

Two children drowned in dams. The other two child deaths were caused by being run over by vehicle trailers, one after falling off the trailer while climbing and the other after running around the rear of the vehicle and into the trailer. The adult death was caused by a tractor roll-over.

3.2.2 Non fatal injuries

3.2.2.1 Emergency Department presentations

The National Injury Surveillance Unit (NISU) holds a database of emergency department presentations collected by a non-random sample of hospitals, which serve predominantly urban populations, in a number of states in Australia. The data is collected using a questionnaire completed by each patient presenting with an injury. Information is collected on the location of the injury incident, circumstances leading to the incident, factors associated with the injury, and demographic characteristics. The attending doctor then completes a section relating to the nature of the injury and treatment. This national data collection was used to identify dairy specific injuries, in addition to the state based Victorian Injury Surveillance System (VISS), to obtain a larger sample size. Further details about VISS may be found in Chapter 2.

Dairy farm specific cases were extracted from this database by firstly selecting all cases where the location was recorded as farm. A search for records containing the text "dairy", "cowshed", or "milk" produced 113 cases. This is a sample only and does not reflect the number of cases Australia-wide. The major contributing states were Tasmania (30%), Victoria (30%) and New South Wales (25%). Thirty-four of the 113 cases were collected in Victoria, through VISS. The majority of these were recorded after July 1991 by the Latrobe Regional Hospital (Moe and Traralgon), which is the only regional collection of injury data within VISS.

Data relating to these national dairy farm specific cases were provided in an electronic form to Monash University Accident Research Centre (MUARC), where the cases were further coded on the variables external cause of injury, place of injury, agricultural context and agricultural agent of injury according to the Farm Injury Optimal Dataset developed by the

Australian Agricultural Health Unit (Coleman, 1994). Analysis was conducted using the frequency and cross tabulation functions of SPSS-X (Version 4.1).

Age/sex distribution: There was a broad peak in the age distribution between 20 and 39 years of age (Figure 3.1). Males predominated with an overall male : female ratio of 2.9. This ratio was highest in the 15-19 years group (9.0) and lowest in the 40-49 years group (0.89), the only age group in which the ratio was less than 1. When compared to the industry age profile, under 20 year olds and 31-40 year olds were over represented in emergency department presentations, while 41-50, 51-60 and over 60 year olds were under represented.

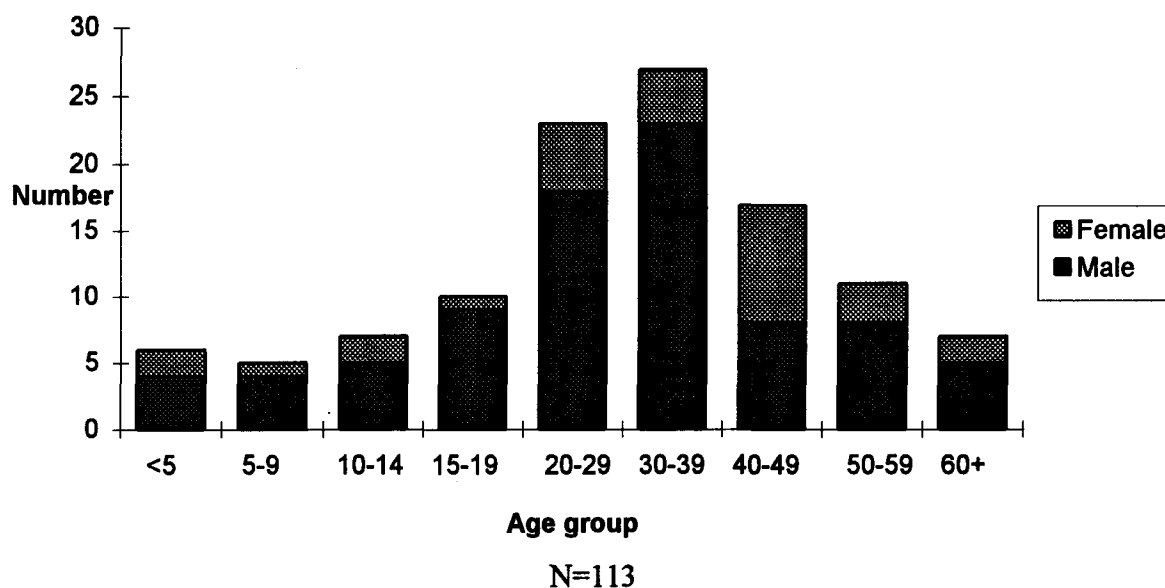


Figure 3.1: Age and sex distribution, dairy farm injuries
Data source: National Injury Surveillance Unit, 1995

Causes of injury: The most common external cause was animal related, with more than one third of cases (43) being in this category (Table 3.2).

Location of injury: The most common locations of injury incidents were the dairy (70 cases), stockyards (8) or other animal shed (6), with the most common contexts being milking (51), maintenance (11), playing (11), herding (6), and transport (5).

Table 3.2 External cause of injury, dairy farm injuries

External cause	Children <15 yrs		Adults > 15 yrs		Total	
	N	%	N	%	N	%
animal	4	22	39	41	43	38
hot water	3	17	9	9	12	11
fall from < 1 metre	3	17	6	6	9	8
motorcycle	2	3	6	6	8	7
cutting/piercing object	-	-	8	8	8	7
other	6	33	27	28	33	29
Total	18		95		113	

Data source: National Injury Surveillance Unit, 1995

Specific agents of injury: The agent of injury by major category of agent is shown in Figure 3.2. The most common specific agents of injury were cattle (37), followed by dairy plant (14), hot water (12), and gates (9).

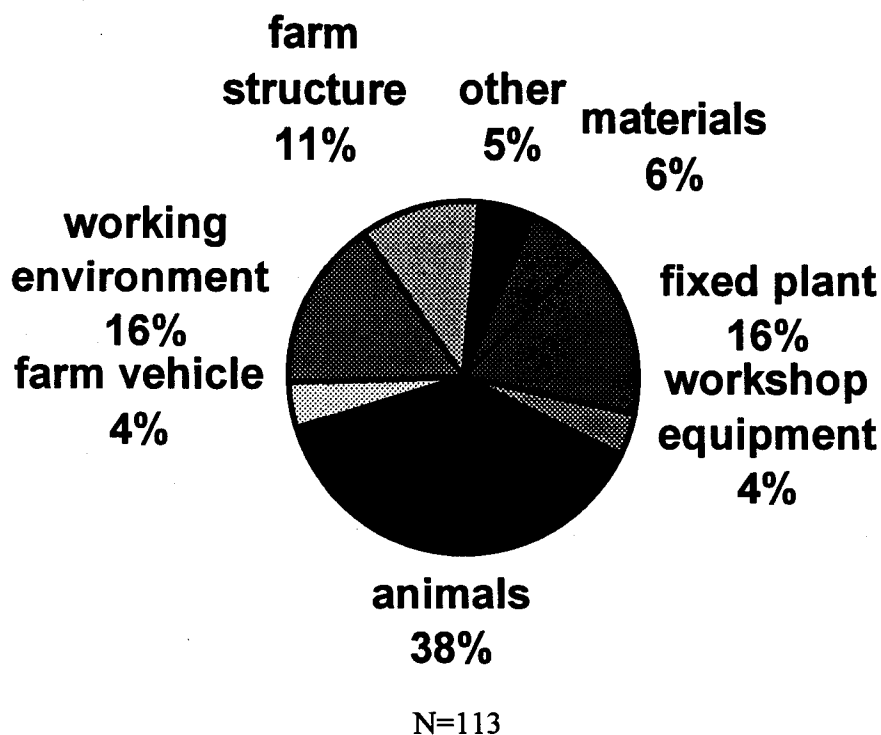


Figure 3.2: Agent of injury, dairy farm injuries

Data source: National Injury Surveillance Unit, 1995

Cattle were the actual agent of injury in 37 cases, but were involved in the injurious event in an additional 8 cases. Close to half of the incidents involving cattle were cases where the injured person was kicked (21 cases). Other ways that cattle were associated with injury included persons being caught between cattle and an object (9), stood on (7), or knocked by

cattle (3). The body part most frequently injured was the hand (21 injuries), half of which involved the fingers.

The most common items of dairy plant involved as an agent of injury were metal bars (4 cases), and bails (3). Cattle were involved in half of the cases in which dairy plant was the agent of injury (7). Falls from dairy plant were featured to a lesser extent (3).

Hot water was the agent of injury in 12 cases. Three cases were children who accidentally came into contact with hot water while in the dairy. The adult cases were all using hot water during cleaning. Three adults spilt or splashed hot water into their rubber boots, and two adults tripped while carrying buckets of hot water. The legs were the body part most frequently injured (8 injuries), particularly the lower leg (6 injuries). Anecdotal evidence suggests that hot water injuries are often associated with the use of plastic buckets with handles which break easily (T. Lower, personal communication).

Half of the motorcycle-related cases occurred when the driver hit an irregularity in the ground (4 cases). Two cases occurred when the rider either swerved to miss or ran into an electric fence, and an additional two occurred when a foreign body lodged in the rider's eye. Three motorcycle cases were under the age of 15.

The predominance of potentially contaminated metal items, such as wire, iron, nails and metal tools, as the agent of injury in the cutting/piercing cases highlights the importance of farmers having current tetanus immunisation.

Common injury scenarios can be found in Appendix A.

Nature of injury, treatment and referral: One hundred and thirty-three injuries were sustained by the 113 cases (up to three injuries can be recorded per case). The more frequent injuries were cuts, burns, fractures, and sprains (Table 3.3). The most common body parts injured were hands (35, of which 20 were fingers), eyes (14), and forearms (11). Sixty-five cases were treated and referred for at least one additional visit for medical care. Sixteen cases were admitted to hospital, giving an admission rate of 14%.

Table 3.3 Nature of injury, dairy farm injuries

Injury	Number	% cases
cuts	32	28
burns (first & second degree)	23	20
fractures	16	14
sprains	14	12
bruising	12	11
foreign bodies	8	7
crushing injuries	6	5

Data source: National Injury Surveillance Unit, 1995

Job status: Approximately equal proportions of injuries were reported to occur while at work and while not at work (51% and 49% respectively). Close to 8% of cases reported that workers' compensation would be claimed and 11% indicated that it would not be claimed. Workers' compensation status was unknown for the remainder of on-the-job injuries (32%).

Comparison of pattern of injury in children and adults: The patterns of injury occurrence for those under 15 years (18 cases) was similar to that described above. The same external causes and agents of injury were important for children (Table 3.1). Playing and helping with the milking were equally distributed as the leading contexts for children. However, the admission rate for children was considerably higher than the overall rate (55% compared with 14%). The reasons for the higher child admission rate could be that the children sustained more severe injuries and/or rural hospital admissions policies may differ for children and adults.

The patterns of injury occurrence for those over 15 years (95) was similar to the overall pattern. The admission rate for adults was considerably lower (6%).

Comparison of Victorian to national cases: The age and sex distributions of the Victorian cases was somewhat different to those of the national cases. The Victorian sample had a lower proportion of under 15 year olds, and, conversely, a higher proportion of over 15 year olds (mainly in the 15-19 year age group). The Victorian male : female ratio was 5.8 compared with the national ratio of 2.9. These differences could be due to either one or a combination of the following factors:

- different age and sex distributions of the Victorian and national dairying populations
- different practices and employment patterns between the two populations
- sampling variations particularly as a result of the small numbers of cases in the Victorian sample

Despite the age and sex differences, patterns of injury occurrence and injuries sustained among the Victorian cases was very similar to those among the national cases. There was, however, a lower proportion of hot water burn cases in the Victorian sample (6% compared with 11% in the national sample).

3.2.2.2 Hospitalisations

The most comprehensive source of hospitalisation injury data in Victoria is the Victorian Inpatient Minimum Database (VIMD) which holds information on all injury cases admitted to a public hospital in Victoria (see Chapter 2). There is provision in this database for the location of the injurious event to be recorded. Unfortunately, the location variable is specified in about 11% of cases. The result of this poor reporting rate is that any data obtained on the basis of location is not particularly reliable because of the potentially biased sample of cases. Furthermore, data extraction using the location variable is complicated.

An alternative approach using geographic identifiers to map dairy intensive areas of Victoria, as described in Chapter 2, has been used here. Injury cases where the postcode of residence matched those identified for dairy intensive local government areas (listed in Appendix B) were extracted for further analysis.

It should be noted that, while it was possible to exclude major towns which form an entire local government area, it was not possible to exclude all injuries occurring on non-farm locations in the dairy intensive areas. The pattern of injuries presented below, therefore, relates more to people who live outside major towns in the dairy intensive local government areas of Victoria, than specifically to those who live on dairy farms.

Analysis was conducted on seven years of VIMD data from public hospitals (July 1987-June 1994). Second or subsequent hospitalisations for the same injury were excluded, as previously described (Langlois et al, 1992). The subset of injuries from dairy intensive areas was analysed using SPSS-X to generate frequency distributions describing injury by major factors such as age, sex, external cause of injury and intent.

Over the seven years studied, there were a total of 31,463 cases of hospitalisations for acute injury among those who lived in the study area (excluding injuries of undetermined intent and health care related injury).

Males accounted for 61% of cases, giving a male : female ratio of 1.6. The peak frequency for injured males occurred in the 20-29 year age group, while for females it occurred in the 60 years and over age group. Eight percent of cases were under 15 years of age.

A small proportion of cases (7.5%) were due to intentional injuries, which were approximately equally divided between self-inflicted injuries and those inflicted by others. The remainder were due to unintentional injuries, the leading causes of which are shown in Table 3.3. The ranking shown here is similar to that previously documented for Victoria as a whole (Watt, 1995).

As shown in Table 3.4, falls, transport and hit/struck/crushed accounted for two-thirds of unintentional injuries.

Table 3.4: Causes of unintentional injury hospitalisations in dairy intensive local government areas, Victoria

Injury type	Percent
Falls	35.5
Transport	21.2
Hit/struck/crushed by object	10.8
Cutting/piercing	6.1
Natural/environmental causes	5.6
Poisoning	4.5
Fire/burns/scalds	2.9
Machinery	2.9
Choking	2.5
Near drowning	0.2
Other	7.8
Total	100%

Data source: Victorian Inpatient Minimum Database, 1987/88-1993/94

The leading cause of transport related injury was motor vehicle traffic (61% of transport related injury), followed by motor vehicle non-traffic (15%) and animals being ridden (12%), the vast majority of which would probably be horses.

An injury sustained by a kick or butt from, or trampling by, a cow would be coded as "other specified injury caused by animal". This category made up 26% of natural/environmental injuries.

Seventy percent of the poisoning cases were due to medicinal substances. Acute poisoning by agricultural and horticultural chemicals (excluding fertilisers) accounted for 6% of all unintentional poisoning cases.

Agricultural machinery accounted for 30% of all machinery related injury hospitalisations, followed by woodworking machinery (25%).

Dairy farm injury hospitalisations (national data)

In order to describe the causal pattern more specifically for dairy farm injury hospitalisations, admitted cases were extracted from the dairy farm injury dataset obtained from NISU and described in Section 3.2.2.1.

There were a total of 16 admissions in the dataset. Thirteen were male, giving a male : female ratio of 4.3:1. Ten cases were under 15 years of age.

Child injury cases (N=10)

Half of the children were in the 10-14 year age group and four were under 5 years. Three of the children fell either on the same level or from a low height, two were driving a motorcycle, and two were scalded. Four of the children were playing in or around the dairy, and three were helping with the milking. The actual agent of injury varied including gates or fences (3 cases), hot water (2), barbed wire, cattle, sodium hydroxide, and a four wheeled vehicle (1 case each). Injuries included burns (7 injuries, including 1 third degree burn), fractures (5), concussion (1), and poisoning (1).

Adult injury cases (N=6)

Three adults were in the 40-49 year age group, and two were aged 18 years. Three of the injurious events were cow related, with a snake bite, a motor vehicle accident, and a scald accounting for the remainder. The injuries occurred in a range of contexts including animal handling (2 cases), milking (1), transport (1), and swimming (1). The agent of injury was a cow in three cases. Injuries included burns (2 injuries), fractures (2) and cuts (2).

3.2.2.3 Workers' compensation data

A total of 726 claims from the milk cattle industry were made to the Victorian WorkCover Authority from commencement in September 1985 to April 1995. During this period, the definition of a standard claim changed from more than 5 days lost work time or more than \$378 (pre 1 July 1993), to more than 10 days lost work time or more than \$378 (post 1 July 1993).

Eighty-seven percent of cases were males. Thirty-six percent were aged 20-29 years and 23% were under 19 years. Common causes of the injurious event are shown in Figure 3.3.

Sprains and strains accounted for 30% of claims and fractures accounted for 23%. The most commonly injured body parts were hands (including fingers) (16%), the back (12%) and the knee (10%).

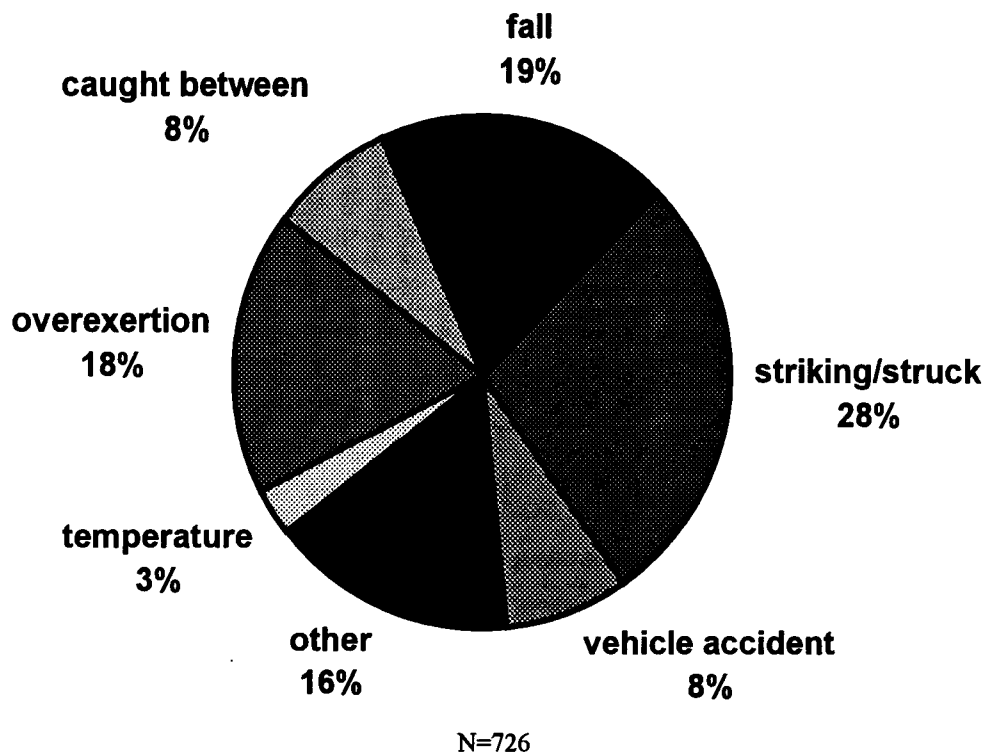


Figure 3.3: Cause of injury, milk cattle industry
Data source: Victorian WorkCover claims, 1985-1995

A total of \$5.9 million has been paid out for 48,386 days compensated, with an average of \$8726 per claim pre July 1993, and \$4966 per claim post July 1993. Nine percent of claims have required compensation payments of over \$20,000.

The pattern presented by Victorian workers' compensation data is similar in some respects to that of Queensland, where the most common body parts injured were also hands, the back and the knee in that order (Coleman, 1995). The predominate mechanism of injury in New South Wales workers' compensation data are falls, trips or slips (which together account for 41% of cases) which is different to the injury pattern in Victoria (Coleman, 1995). The average cost of a claim is similar in the three states.

Table 3.5 Summary of dairy farm injuries, 1995

	Deaths (Victorian)	Hospital admissions (National)	Emergency department presentations (National)	Workers' compensation data (Victorian)
Cause of injury event	vehicles dams tractors	animals hot water vehicle falls	animals hot water falls	striking/struck fall over exertion
Agent of injury	vehicles drowning tractors	cattle hot water gates/fences	cattle hot water dairy plant gates/fences	
Injuries		burns fractures	cuts burns fractures sprains	sprain/strain fractures
Body part injured		eyes forearms fingers upper legs upper arms	fingers hands eyes forearms	hands (inc fingers) back knee

Table 3.6: Dairy farm injury hazards

Hazard	Basis for priority	Vulnerable groups
dams	deaths	children < 5 yrs
vehicles (especially with trailer)	deaths	children < 5 yrs
tractors	deaths	adults and children
cattle	hospital admission emergency department presentations UDV and NSW survey	adults and children
hot water	hospital admission emergency department presentations	adults and children
motorcycles	hospital admissions emergency department presentations UDV and NSW survey	adults and adolescents
lifting	workers' compensation data UDV and NSW survey	male adults
unsatisfactory dairy design	workers' compensation data UDV and NSW survey	adults

4.0 DISCUSSION AND CONCLUSIONS

In the absence of a comprehensive database dealing with dairy farm injuries, this study has used information from a number of databases in which it was possible to identify dairy farm specific injuries. These databases differ in terms of the aspect of dairy farm injury captured and the geographical areas covered.

These variations result in different biases operating when data from the databases are analysed. For example, the emergency department data is biased in respect to the aspects captured, the geographical areas covered and the selection criteria which were used to identify dairy farm specific injuries. It is highly likely that other dairy farm injuries have been captured in the emergency department data but can not be identified as such. The hospital admissions data from VIMD provided an injury profile for those living in dairy intensive local government areas, rather than a profile of dairy farm injury. The WorkCover data, while covering Victoria, only captures notified injuries, which are not necessarily representative of all dairy farm injuries. An additional problem with the available data is the relatively small numbers of specific dairy farm cases in most of the databases. Notwithstanding these deficiencies, the available data provides a useful starting point for the development of an industry specific injury profile.

Common themes which arise from the study of the international literature on dairy farm injuries and the data analyses presented here are the predominance of males amongst the injury cases, and the prominence of cattle as either the actual agent of injury or an associated factor.

The farm hazards involved in fatal Victorian dairy farm injuries - vehicles, dams and tractors - are also the most common hazards associated with unintentional deaths on farms in general (Clarke, 1993). Management of these hazards should receive priority on dairy farms, as on other farms.

There were some differences in the pattern of injury on dairy farms compared to the pattern reported by Clarke (1993) for farms in general. When compared to farms in general, cattle and hot water were more prominent causes of hospital admission for dairy farms, while animals being ridden, motorcycles, and machinery were less prominent causes. For emergency department presentations, cattle, dairy plant and hot water appear more important causes of injury on dairy farms and motorcycles and machinery appear to be less important. It is interesting to note that back injuries mainly featured in retrospective surveys reported in the literature and in the WorkCover data.

It would appear from this initial study that the hazards for the dairying industry to address are **dams, vehicles and tractors** for fatal injury and **cattle, hot water and motorcycles** for non fatal injury (Table 3.6). Back injury also appears to be a chronic injury issue, although the hazards are a little more difficult to define from the data presented here.

These findings should be regarded as preliminary because of the limitations of the databases outlined above. The fatality and serious injury data of the Victorian Health and Safety Organisation and hospitalisation data of the VIMD are important additional sources of data, provided a suitable method of identifying dairy farm injury cases can be developed.

5.0 RECOMMENDATIONS

To reduce hazards which are associated with injury on dairy farms:

- reduce opportunities for cattle contact by improving either the design of the dairy or cattle handling practices
- develop and implement safe practices and improve the design of the dairy for the safer handling of hot water
- design boots to protect from hot water splashes and spills
- investigate the circumstances in which frequent injuries, such as hand injuries, occur to determine whether a generic countermeasure such as some form of hand protection might be applicable.
- reduce injuries to children as they are over-represented in deaths and serious injuries in the available data

This study only dealt with dairy farm injury and was not extended to include other occupational health issues relevant to dairy farmers such as zoonoses, chronic exposure to chemicals and sun exposure. Such issues should also be considered when devising an occupational health and safety strategy for the industry.

To improve injury data to inform prevention programs and evaluations:

- Liaise with the State Coroner to ensure identification of farm type in the Coroner's database.
- Explore the potential for identification of farm type in the Health and Safety Organisation's fatality and serious injury database.
- Incorporate the National Minimum Dataset (Injury Surveillance) Level 1, plus an extended location code for farms into the Victorian Inpatient Minimum Database, which must be completed in all injury cases. This would require systematically collecting this information from the patient before discharge. For hospitals participating in the Victorian Emergency Minimum Database, this could be achieved by linking that database with the Victorian Inpatient Minimum Database.
- Ensure that the coding framework for the National Minimum Dataset (Injury Surveillance) Level 2 includes the Farm Injury Optimal Dataset developed by the Australian Agricultural Health Unit.
- Encourage regional hospitals in Victoria to participate in Victorian Emergency Minimum Dataset and use the National Minimum Dataset (Injury Surveillance) Level 2, including the Farm Injury Optimal Dataset.
- Ensure that injury surveillance methods allow the identification of all farm injuries and the relevant commodity group.
- Explore the feasibility of compulsory notification of farm injury, including farm type, by all treating doctors in a similar fashion to infectious diseases.
- Incorporate a farm injury register sheet into the Managing Farm Safety Kit to facilitate self recording of farm injuries, including dairy farm injuries.
- Institute some incentives for farmers to collect injury data on their farms.

- Establish a system for the collection, validation and integration of injury data collected by farmers.

Given the patchy nature of current databases for dairy farm injury identification, a comprehensive survey of members of the United Dairyfarmers of Victoria should be seriously considered. The purpose would be to determine the pattern of injuries experienced on dairy farms, to establish a baseline of injury occurrence against which the success of the health and safety strategy could be measured and to investigate the current safety practices used and equipment available on dairy farms. The survey would facilitate targeting of the farm safety strategy and provide a baseline to measure the impact of the actions taken. It is recommended that the survey method chosen should have the capacity to generate a high response rate from the members.

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APPENDIX A

Selected one line narratives, dairy farm injuries

Milking a cow in the shed. Kicked in the finger by the cow.

Milking cows and cow stood on wrist.

Milking cows and pushed into gate by a cow.

Helping with milking. Spilt hot water down rubber boot.

Helping Mum feed calves - fell back into bucket of 170F hot water.

On 4 wheeled farm bike. Hit bump. Lost control and fell into barbed wire fence.

Riding motorbike. Bug flew in eye.

Climbing over wet gate. Caught foot and fell.

Cleaning yard. Cut self on corrugated iron.

APPENDIX B

Dairy Intensive Local Government Areas of Victoria (based on pre-1994 LGA boundaries)

Shires of:

Pakenham
Otway
Hampden
Mortlake
Heywood
Swan Hill
East Loddon
Cobram
Nathalia
Rodney
Tungamah
Yackandandah
Tallangatta
Maffra
Buln Buln
Rosedale
Korumburra
Woorayl

Colac
Belfast
Heytesbury
Warrnambool
Kerang
Cohuna
Rochester
Deakin
Numurkah
Shepparton
Waranga
Oxley
Avon
Narracan Pt A & B
Alberton
Bass
South Gippsland

Rural City of Warragul

City of Morwell Pt A & B

